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ANALYSIS OF REGIONALIZATION OF A NUMBER OF REFERRAL PATIENTS' VISITS AND SATISFACTION OF THE NATIONAL HEALTH CARE INSURANCE AT THE PREFERRED FURTHER TREATMENT HEALTH CARE FACILITIES IN THE REGENCY OF BANTUL, INDONESIA

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Abstract- Regionalization policies and tiered referral systems are issued to meet the availability of health facilities facilities and satisfaction of National Health Care Insurance (JKN) participants. This study was conducted to determine the difference in the number of visits and the level of satisfaction before and after the referral regionalization policy enacted. This research type is quantitative research with *Cross Sectional Study* approach. This study used secondary data of JKN participants who came both in outpatient and inpatient at Bantul Regency Hospital. Data analysis using *paired t-test* paired test and *Analysis of variance (Anova).* Based on the *Test of Normality's output* that visit data and satisfaction are normally distributed. The research data were taken in 7 hospitals as they have complete data related to the number of advanced outpatient and in-patient outpatient visits and data of JKN participant satisfaction before and after the policy was enacted. Conclusions of this research the number of visits by JKN participant patients at Further Treatment Referral Medical Care Facilities (*Fasilitas Kesehatan Rujukan Tingkat Lanjutan* (FKRTL)) before and after the implementation of the policy shows a significant difference, statistically. The level of satisfaction of JKN participant patients at FKRTLs before and after the implementation of the policy between 2015 and 2016 does not show any statistically significant difference. The number of visits by JKN participant patients after the implementation of the policy does not show any statistically significant differences. The number of visits by JKN participant patients after the implementation of the policy shows that there is a stastistically significant difference.

Index Terms- National Health Insurance, Regionalization, Policy

I. INTRODUCTION

Health Care Services in Indonesia have now entered the era of funded health care via the National Managing Body of Social Security (*Badan Penyelenggara Jaminan Sosial* (BPJS) as the executive agency. The National Health Care Insurance (*Jaminan Kesehatan* Nasional (JKN)) has and Constitution Number 40 of 2004 on the National Social Security System (*Sistem Jaminan Sosial Nasional* (SJSN)) in order to achieve the entirely holistic health care [9].

One of the targets to be achieved in the development of JKN is the patients' satisfaction. In the current JKN Map, it is stated that at least 75% of the patients have expressed their satisfaction after being provided with the health care services by the health care facilities (*faskes*), in cooperation with BPJS in 2014, and the patient satisfaction index is expected to reach 85% in 2019 [9].

Based on the data provided by Regional Division VI of Health Care BPJS (*BPJS Kesehatan Divisi Regional VI*), it is recorded that as per June 30th, 2016 of the total number amounting to 2,664,906 JKN participants in the Special Province of Yogyakarta 727,077 (27.28%) were from the Bantul Regency, representing the Second Most JKN Participants, after the Minicipality of Yogyakarta (*Kotamadya Yogyakarta*) [4]. This certainly results in the needs for more health care facilities than there were previously, in order to serve the JKN participants.

The Health Office of the Special Province of Yogyakarta has issued Decree Number 441/7102/III dated Juli 21st, 2014 on the policy of regionalization and the ranked reference system to ensure the availability of the health care facilities and satisfaction of the JKN participants [15]. Based on the findings of the interviews with Health Care BPJS *(BPJS Kesehatan Kantor)* Yogyakarta Branch, the complaints expressed by the JKN visitors to the FKRTL of the Bantul Regency include the unfriendly attitudes, less informative services, long waiting lines, refusals of unregistered participants, and refusals of participants from outside the region of the Regency. The number of health care facilities (FKRTLs) in cooperation with Health Care BPJS (*BPJS Kesehatan*) in the Bantul Regency has increased since 2014, with only 10 facilities initially and there were 13 health care facilities plus 2 main clinics (*haemodailisa* and surgery) as per June 30th, 2016. The existence of favorite Health Care Facilities (FKRTL) in the Bantul Regency has led to excessive numbers of visitors/patients at certain Health Care Facilities

(FKRTLs). This shows that a new problem regarding the even distribution and the satisfaction of JKN patients.

Seven (7) Health Care Facilities (FKRTLs) in the Bantul Regency were taken as samples in this study and 30 respondents in each facility were inquired for their satisfaction at each Health Care Facility. This research was conducted in order to find out the level of the patients' satisfaction before and after the implementation of the patient referral regionalization policy (the policy).

II. METHODS

The method used in this study is the qualitative method using the *Cross Sectional Study approach*. The independent variables of this study of the patient referral regionalization policy conducted by the Office of Health of the Special Province of Yogyakarta (*Dinas Kesehatan Provinsi Daerah Istimewa Yogyakarta)* are the number of visits and the level of satisfaction of further treatment outpatients (RJTL) and futher treatment inpatients (RITL).

The data prior to the patient referral policy implementation is the data of the 2014 period and the data acquired after the implementation of the same plocy is taken from the 2015 and 2016 periods. The Analysis of the data has been made statistically in order to find the differences.

III. RESULTS

The following research data is provided in table 1

Table 1. Data Object of Research

	Name RS	Type RS	Class RS	Number of Visits				Satisfaction			
				RJTL		RITL		RJTL		RITL	
				2014	2015	2014	2015	2015	2016	2015	2016
1.	RSUD Bantul	D	B	116452	127895	12667	11761	73,41	73	74,49	79,85
2.	RS. Dr. S.Hardjo lukito	P	B	57503	79662	5030	7079	75,09	73,37	74,07	73,73
3.	RSK Paru Respira	P	C	926	2201	340	306	72,35	77	73,73	72,40
4.	RS. PKU Muham madiyah	S	C	34351	52893	5425	5689	74,72	74,20	73,17	72
5.	RS. Nur Hidayah	S	D	15740	21443	3258	3130	75,42	78,07	94,20	87
6.	RS. Rachma Husada	S	D	6637	7959	2404	2625	70,05	76,36	71,60	79,30
7.	RS. Santa Elisabeth	S	D	2798	3838	915	987	71,19	76	83,82	75,96

Seven (7) Health Care Facilities (FKRTLs) in the Bantul Regency were taken as samples in this study and 30 respondents in each facility were inquired for their satisfaction at each Health Care Facility

Table 2. Result *Paired t-test*

	RJTL visits		RJTL visits		RJTL Satisfaction		RITL Satisfaction	
	Mean	*P*	*Mean*	*P*	*Mean*	*P*	*Mean*	*P*
before	3.35		4.21					
after	4.23	0.038	4.48	0.462	-2.428	0.084	-2.088	0.082

Based on table 2, the significance of the result of the test of the number of RJTLvisits is 0.038, less than 0.05, which may be concluded that there is a significant difference between the number RJTL visits before and after the implementation of the patient referral policy. The significance of the number of RITL visits RITL is 0.462 greater than 0.05, and therefore this can be concluded that there is no significant different between the significance of the number of RITL patient visits befor and after the implementation of the policy.

The significance of the results of the RJTL visits is 0.084, being greater than 0.05, and it can be concluded that there is no significant difference between the level of RJTL s' satisfaction before and after the implementation of the policy. The mean difference indicates that the number of RJTL patients after the implementation of the policy is greater than that before the implementation of the policy. The significance of the resulted level of RITL patients' satisfaction is 0.082, being greater than 0.05, and therefore it can be concluded that there is a significant difference of the RITL patients before and after the implementation of the policy.

Table 3. *Analysis of Variances (Anova)*

	Type FKRTL		Class FKRTL	
	RJTL	**RITL**	**RJTL**	**RITL**
significant	0.110	0.128	0.037	0.085

Based on table 3, the results of the test indicates that th significance is 0.110, being greater than 0.05, and therefore it can be concluded that there is no mean difference between the number of RJTL patients and that the regular hospitals. Hospital Types D, P and S do not influence the number of RJTL being participants of the JKN. The results of the test indicates that the significance is 0.128, being greater than 0.05, and therefore it can be concluded that there is no mean difference of the number of RITL patients with that of the types of the Hospitals. Hospitals Types D, P and S do not influence the number of RITL patients being participants of JKN.

When the significance of the test result is 0.037, being smaller than 0.05, it can herefore be concluded that there is a mean difference in the number of RJTL patient visits as compared with that of the different hospital classes. Hospital Types B, C and D influence the number of visits of RJTL patients being participants of JKN. The significance found as the results of the test is 0.085, meaning greater than 0.05, and therefore it can be concluded that there is no mean difference between the number of visits by RITL patients and the different classes of the Hospitals. Class B, C and D hospitals do not influence the number of RITL patients being participants of JKN.

1. Visits of RJTL and RITL patients before and after the implementation of the policy

The results of the analysis for the number of visits of RJTL patients show that there is a difference in the number of JKN participants before and after the implementation of the policy. According to [23] the high number of the visits by futher treatment outpatients has been influenced by several factors. These factors include the avalibility of doctors at the Primary Level Health Care Facilities (FKTP), the availability of the medicine, health care facilities and, certainly, a lot more factors.

From the available data, it is known that the highest number of visits to FKRTL is at Panembahan Senopati Regional General Hospital (RSUD Panembahan Senopati) in Bantul and the lowest number is at RSK Paru Respira, all these hospitals are owned by the Government. The increase of the number of visits at RSUD Bantul are mostly caused by a number of factors, including the facilities available and the more flexible service hours. According to the observation results and the interviews conducted, it shows that RSUD Panembahan Senopati Bantul provides morning and afternoon policlinics that results in more JKN participant patients benefit from these servicess, in comparision to private hospitals providing/opening the same policlinics. Most of the outpatients require other facilities such as the chemist's (drugstore) and hospitalization and it is only natural to say that the outpatient unit is the showroom for the entire quality of a hospital [14].

[10] states that this increased number of visits in the adults' hospitals benefits more to the outpatients' unit because of the medical technology, patients' demands, safety, complication of the illnesses, effenciency, funds from the third party (insurance), the adjustment of these all will eventually influence the efficiency of outpatient services and the increased number of visits by outpatients. This condition shows that JKN has generated positive influences onto the communication system conducted prior to the referral of patients, that is, to maintain the continuity of the services as expected in the National Heatth Care Insurance (JKN) [14].

[21] points out the differences between urban and rural communities in accessing the halth care facilities. Two (2) main differences stand out between the two different communities, the status of health and the number of people accessing the health care services. This inconsistence shows that the comprehension of FKTP doctors of their role as a *gatekeeper* and their commitment to perform the role is still

insufficient and consequently they simply refer patients without considering the resulted impacts of the high ratio of the RJTP patients to the expenss incurred by health care services [19].

According to the data of visits (table 4), at Sardjito Hospital (RS Sardjito), which is the only Type A FKRTL, there is a tendency that the number of visits by outpatients has slightly increased and that of the hospitalized patients has decreased. This indicates that many diseases (cases of illness) suffered by JKN participants can be handled at Type B, C and D FKRTLs in the region of the Regency of Bantul.

Table 4. Number of Visits from JKN RS Sardjito participants

Kind of service	Number of Visits 2014	Number of Visits 2015
RJTL	151130	155880
RITL	19368	15357

Source: Data BPJS Health Branch Yogyakarta

According to [18] in his study, apart from the FKRTL facilities and amenities available, another factor having been associated with this situation is the transportation system.

The results of the analysis of the number of further treatment inpatients show that there is no difference between the numbers of visits by further treatment inpatients before and after the implementation of the policy diberlakukan. RSUD Bantul is ranked first in the number of visits by JKN participant inpatients, and RSK Paru Respira with the smallest number of visits by inpatients. Although some FKRTLs have undergone increases in the number of visits, others have undergone decreased numbers of visits. This situation is associated with the fact that the majority of people do not have sufficient knowledge about the National Health Care Insurance (JKN), and the definition, goals and the cannels of the JKN services. As a result, a lot of JKN participants not being in an emergency condition visit the Emergency Unit of an FKRTL for medication, while they should in fact visit an FKRTL for examination and medication, as the participants have been registered.

[10] in his study states that the increased number of inpatients is caused by the admission procedures serving as the selector of the requirements/criteria of the patients to be hospitalized, although such selection is not compatible with the actual condition. From the data, it is known that the number of visits of inpatients (hospitalized patients) being the participants of JKN has increased every month, which means that the problem is not yet solved. Results of the on-site observation indicate that the roles of the administrative officials are crucial in providing the services to inpatients as these officials function as the coordinator in admitting the patients. In performing the duties, these admission personnel must have clear working procedures in the form of Protap (permanent procedures) or SOP functioning as the guidelines for the selection (*filter*) feasible JKN patients to be referred to hospitalization at an FKRTL [12].

2. Satisfaction of RJTL and RITL patients after the implementation of the policy

Results of the analysys of JKN participant patients' satisfaction for their level of satisfaction indicate that there is no difference in the level of JKN participant patients' satisfaction before and after the implementation of the policy. This shows that the services provided to the JKN participant patients at the FKRTL are not maximal, for both further treatment outpatients and inpatients.

One of the indicators or measurements of the quality of the health care services in hospitals is the fulfillment of the patients or their families' expectations, so they may be able to get satisfaction [3]. The positive perceptions toward the service prosedures (registration) at the outpatient unit will eventually grow satisfaction, trust and hope on the part of the patients, on which they will further determine their attitude and subsequent behavior toward the services given by the hospitals. Polite gretings and words from the admission or registration officials or attendants at the hospital can make the patients feel that they are psychologically not suffering and may decide to come back for futher health examinations in this hosptal [17].

The patients' dissatisfaction with regard to the required emphaty at a FKRTL may be associated with the high number of visiting patients which lead to the inadequate attention to individual patients. Results of the study conducted by [20] and [23] indicate that there are positive corelations between the doctors' communication and the satisfaction of the outpatients. A good relationship will create mutual trust and respect, responsiveness and affection. Similar findings have been found in the study done by [22] which shows that there is a correlation between the comfort, information, access and competence of the serving officials and the satisfaction of the patients.

It can be concluded that the performance of the health care officials will determine the quality of the health care services because they are able to directly satisfy the patients. In addition, the patients' satisfaction is also influenced by reliability, assurance, humanity, responsiveness, tangible attitud*e*, accessibility, emphaty, fund sources, diagnoses and the characteristics of the patients [7]. Some studies conducted in 21 European countries are similar, in that the petients' level of satisfaction at private healt care facilities is lower than that of the health care facilities owned by the government because the petients receiving the services from a private health care facility tend to expect more satisfying services from the private provider [6]. Results of the analysis of the Survey of Aspects of Indonesian Household Life (*Survei Aspek Kehidupan Rumah Tangga Indonesia*) indicate that insurance police holders tend to prver private insurers or providers to the government-owned insurance companies because government-owned insurance companies do not provide the required level of satisfaction [11].

According to the DJSN roadmap, the achievement of JKN participant patients' satisfaction was expected to reach 75% 2014 and will achieve 85% in 2019. From the mean level of each FKRTL, varied levels of mean rate of satisfaction are found; some having achieved the targets and other have not.

3. Number of visits at FKRTL Types after the implementation of the policy

Results of the analysis of the different types of FKRTL with the number of patients' visits show that there is not difference in the number of visits by patients between the type of the FKRTL and the number of JKN participant patients' visits before and after the implementation of the policy.

Based on the data of patients' visits to hospitals, the Panembahan Senopati Regional General Hospital of Bantul (*Rumah Sakit Umum Daerah Panembahan Senopati Bantul)*, which is owned by the government, has received the most visits fron JKN patients.[16], states that this hospital is also the favorite FKRTL in the region of the Bantul Regency and its vicinity because it is located in the center of the town and it has the adequate facilities. [8] points out that the greatest obstacles in the implementation of JKN are financial problems, inadequate access to public health care, poor quality of the services and discrimination felt by the JKN participants accessing the health care services.

In general, the quality of both government-owned and private hospitals is affected by three (3) factors: First, the aspect of the structure which is visible in the physical conditions of the facilities, health care and non-health care personnel and the patients. Second, the process which includes the the condition of the inter-personal management, techniques and –the services at the hospital, reflected in both the medical and the non-medical actions or treatments to the patients. Third is the outcom*e*, which is visible in the professional appearance (the clinical aspect), efficiency and affectiveness, the safety and satisfaction of the patients (as the customers) [17].

From the on-site observation it is undeniably known that the number of FKRTL in each region is not properly equal. JKN participants' perpective being limited to the government-owned facilities serving this program may also have an effect. As the visits to government-owned health care facilities are in great quantities and the number of visits to private FKRTLs is still small although the facilities and amenities available at private FKRTLs may be of equal to those owned by the government. With better socialization by the Health BPJS and the increased number of private FKRTLs cooperating with the BPJS, it shows that the numbers of visits become more even, although not maximally even.

4. Number of visits at FKRTL Classes after the implementation of the policy

The analytical results show that there are different average numbers of visits with regard to the hospital classes. Class B, C and D hospitals do affect the number of visits by JKN paricipant patients after the policy has been implemented.

It is known from the existing data, that the JKN System has made the referral channel of social insurance policy holders from PPK I to PPK II become better. The referral for outgoing patients has been mostly made to the Central Hospital (RS Pusat), despite the fact that there are referral hospitals on the provincial level [14].

Based on the results of the data analysis, the number pf visits by outpatients and inpatients in respect of the classes of hospitals, Class D hospitals have undergone the highest increase as compared to Class B and Class Chospitals. The observation findings show that the FKRTLs in the Regency of Bantuk is classified as Type D and the deployment of such RKRTLs is not properly even, especially in the western and southern parts of the region of the Bantul Regency. [1] points out that many JKN participants do not feel that they receive a referral to an FKRTL of a higher type when they are referred to this FKRTL type. The expectation of the JKN participants when being referred to this type of FKRTL ends when the medication provided ends. According to [13], in his observation article, in practice the Health Care BPJS has repeatedly announced the importance of the compliance with the regionalization of patient referrals in order to avoid excessive numbers of patients in certain hospitals.

Based on the issues pointed out above, a referral system based on the topography and geographical areas must be developed so that the facilities available to provide health care services to the communities are accessible for them. The hospitals in the Bantul Regency can be divided into several areas so people who need health care services di not have to directly go to the Regional General Hospital of Bantul (RSUD Bantul).

IV. CONCLUSION

1. The number of visits by JKN participant patients at Further Treatment Referral Medical Care Facilities (*Fasilitas Kesehatan Rujukan Tingkat Lanjutan* (FKRTL)) before and after the implementation of the policy shows a significant difference, statistically.
2. The level of satisfaction of JKN participant patients at FKRTLs before and after the implementation of the policy between 2015 and 2016 does not show any statistically significant differences in 2015 and 2016.
3. The number of visits by JKN participant patients after the implementation of the policy does not show any statistically significant differences among the typer of the FKRTLs.
4. The number of visits by JKN participant patients after the implementation of the policy shows that there is a stastistically significant difference among the various classes of the FKRTLs.

IV.RECOMMENDATION

1. Suggestions for further studies

   As no hospitals in the FKRTLs located in the Regency of Bantul have been observed as samples for this study therefore further observations or researches with regard to the relations of the regionalization of patient referral system and its effects on the number of visits by the JKN paticipants patiens and their level of satisfaction at all the FKRTLs located in the Regency of Bantul are still required.

2. Suggestions for JKN providers.

   The findings of this study may be used as feedbacks and considerations to improve the quality of the health care services for FKRTLs and and for Health Care BPJS, as the JKN management.

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LAND USE EFFECTS ON SOME PHYSICO-CHEMICAL PROPERTIES OF ULTISOL AT NDUME–IBEKU, SOUTHEASTERN NIGERIA

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ABSTRACT

Improper land use causes soil degradation with its resultant negative effects on agricultural production. A study was conducted at Ndume-Ibeku, in southeastern Nigeria to ascertain the variability in some physico-chemical properties ofUltisol under four differentland use types. Theland use types were continuously cultivated land (CC), forest land (FL), 1-year grass fallowland (GL1) and oil palm plantation (OP). The layout was a randomized complete block design (RCBD). Stratified random sampling method was applied by partitioning each landuse into three segments according to differencesin topography. Soil samples were randomly collected at 0-15cm depth within each segment and bulked to obtain a composite sample. Hence, three composite samples were obtained from each land use representing three replicates, totaling 12 bulk soil samples from the four landuse types. Also, three replicate core samples were collected from each landuse, giving a total of 12 core samples from the four land use types.The samples were analyzed using standardlaboratory procedure. Data obtained were statistically analyzed using SPSS version 20 software.Across the land use types, the physico-chemical properties varied significantly ($P \leq 0.05$). FL had the best ratings for pH (5.60), total N (0.18g/kg), avail.P (45.07Mg/kg), Mg (2.87Cmol/kg), K (0.22Cmol/kg) and CEC (7.91Cmol/kg) while OP was the best in organic carbon (2.11g/kg), Ca (3.73Cmol/kg), exchangeable acidity (0.75Cmol/kg), and % BS (89.90%). The highest sand (857.00g/kg) and lowest clay (74.00g/kg) fractions were observed in FL while CC and GL1 hadthe highest clay (161.00g/kg) and lowest sand (750.00g/kg) fractions, respectively. The lowest bulk density (1.26Mg/m^3) and highest field capacity (21.24%) and available water content (12.16%) under OP reflected its highest OC (21.10g/kg). The very rapid K_{sat}(3.62cm/min) under CC suggested high permeability which was revealed in its low water retention (FC=9.96%, AWC=8.17%). It is therefore necessary to improve the organic matter status of the continuously cultivated land by mulching and manure application. Further use of heavy machineries on the land should be reduced or eliminated to avoid aggravating degraded conditions.

Keywords: Land use, Ultisol, particle size, hydraulic properties, exchange properties.

INTRODUCTION

The use to which a land is put greatly influences the physical, chemical as well as biological properties of the soil. Soil physical properties deteriorate with changes in land use especially from forest to arable. Cropping usually results in losses of soil organic matter and reduced soil aggregate stability, increased bulk density and compaction (Chisci and Zanchi, 1981). Intensity of landuse has influence on the microbial processes that lead to soil aggregation and structural stability (Gupta and Germida, 1988). Oguike and Mbagwu (2009) reported that changes in landuse, such as conversion of natural forest to cropland, contributed to land degradation that manifested in losses of soil organic matter and total nitrogen. Landuse greatly influences the soil reactivity, available phosphorus, exchangeable acidity (H^+ and Al^{3+}) and exchangeable bases (Mbagwu and Auerswald, 1999). Soils under conventional tillage practices become poorly structured and are easily eroded (Chisci and Zanchi, 1981).

Continuous cultivation results in increase in sand fraction and bulk density, reduced soil nutrient status and water retention capacity while increasing soil acidity as against bush fallow land (Malgwi and Abu, 2011). The world cultivated soils have lost 50 – 70% of their original carbon stock (Schwartz, 2014). Holland (2004), showed how effective land restoration through bush fallow and conservation tillage could be in sequestering carbonand slowing down climate change.

Intensive soil tillage due to continuous cultivation, increases soil aeration and changes the climate (temperature and moisture) of topsoil and thus, often accelerates soil organic matter decomposition rates and loss of nitrogen by volatilization and leaching (Balesdent*et al*., 2000). Reduced tillage is therefore considered a measure to sequester carbon in soils as it has proven to be effective in conserving soil organic matter at the top soil (Holland, 2004). Blaire *et al*. (2006) revealed, in a comparative study on grass and crop lands, that there was a significant difference in the amount of carbon stored in grassland than that in cropland under similar site conditions such as climate and topography. At Ndume-Ibeku near Umuahia, information on land use effects on soil properties is scarce. Such information will redirect conservation practices to be adopted by the farmers in the area.Therefore, the objective of this study was to ascertain the variability of selected physical and chemical properties ofUltisol under four different land use types.

MATERIALS AND METHODS

Study area

The study was conducted at Ndume-Ibeku, near Umuahia, southeastern Nigeria. The area lies within latitudes 5°29'N to 5°31'N and longitudes 7°30'E to 7°32'E with mean annual rainfallof 2200mm (NRCRI, 2007). The area is characterized by rainy and dry seasons. The rainy season starts from March and extends to October with bimodal peaks in July and September, and a short break in August. The dry season starts in November and lasts till February. The mean annual temperature is about 28°C (NRCRI, 2007). The landscape is flat to gently undulating. Coastal plain sand is the dominant parent material, although, there are localized regions of the area where the parent material is alluvium. The soil of the area is of the order "Ultisol" (Soil Survey Staff, 2010) and vegetation type is tropical rainforest. The common land use types in the area include bush fallow, oil palm plantation, grassland and arable farm land cultivated to cassava, maize, yam and vegetables in a mixed cropping system,

Land use types

The four landuse types studied included arable farmland under continuous cultivation (CC), oil palm plantation (OP), forest land (FL) and 1 - year grass fallow land (GF1). The forest land was secondary vegetation established for over 20years at the upper slope on the landscape. The 1-year grass fallow land, was at upper slope on another landscape,and previously ploughed, harrowed and ridged and then sown to cassava. The grass species was elephant grass (*Panicum maximum*).The oil palm plantation, established for over 20years was growing at the bottom slope on the landscape while the continuously cultivatedland at the mid slope was sown to cassava (*Manihotesculentus*), yam (*Dioscorea spp.*) and pumpkin (*Telferiaoccidentalis*). The soil fertility was managed by the application of both mineral (NPK) fertilizerand organic manure. Weed control was by the manual method of hoeing and hand picking.

Soil sampling and preparation

Topsoil samples (0-15cm)were collected from each landuse type using stratified random sampling method of partitioning each land use into three segments according to differences in topography. The soil sampleswere randomly collected from each segment and bulked to obtain a composite sample. Hence, three composite samples were obtained from each land use, representing three replications. A total of 12 composite sampleswere therefore collected from the four landuse types. Also, three replicate core samples were collected from each landuse type, totaling 12 from all four. The bulksamples were air-dried and passed through a 2mm mesh while the core samples were saturated in water for laboratory analyses.

Laboratory analyses

Particle size distribution was by the method outlined by Gee and Or(2002). Saturated hydraulic conductivity (K_{sat}) was by the constant head method ofKlute(1986) and was calculated using Darcy's equation as explained by Youngs (2001). Bulk density (Bd) was by method ofAnderson and Ingram (1993). Soil water retention atfield capacity (FC) and permanent wilting point (PWP) were determined by the estimation method outlined by Mbagwu (1991). Available water content was deduced from the difference between FC and PWP. Soil pH was by the method of McLean(1982). Total nitrogenwas determined by the micro Kjeldahl method (Bremner, 1996).Organic carbonwas determined by the dichromate oxidation procedure of Walkley and Black as modified by Nelson and Sommers (1982). Exchangeable Acidity was determined by the method of Mclean(1982).Exchangeable cations were by ammonium acetate (NH_4OAC) method of Tel and Hagarty(1984). Exchangeable calcium and magnesium were determined by titration while exchangeable sodium and potassium were determined using flame photometer. Available phosphorus was determined using Bray II method(Oslen and Sommers, 1984).Cation Exchange Capacity (CEC) was by the method of Rhoades (1982).Percentage base saturation (BS %) was calculated as the ratio of exchangeable bases to cation exchange capacity.

Statistics analysis

Theexperiment was laid out in a randomized complete block design (RCBD) with three replications in each landuse type. This gave a total of twelve (12) observational units. Data generatedwere subjected to analysis of variance (ANOVA) and treatment means were separated using Fisher least significant difference at 5% probability level ($LSD_{0.05}$).

RESULTS AND DISCUSSION

Soil physical properties

The sand fractions varied significantly ($P \leq 0.05$) across the land use types with the forest land (FL) having the highest value of 857.00g/kg (Table 1). The lowest value of 750.00g/kg was observed under GL, which was not significantly different from OP (756.00g/kg) and CC (752.00g/kg). The silt and clay fractions of the soils varied significantly ($P \leq 0.05$) across the land use types with the highest value of siltfraction observed under GL (133.00g/kg) while the lowest (69.0g/kg) was observed under FL. The highest value of clay fraction (161.00g/kg) was observed under CC and the lowest (74.00g/kg) was observedunder FL.

Table 1: Particle size distribution

Land use	Sand (g/Kg)	Silt (g/Kg)	Clay (g/Kg)	Texture
CC	752.00	87.00	161.00	SL
FL	857.00	69.00	74.00	LS
GL1	750.00	133.00	117.00	SL
OP	756.00	101.00	143.00	SL
LSD($_{0.05}$)	8.70	10.40	5.90	-

CC=continuously cultivated land; FL=forest land; GL1= one-year grass fallow land; OP= oil palm plantation

The relatively high sand and low clay fractions under FL were probably due to its position at the upper slope. In contrast, the relatively high clay content under CC and OP may be attributed to their position at the mid and bottom slopes on the landscape. This agreed with Ojanuga (2003) who reported that soils formed at the upper elevation on a landscape contained higher sand fraction and lower clay while soils at the lower elevation formed by the same parent material and on the same landscape contained higher clay due to the lateral translocation of clay particles from the higher elevation to the lower via erosional and depositional processes. However, the low sand fraction and relatively high clay and silt fractions under GL compared to FL that were on similar elevation may be attributed to the mechanical manipulation of the soil during the previous tillage operations. These tillage operations may have contributed to illuviation of silt and clay as well as sand fraction being crushed to silt and clay sizes due to abrasion thereby leaving little sand fraction at the surface (Nwite, 2015).

Bulk density (Bd), saturated hydraulic conductivity (K_{sat}), field capacity (FC), permanent wilting point (PWP) and available water content (AWC) varied significantly across the land use types although, K_{sat} was only significantly different between CC and GL and between FL and GL (Table 2). The highest value of K_{sat} (3.62cm/min) was observed under CC, while the lowest of 2.56cm/min was observed under GL. The K_{sat} of CC corresponded with its low Bd revealing minimum compaction, reminiscent of good structure. The highest value of Bd (1.55Mg/m^3) was observed under GL, which differed significantly ($P \leq 0.05$) from the other landuse types. The lowest (1.26Mg/m^3) was observed under OP, indicative of good structure with less compaction, reflecting the high organic carbon (OC) content (Table 3). The relatively low Bd and rapid K_{sat} observed under CC, compared to the other landuse types, were probably the result of the pulverization of the soil during

tillage operations leading to the loosening of the soil and development of macropores confirming the report of Nwite (2015). These values suggested high permeability which was reflected in the low moisture retention capacities (FC and AWC) under CC. Conversely, the relatively high Bd and slow K_{sat} observed under GL were attributable to the compaction of the soil as a result of traffic with heavy farm machineries during previous mechanized tillage operations, despite the somewhat high OM content. This concurred with Kutilek (2005) who reported that long use of machinery during tillage operation caused an irreversible soil compaction.

Table 2: Bulk density and hydraulic properties

Land use	Bd (Mg/m^3)	K_{sat} (cm/min)	FC (%)	PWP (%)	AWC (%)
CC	1.35	3.62	9.96	1.78	8.17
FL	1.41	3.38	20.90	8.86	12.04
GL1	1.55	2.56	15.28	5.23	10.05
OP	1.26	2.88	21.24	9.08	12.16
$LSD_{0.05}$	0.03	0.77	1.25	0.81	0.44

CC, FL, GL1, OP are as denoted in Table1 above

The soils varied significantly ($P \leq 0.05$) in their moisture retention characteristics. The highest values of 21.24%, 9.08% and 12.16% for field capacity (FC), permanent wilting point (PWP) and available water content (AWC), respectively, were observed under OP. These parameters varied significantly ($P \leq 0.05$) acrossthe landuse types. The lowest of 9.96%, 1.78% and 8.17% for FC, PWP and AWC, respectively, were recorded under CC, differing significantly from the other landuse types. The higher water retention characteristics of soil under OP may be related to its high clay fraction (Table 1) and OC content (Table 3) whose large charged surfaces attracted and retained the charged surfaces of water molecules. Under FL, with low clay fraction, the moisture retention characteristics were probably due to its relatively high OC content which may have improved the stability of the soil macro aggregates thereby providing large charged surfaces for the attraction and retention of water molecules (Malgwi and Abu, 2011).

pH, OC, total N, and avail. P

The pHvalues observed under the various land use types indicated moderate acidity (Table 3). The highest pH value of 5.6 observed under FL was significantly different ($P \leq 0.05$) from the other land use types except OP (pH 5.4). The lowest pH

value of 5.2 obtained under CC was significantly different from that under FL but not different from the other land use types. The acidity of the soils may be due to the nature of their parent material (coastal plain sands) as well as their highly weathered conditions. This observation corroboratedLekwa and Whiteside (1986) who reported that highly weathered soils of the coastal plain sands were acidic. However, the relatively higher acidity recorded at CC compared to the other land use types, was probably as a result of leaching of thecations possibly due to increased porosity of the soil induced by pulverization as a result of continuous tillage operations. This agreed with the report of Isirimah and Dickson (2003) who stated that the leaching of the exchangeable bases due to excessive drainage increased soil acidity. Also, the higher acidity under CC, compared to the other land use types, may be attributed to frequent plant uptake of thecations coupled with continuous crop harvesting (IITA, 1999). Conversely, the relatively lower acidity observed under FL and OP was possibly the result of reduced leaching ofcations as well as the fall and decay of plant residues which returned absorbedcations to the soil through mineralization of the added OC. This agreed with the report of Isirimah and Dickson (2003).

Table 3: Soil pH, totalN, OC and Avail. P

Landuse	**pH (H_2O)**	**TN (g/kg)**	**OC (g/kg)**	**Avail. P (Mg/kg)**
CC	5.20	1.20	13.50	32.97
FL	5.60	1.80	18.70	45.07
GL1	5.30	1.50	18.80	31.63
OP	5.40	1.50	21.10	39.63
LSD($P \leq 0.05$)	0.26	0.10	6.30	3.51

CC, FL, GL1, OP as indicated in Table 1

The highest value of OC (21.10g/kg) observed under OP was not significantly different ($P \leq 0.05$) from that of FL (18.70g/kg) and GL (18.8g/kg). The OC contents of the soils under FL, GL and OP were significantly different from that of CC. The very low concentration of organic carbon (OC) observed under CC was probably related to the increased oxidation of the soil organic matter (SOM) stimulated by increased disturbance of the soil by continuous and intensive tillage operations coupled with low vegetation cover that exposed the soil to intense heat of the sun. This observation was consistent with the report of Balesdent*et al.* (2000) who stated that soil aeration was increased by tillage while the climate of the topsoil, with respect to temperature and moisture, was altered leading to an increased rate of SOM decomposition. Low

turnover of residues to the soil due to frequent crop removal may have added to this effect. Contrarily, the highest concentration of OC recorded under OP may be attributed to the frequent return of biomass to the soil by the periodic slashing of the over - grown plants as well as the high ground cover contributed by the vegetation canopy of the palm fronds as well as reduced soil disturbance. This confirmed the finding of Holland (2004) that little or no disturbance to the soil was effective in conserving SOM at the topsoil and therefore served as a measure to sequester carbon in the soil.

The soils under the different landuse types were significantly different ($P \leq 0.05$) in total nitrogen (total N) content. The highest value of 1.80g/kg was observed under FL while the lowest value of 1.2g/kg was recorded under CC. The relatively very low value of total N observed under CC may be due to the volatilization of nitrogen resulting from increased oxidation of nitrogenous compounds in the soil. This may have been triggered by high exposure of the soil to air and increased temperature by frequent tillage operations. Also, the increased mobility of nitrogen caused by incessant pulverization of the soil possibly resulted to losses by leaching. Oguike and Mbagwu (2009) reported similar result, stating that continuous cultivation of soils caused a substantial loss of nitrogen due to increased volatilization and leaching effects. On the other hand, the relatively high value of total N observed under FL and OP may be due to the micro climate created by adequate vegetation cover which moderated the soil temperature, air and moisture against total N loss by volatilization. Due to the undisturbed state of the soils under FL and OP, there was a significant reduction in loss of total N through leaching. Similar observation was reported by Oguike and Mbagwu (2009).

The soils were significantly different ($P \leq 0.05$) in available P with the highest value of 45.07Mg/kg observed at FL. The lowest value of 31.63Mg/kg was observed under GL, and this varied significantly from the other land use types except CC (32.97Mg/kg). High concentration of avail.P under FL and OP compared to CC and GL1 was perhaps due to the reduced level of acidity under the later than under the former land use types indicated by low values of exchangeable Al.Ano (2004) had reported that Al formed mineral complex with avail. P in acid soils thereby leading to P – fixation with its resultant effect on P unavailability.

Exchange properties and percentage base saturation

Exchangeable Ca varied significantly ($P \leq 0.05$) across the land use types although, the concentrations under OP and FL were statistically similar. Table 4 revealed that the highest concentration was observed under OP while CC had the lowest concentration. With regard to exchangeable Mg, FL and OP were statistically similar but they significantly differed from CC and GL1. The highest concentration of exchangeable K was observed under FL followed by OP, GL1 and CC in the descending order. The highest concentration under FL (0.22Cmol/kg) was significantly different from those under GL1 and

CC but statistically similar to OP. The lowest concentration (0.06Cmol/kg) was observed under CC. Sodium (Na) concentration did not vary significantly across the land use types. It was highest under CC and GL1 with value of 0.23Cmol/kg while the lowest was recorded under OP (0.19Cmol/kg).The highest and lowest concentrations of exchangeable H^+ and Al^{3+} were observed under CC and OP, respectively. The values of these acidity properties indicated variation across the land use types. However, for exchangeable H^+ and Al^{3+}, CC and GL1 were statistically similar while significantly differing from OP. Cation exchange capacity (CEC) and percent base saturation (%BS) were statistically similar under FL and OP but significantly different from CC and GL1. The highest CEC was observed under FL (7.91Cmol/kg) while CC had the lowest (4.90Cmol/kg). The highest %BS was found under OP (89.90%) while the lowest was observed under CC (69.43%).

Table 4: Soil exchangeable properties and percentage base saturation

Land use	Ca	Mg	K	Na	EA	Ex. H	Ex. Al	CEC	BS (%)
	←			Cmol/kg				→	
CC	2.20	0.93	0.06	0.23	1.49	1.21	0.29	4.90	69.43
FL	3.67	2.87	0.22	0.20	0.95	0.87	0.08	7.91	87.93
GL1	2.93	1.87	0.13	0.23	1.31	1.07	0.23	6.46	79.77
OP	3.73	2.60	0.16	0.19	0.75	0.68	0.06	7.44	89.90
$LSD_{0.05}$	0.46	0.50	0.06	0.05	0.36	0.33	0.16	0.53	5.50

CC, FL, GL1 and OP as indicated in Table 1

The relatively low concentrations of thecations (Ca, Mg and K) under CC compared to the other land use types may be attributed to continuous crop uptake of these essential cations and low biomass turnover to the soil due to crop removal at harvest as well as increased leaching of these cations from the topsoil (Isirimah and Dickson, 2003). On the other hand, the relatively high concentrations of the essential cations under OP and FL may be related to high biomass returned to the soil via litter fall (IITA, 1999). The high OC content under OP and FL (Table 3) provided large surface area for the bonding of these cations against leaching (Isirimah and Dickson, 2003).

The relatively higher exchangeable acidity ($H^+$and Al^{3+}) under CC followed by GL1 was probably as a result of the low exchangeable cations under these land use types (Table 4). Potassium (K) and Mg may have been lost from GL1 by crop removal during previous harvest of cassava and other crops prior to the grass fallow. Continuously cultivated land (CC),

apart from loss of cations by crop removal, lost considerable amount of essential cations through leaching. These inferences corroborated the report of Yagodin (1984) who stated that reduced concentration of cations in the soil resulted in decreased soil pH which by extension induced an increase in exch. H^+ and Al^{3+} at the cation exchange site.

The low values of CEC and BS observed under CC and GL1 compared to OP and FL were as a result of their relatively low OC content. This observation was consistent with the findings of Nwadialo (1991) who reported a positive relationship between OC and CEC as well as OC and BS.

CONCLUSION

Significant differences were observed in the physical and chemical properties across the landuse types studied. Organic carbon (OC) was significantly higher under the oil palm plantation (OP) than the other landuse types. On the other hand, the continuously cultivated land (CC), compared to the other land use types, was significantly lower in OC content. Soils at the upper slope on the landscape were sandier than those at the lower slope. Pulverization of soil by tillage reduced the bulk density (Bd) while increasing water transmission capacity reflecting in the relatively rapid saturated hydraulic conductivity (K_{sat}). The use of heavy machineries in farm operations left the soil with high Bd even after a short period of fallow as observed under GL1 compared to the continuous use of simple farm tools on soils under CC. Continuous cultivation of soil depleted the fertility status of the soil by significant reductions in total nitrogen, avail. P, exchangeablecations, CEC and % BS while increasing the soil acidity. Conversely, forested lands (FL and OP) significantly improved the fertility of the soils and their water retention capacities.

In order to improve moisture retention, optimize soil physical properties and to enhance the fertility status of the continuously cultivated land, mulch and manure application should be adopted as a management option. The one year grass fallow land (GL1) requiredlonger fallow period for greater OM accumulation. Therefore, to reduce soil degradation, conservation practices are the option for sustainable environmental impact.

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Integrating a Virtual Learning Environment in to First year Accounting Course Units:

Determinants of Overall Student Perception

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Abstract - With the evolution of the digital era, internet and eLearning tools have become more popularized among educational institutes. Educators in all over the world increasingly combine e-learning tools with traditional learning to enable a blended learning environment.

The purpose of this study is to evaluate the pedagogical effectiveness of the Virtual Learning Environment - VLE (Learning Management System – LMS) by ascertaining how first year students use this to accounting course units, and identifying student perception of the VLE as a learning tool. To conduct the study, we develop a standard questionnaire and distributed among first year students in Sri Lanka.

The survey was based on the VLE of the department of accountancy (LMS) and investigated four research questions. The initial sample size was 105 students and 103 responses were collected. The questionnaire consisted with five main sections. Further, six main VLE resources were used to measure the total influence on overall perception of students on VLE. A comprehensive descriptive analysis was conducted to measure the Overall usage of VLE (LMS) by students, while multivariate analysis was undertaken to investigate the main influential factors of students' overall perception on VLE.

According to the findings, three variables were identified as main influential factors for the overall perception of students; namely Lecture Notes, Announcements and Online Quizzes. And further it was evident that the high amount of student involvement and satisfaction towards the VLE as an interactive learning tool.

Keywords: Virtual Learning Environment, Accounting, Student Perception, Blended Learning

I.INTRODUCTION

Numerous novel tools and products have been developed with the growth of the internet in the early 1990s, in order to exploit the full benefits of the internet. The education community software products labeled Virtual Learning Environment (VLEs) have appeared since mid-1990s, with the aim of supporting teaching and learning activities across the internet. As per [1] VLE is a web based software system developed to facilitate learning and teaching with the use of tools and activities. Further, VLEs, identified as online systems supporting interactions between and amongst students and instructors as well as access to resources and activities, have been held to provide a range of benefits in higher education.

VLE represents one way of improving undergraduates' education which can be upgraded and VLE lectures can be offered by individuals with a recognized depth of knowledge. Further, effective application of this technology can benefit the education of students in programs ranging from high schools to community colleges to universities. As per [2] the technology relieves the instructor from being primarily responsible for delivering core content and enables the instructor to

use the physical schoolroom for engaging students in advanced level seminar-style discussions.

The internet offers such potential benefits as flexible access and new ways of communicating and assessing for students and lecturers. However, for the instructor, producing internet resources that are stimulating, appealing, stress-free to use and academically sound but it is time consuming and requires considerable expertise. VLEs permit instructor to produce lecture materials quickly and without the necessity of developing technical skills.

Typically Web-based, VLEs offer a combined set of internet tools, permit stress-free upload of materials and suggest a constant appearance and impress that can be modified by the user. Widespread marketable VLEs presently being used include Learning Management Systems (LMS), Blackboard and WebCT. Such VLEs are being used largely to the enhancement or sustenance the existing programmes as differed to deliver comprehensive online courses. According to the [3] the traditional educational system which was designed to teach students is not matching to present learners as they are not the people the as they dependent on communication technologies for accessing information and for interacting with others.

The selected educational institute in Sri Lanka introduced LMS in to their teaching and learning process in 2007 and since then department applies the integrated teaching and learning mechanism for their undergraduates. It is evinced that the results of this integrated teaching mechanism is successful, however no study is conducted to evaluate the perception of undergraduates on the applied mechanism. Thus there is a vital need to evaluate the success of this methodology. Accordingly, the current study evaluates the pedagogical effectiveness of Department of Accountancy's VLE the LMS by ascertaining how first year students use this learning tool, and identifying student perception of the VLE as a learning tool.

Thus the main purpose of this study it to identify the level of perception of first year accountancy undergraduates on integrating LMS in to their teaching and learning process. First year undergraduates of department of accountancy were considered for data collection and methodology follows the survey methodology applying descriptive analysis and multivariate analysis techniques.

II. SYSTEM MODEL

The study was conducted at a Sri Lankan university, which provides Bachelor of Business Management (Special) Degree in Accountancy for four (04) years including the core subject areas of Accounting, Finance, Economics, Management, Mathematics and Information Technology. This study was conducted to identify the major determinants of overall student perception on LMS as the VLE of the department which was introduced in the year 2007.

All undergraduates enroll to the accountancy degree programme are also enroll to the LMS from their first year, since they have been taught the fundamental of information technology course unit for forty five hours in the first semester which initiates the students to be familiar with computer literacy, internet, email, online learning technologies and use of the learning management system. Hence, three hours practical sessions are conducted for two separate groups of fifty students, in each week during the semester in order to enhance technical knowledge while receiving the involvement on the LMS. These sessions are conducted by lecturers who are savvy with information technology skills in the mode of two way interactive sessions in which undergraduates are actively communicating to the lecturers, responding to the raised questions and concurrently developing the information technology skills.

Further department of accountancy already integrated first year accounting subjects with information technology in the courses of 'IT Applications in Business' in first year first semester and 'Computerized Accounting' course in first year second semester. Accordingly all undergraduates essentially work with LMS in completion of said courses. Academic staffs of the department of accountancy are keenly motivating undergraduates by facilitating them by providing lecture notes and additional readings, online quizzes of all course units through the LMS. Teaching programme of all courses are designed to facilitate through LMS. Hence, teaching, learning and assessment of all first year courses of department of accountancy are conducted through the LMS.

In supporting the LMS, department of accountancy, itself owned a separate computer lab other than the faculty computer lab, with fifty computers and two technical officers. Therefore, there are adequate physical resources and human resources to integrate the LMS for all the course units of the degree. All undergraduates acquire a significant knowledge on working with LMS in their first academic year and it supports them to work successfully

with the LMS throughout four years of university education.

Hence, this study aimed to assess the effectiveness of integrating a VLE (LMS) in to first year accounting courses of the department of accountancy in determining its usage as a learning tool. Further it was aimed to identify undergraduate's perception of VLE (LMS) as a learning tool.

Following research questions were developed based on the objectives of the study.

1. Do undergraduates use the VLE (LMS) in their accounting courses?
2. At what extent undergraduates use the resources offered through the VLE (LMS)?
3. What are main factors namely,– provision of lecture notes, discussion forums, online quizzes, self- tests, announcements and other tools- which affect the undergraduates' overall perception of the VLE (LMS)?
4. To what extent is the perception of the LMS (as a VLE) driven by a lack of pre-requisite computing skills and limited access to technology by undergraduates?

The article is organized as follows. Section 2 describes the previous research findings on applying VLE on student learning process. Section 3 suggests the research methodology of the study. Session 4 discusses the findings of the study, while section 5 summarizes the conclusions of this study.

III. PREVIOUS WORK

Empirical evidence proposes that the usage of a VLE has an influence on student accomplishments, inspires self-governing learning and rises students' inspiration to learn [1]. The effectiveness of delivering the core curriculum of an introductory neuroscience course using a software application mentioned to as a virtual learning interlace was tested by [2] using five lecturers of an introductory course, Topics in Neuroscience, were used as the basis for this study and covered the next part of a semester-long, two credit course. Forty (40) students enrolled in this study were divided randomly into two groups of equal size. For the first half of the study, single group of students was instructed using the VLE, and the other group was instructed using a conventional lecture format. The performance of students in a VLE have compared with that of students in a conventional lecture hall in which the same lecturer presented the same material. Results of the study designate that average scores on weekly examinations were 14 percentage points higher for students in the VLE compared with those for students in a conventional lecture hall setting.

A VLE represents one way in which undergraduate education can be improved. VLE lectures could be offered by individuals with a recognized depth of knowledge. Further, effective application of this technology can benefit the education of learners in programs ranging from high schools to community colleges to universities. This technology relieves the lecturer from being primarily responsible for delivering core content and enables him to use the physical classroom to engage learners in higher level seminar-style discussions.

Later, [4] tried to improve an experientially fastened perspective on the implications of e-learning through a case study, informed by work on the Social Shaping of Technology (SST) that emphasized organizational, cultural, economic and other factors inducing the procedure of technological modification and innovation. They gathered responses from 225 individuals during the period of January to March 2002 including technical staff, administrators, instructors, students and other actors. Data was collected using a web-based questionnaire, asking for information such as participants' use of e-Class and their overall usage of personal computers and the Internet and trough training sessions and e-Class courses, enabling more participant to observation of these events. Results of this research depicts that VLE was highly valued by many users and used innovatively by a few and VLE was limited to uses that primarily supported traditional patterns of classroom instruction.

Further, [5] investigated the impact of features of an off the shelf LMS in teaching undergraduate accounting standards. They have done a questionnaire survey and found that design features most satisfying for these international cohorts are designed features relating to usefulness of lecture notes, availability of lecture notes, the use of bulletin boards and discussion forums and other LMS tools are universalistic and are positively related to students evaluation. [6] examined the computer reinforced cooperative learning and protracted the work debating the usage of players in online education. For this study they examined 300 Master of Business Administration (MBA) students in both on campus and online program a Western university. The results of the study indicate that not only the team work orientation and group cohesiveness predict student learning but also with group cohesiveness facilitating the association between teamwork orientation and student learning.

Accordingly teamwork orientation and group cohesiveness appear to be equally important predictors of team source learning.

The study conducted by [7] reported the usage of blackboard as a tool for creating a virtual learning environment. Responses from accounting undergraduates in New Zealand were considered for data on the use of the VLE as a learning assistance. Findings of their research suggested that undergraduates have flexibly comprised the VLE and support its implementation by faculty members in other courses. However, undergraduates seem reluctant to vigorously contribute in two-way online activities which has consequences for faculty anticipating the implementation of a VLE in their courses. In terms of overall perception of their findings, it was found that the use of the VLE had been a worthwhile involvement and that the integration of computers into the learning process aided student learning, staff and students became more accessible to each other, and there was a high level of support for the use of the VLE in other courses. Their findings were consistent with previous research that supports new and novel teaching approaches as techniques for stimulating learning. [8] conducted a case study based research aiming to integrate the use of IT with the development and application of management accounting techniques. The experience of both students and staff are analyzed for a period of six years. They received positive student response over a number of years suggesting that adopting a teaching approach which clearly combine theory with its application in practice. Further they could conclude that the suggested method enhance the student learning involvement at an introductory level.

Further, [9] found that learning approach implemented by the student often had an impact on their opinion of certain learning features of the platform. In their research they tried to establish the experience of VLE for students appearing traditional face to face courses in the subject area of operations management and assess the experience of a VLE among students studying course in operations management. Findings of empirical studies emphasis the importance of applying VLE into student teaching and learning process which enhances the quality of delivery while enhancing student performances.

IV. PROPOSED METHODOLOGY

The research paper sought to evaluate the effectiveness of the VLE by ascertaining how undergraduates use VLE as a learning tool in the accounting related course units and, to identify the student perception on the VLE as a learning tool. A survey was conducted during the second semester of the academic year 2015/16, among the first year undergraduates of a Sri Lankan university.

With reference to the research carried by [10] and [6], the survey instrument, questionnaire was developed and tested accordingly from a framework used in their studies and adapted for the present study with minor modifications, to seek information to evaluate the pedagogical effectiveness of Department of Accountancy's Virtual Learning Environment - VLE (Learning Management System – LMS) by ascertaining how first year students use this learning tool, and identifying student perception of the VLE as a learning tool. This study measures student overall perception on integrating the VLE to their learning process and the usefulness of the VLE. The Questionnaire devised to this study consisted of five main sections:

1. Demographic Background
2. Adoption and Usage of LMS in Course Units
3. Students perceptions of the usefulness of LMS
4. Students overall perception on LMS
5. Students overall perception on LMS driven by computer literacy skills and access to technology

Students were asked to provide their demographic profile under the first part of the survey instrument. Then, Respondents were asked to evaluate the usefulness of the VLE for the provision of lecture notes, discussion forums, online quizzes, self- tests, announcements and other tools used by the first year accountancy students influence their overall perception of the LMS. In each section, five point Likert-scale questions were organized and the undergraduates were asked to respond on a scale of 1 to 5 (where 5=Strongly Agreed). Furthermore respondents were given the opportunity to make 'additional comments' at the conclusion of these questions.

The lecture notes sub section which include in the third main section contained 2 questions, which specifically sought information relating to the availability of notes and other 5 questions were designed to ascertain whether the availability of these notes detracted from undergraduates learning and participation in the course. Questions under the discussion forums were designed to identify whether dialogue with academic staff and peers assisted in the learning process. In the self-test section one question related to the usefulness of the self-test and other three questions asked about the usefulness of self-test questions in learning process.

Questions under the announcements were sought to identify whether students considered this to be an

effective technique for communicating with the whole class. Questions related to online-quizzes sought to identify the usefulness of it in the learning process. Other tools referred basically to the availability of adequate amount of special web links and availability of email contacts of lecturers. The final section of the questionnaire consisted with five likert scale type questions to measure the Students' perception on LMS driven by computer literacy skills and access to technology. Further this section comprises with two open ended questions to provide overall suggestions for future improvements.

The questionnaires were distributed and collected during a lecture period to ensure a high response rate among those attending. The questionnaires were only distributed in printed form to avoid bias towards students who were more proficient and enthusiastic users of the VLE system. The instructions on the questionnaire advised the participating respondents that their responses would be accessible only for academic purpose to ensure the confidence and providing their name was not mandatory, thus confidentiality was ensured. The survey was carried out during the later stages of the second semester after students had been given adequate opportunity of using the VLE. Undergraduates were asked to provide responses on the basis of their experience in the accounting related subjected (IT Applications in Business, Financial Accounting, Financial Reporting Framework, and Computerized Accounting) of their first two semesters.

V. SIMULATION/EXPERIMENTAL RESULTS

The sample of the study was 105 enrolled undergraduates of the department of accountancy. Among them, 103 responses were collected during the lecture time, providing the overall response rate of 99%. The demographic profiles of the respondents can be summarized as per the table 1.

Age * Gender Cross tabulation

TABLE 1. Demographic Profiles

		Gender		Total
		Male	Female	
Age	20	4	2	6
	21	23	50	73
	22	14	7	21
	23	3	0	3
Total		44	59	103

Table I above shows the descriptive analysis on age and gender of the entire sample of respondents. The table depicts the age wise gender categorization. According to the table, there were 44 male respondents and 59 female respondents were contributed to the survey.

For the descriptive analysis researchers have selected second semester of 2015/2016 academic year. According to the user log reports generated from LMS, first year students' VLE participation for accounting subjects recorded as 17682 logs out of total 18459 logs. Balance 777 logs represent teacher logins to selected subjects.

Student logs under different activities explain that majority (6997) of logs are for resource view, which represents 39.6% of total student logs. Second highest interest of students is course view which consists of 5161 logs that is 29.2% of total student logs. Quiz continue attempts is the third highest interest of students which comprises 3574 logs and that is 20.2% as a proportion. Above findings revealed that, students use VLE to search learning material, and to view updates in the course units as the first priority and for online quizzes as required by the lecturers. Fig 5.1 displays the student logs for all activities in proportions.

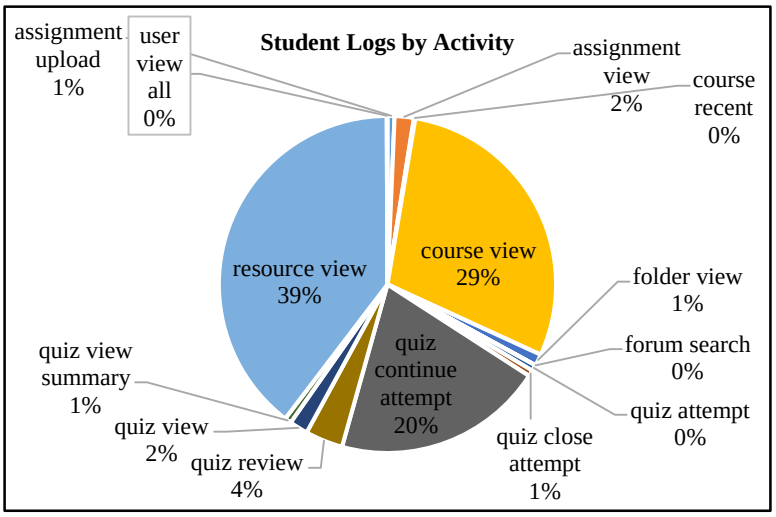

Fig 5.1. Student Logs by Activity

Logs comparison of four months (from September to December) of the semester could be used to identify trends in VLE usage of students. Based on the starting date of the semester, first month logs represent data from 26th September. Last month includes data till 15th December 2016 which is the log reports generated date. For an effective comparison daily average student log is calculated for each month. Output falls on a trend line which continuously boosts in the first three months and

falls in the last month. Table II shows the daily average logs and Fig 5.2 depicts the same in a trend line.

TABLE II. The Daily Average Logs

Month	Daily Average Usage
September	115
October	175
November	298
December	183

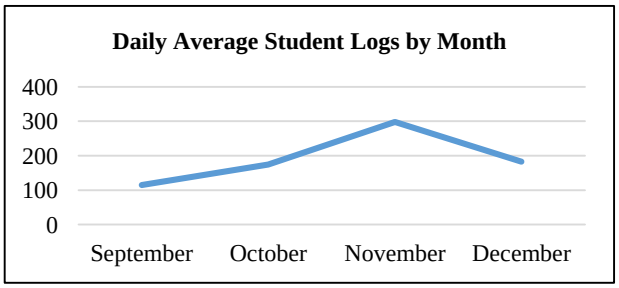

Fig 5.2. Daily Average Student Logs by Month

Analysis of logs by Day of the week expresses a considerable usage on Monday, which comprises 10840 logs or 61.3% of total logs. Second highest usage is on Sunday, which is 1794 logs or 10.1% of total logs. All other days of the week has a common usage pattern and no any significant fluctuation. Computerized accounting, a major accounting subject's lecture falls on Monday, which requires students to refer material on VLE and that could be the reason for unusually high logs on that day.

Fig 5.3 displays the student's usage of VLE by day of the week.

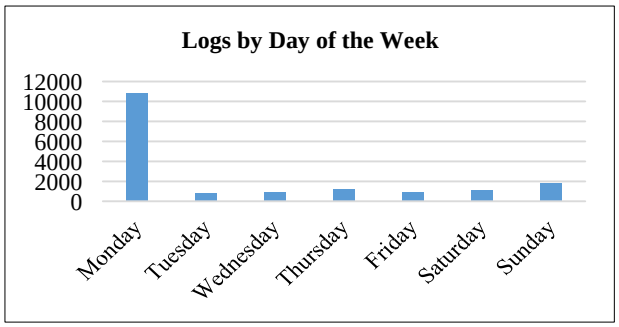

Fig 5. 3. Logs by Day of the Week

Descriptive findings were used to analyze the research question 1 of the current study; which is the usefulness of virtual learning environment to students in their programme of study.

TABLE III. Usage of VLE before join the University

		Frequency	Percent
Valid	Yes	34	33.0
	No	68	66.0
	Total	102	99.0
Missing	System	1	1.0
Total		103	100.0

Table III, displays the usage of VLE among students, before they join the University. Results indicated that, 66% from the total respondents did not engage in any VLE before, while balance 33% engaged in. Fig 5.4, 5.5, 5.6 and 5.7 illustrate the frequencies of main 4 factors to determine the overall perception of students; namely, Lecture notes available in LMS, Participation in discussion forums, Frequency of attaining Self-Tests and Frequency involved in online quizzes respectively.

According to the Fig 5.4, 49.5% of respondents mentioned that the lecture notes are available three times per week. Majority of students never engaged with Discussion Forums. According to the Fig 5.5, it is around 78%. Similarly, majority of students (51%) never attempted on Self-Tests questions (Fig 5.6), while majority of them (79%) attempted for online quizzes once in a week (Fig 5.7).

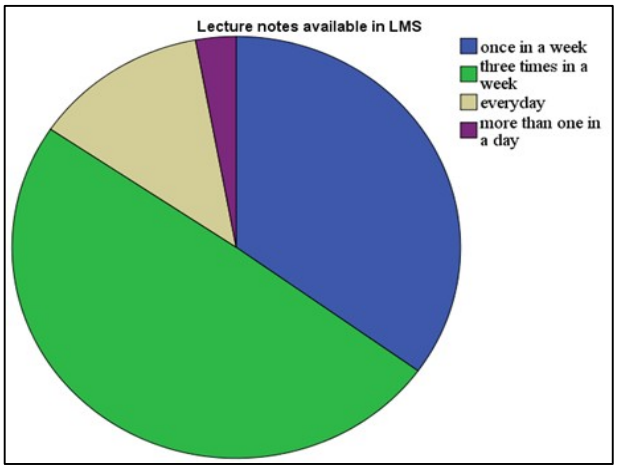

Fig 5. 4. Lecture Notes available in LMS

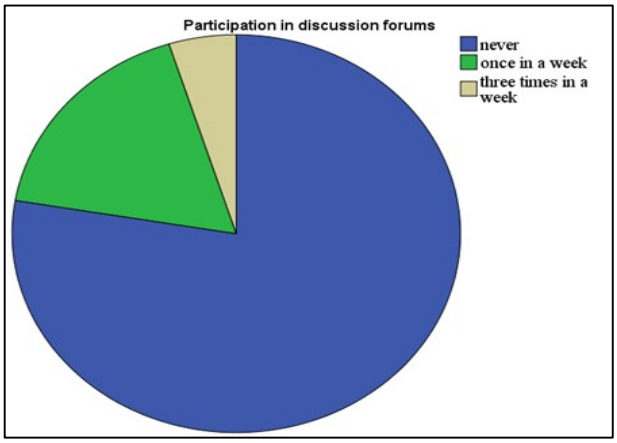

Fig.5.5. Participation in Discussion Forums

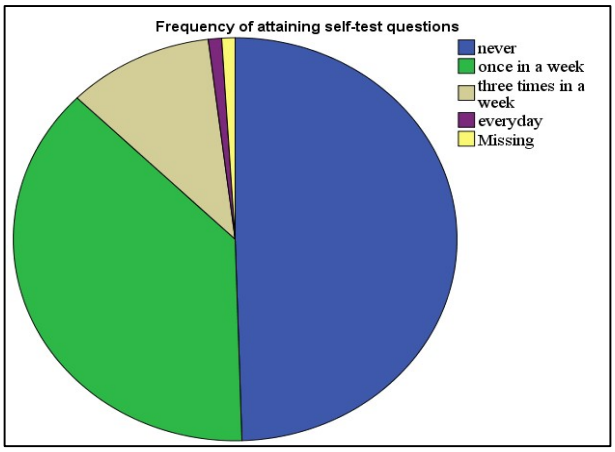

Fig 5.6. Frequency of attempting Self-Tests

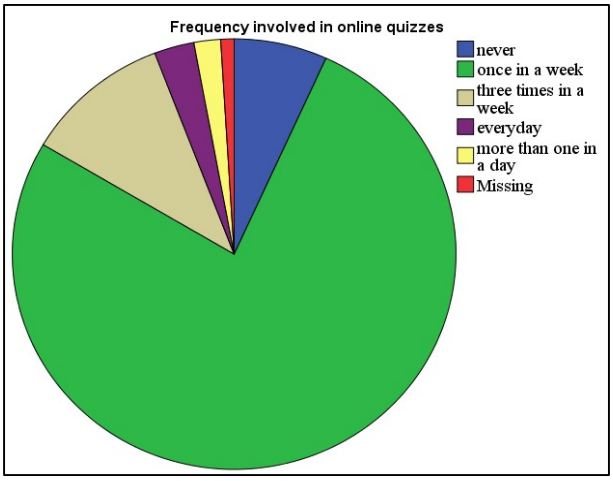

Fig 5.7. Frequency involved in online quizzes

TABLE IV. Overall Usefulness of VLE (LMS)

		Frequency	Percent
Valid	not at all	1	1.0
	small extent	8	7.8
	large extent	70	68.0
	very large extent	24	23.3
	Total	103	100.0

Table IV above, reflects the overall usefulness of the VLE to the study programme of first year accountancy students. It is evident that the usefulness of the VLE is 'large extent' and 'very large extent' among majority of the students in the sample. It was resulted over 91% from the total sample, which is very high value. According to the findings of descriptive analysis, we can conclude that the overall usefulness of the VLE is very high to the programme of study of first year accountancy students.

Multivariate analysis was conducted to evaluate the research question 3 of the study. The analysis conducted through two main stages using SPSS. As the first step, researchers conducted the exploratory factor analysis for the section 3 of the questionnaire, to measure the students' perception of the usefulness of the LMS. From the section 3 of the questionnaire, researchers seek which of the six variables – namely, the provision of lecture notes, discussion forums, online quizzes, self- tests, announcements and other tools - used by the first year accountancy students, influence their overall perception of the LMS. The main aim to conduct the exploratory factor analysis was to reduce number of items in to specific factors [11]. Then the reliability analysis was conducted on derived specific factors using the Cronbach alpha analysis. As the second step of the analysis, the regression analysis was conducted to identify the relationship between refined factors and the overall perception of students on LMS.

As mentioned by [11], it was assumed that the technique would be applied to the entire population of interest. And further, he mentioned that, when these methods are used, conclusions are restricted to the sample collected and generalization of the results can be achieved only if analysis using different samples reveals the same factor structure. So, the exploratory factor analysis was undertaken, to determine the correlation among variables. Only the latent variables of the survey instrument were considered, using principle component analysis (principal axis factoring) with varimax rotation.

The Kaiser-Meyer-Olkin (KMO) Test and the Bartlett's Test of Sphericity , provide a minimum standard which should be passed before a factor analysis (or a principal components analysis) [11]. The KMO test basically measures the sample adequacy for each variable and for the entire model, while the Bartlett's Test of Sphericity relates to the significance of the study and thereby shows the validity and suitability of the responses collected to the problem being addressed through the study. For Factor Analysis to be recommended suitable, the Bartlett's Test of Sphericity must be less than 0.05[11].

TABLE V. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.728
Bartlett's Test of Sphericity	Approx. Chi-Square	1317.885
	Df	276
	Sig.	.000

Table V shows the results of KMO and Bartlett's Test. According to the above table, the value of the KMO measure is 0.728, which is greater than 0.7 indicates that the existence of the sample adequacy. The Bartlett's test is another indication of the strength of the relationship among variables. This tests the null hypothesis that the

correlation matrix is an identity matrix. So we want to reject the null hypothesis. According to the table V, the Bartlett's Test of Sphericity is significant, and accordingly we can reject the null hypothesis. So, the validity and suitability of the responses collected are also existed with the sample. According to [11], communalities should be in the 0.5 range for samples between 100 and 200. Accordingly, due to the low extraction values of communalities in SPSS, six items were removed from further analysis. Namely, Affects to absenteeism of students, Participation on the course unit, Difficulties of doing online quizzes, Availability of contact details of lecturers, Interact with other students and contribution to the final marks.

According to the results of the rotated factor matrix, altogether seven factors were identified and extracted for the further analysis. So, the subsequent regression analysis was conducted using the above mentioned seven variables; namely, , the provision of lecture notes, discussion forums, online quizzes, self- tests, announcements , other tools (independent variables in the regression analysis) and overall perception(dependent variables in the regression analysis).

To measure the internal consistency or the reliability of the extracted factor variables, cronbach alpha measure was used.

TABLE VI. Cronbach Alpha Values

Factor	Cronbach Alpha
Lecture Notes	0.838
Discussion Forums	0.719
Self-test Questions	0.911
Announcements	0.759
Online Quizzes	
Other Tools	
Overall Perception	0.777

According to the Cronbach Alpha values showed in the table VI, all the values are greater than 0.7 indicated that the availability of internal consistency among factor variables [12]. Cronbach Alpha was not reported for factors, Online Quizzes and Other Tools due to single item measures.

Table VII displays the Pearson correlation coefficients between all eight identified factors, including the overall perception. According to the results, all variables were recorded with small correlations, indicates that the unavailability of multicollinearity problem [11

TABLE VII. Inter Factor Correlations

	Lecture Notes	Discussion Forums	Self-Tests	Announcements	Online Quizzes	Other Tools	Overall Perception
Lecture Notes	1	0.2	0.276	0.517	0.242	0.425	0.595
Discussion Forums	0.2	1	0.354	.066	.080	0.224	.167
Self-Tests	0.276	0.354	1	0.237	0.243	0.208	0.328
Announcements	0.517	.066	0.237	1	.193	0.244	0.531
Online Quizzes	0.242	.080	0.243	.193	1	0.204	0.335
Other Tools	0.425	0.224	0.208	0.244	0.204	1	0.356
Overall Perception	0.595	.167	0.328	0.531	0.335	0.356	1

]. The inter factor correlation figures for multicollinearity measure were confirmed by the Tolerance level and VIF values in the table X. Tolerance levels for all factors were reported as greater than 0.2, while VIF values for all factors were reported as less than 5. According to [12], threshold values for both Tolerance level and VIF factor are greater than 0.2 and less than 5 respectively

.

Regression analysis was undertaken to measure the way of predicting the outcome variable (overall perception) from six other predictor variables [11].

TABLE VIII. Regression Analysis - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.687a	.471	.438	.30480

a. Predictors: (Constant), Other Tools, Online Quizzes, Discussion Forums, Announcements, Self Tests, Lecture Notes

Table VIII above, shows the model summary of the multiple regression analysis. According to the R2 value, 47.1% of variance in the overall perception can be explained by the other six selected factors (independent variables). The modified version of R2 that has been adjusted for the number of independent variables is called adjusted R2 and the recorded value was 43.8%.

TABLE IX. Regression Analysis - ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.952	6	1.325	14.265	.000b
	Residual	8.919	96	.093		
	Total	16.870	102			

a. Dependent Variable: Overall Perception
b. Predictors: (Constant), Other Tools, Online Quizzes, Discussion Forums, Announcements, Self-Tests, Lecture Notes.

According to the ANOVA table depicted in the table IX above, the F value of 14.265 is statistically significant. So the regression model overall predicts the dependent variable; overall perception, significantly.

Table X illustrates the standardized coefficients (beta values), t statistics and associated p values.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.671	.315		5.306	.000		
	Lecture Notes	.213	.058	.347	3.670	.000	.614	1.628
	Discussion Forums	.006	.050	.010	.120	.904	.841	1.190
	Self Tests	.050	.039	.108	1.295	.198	.788	1.269
	Announcements	.196	.063	.274	3.125	.002	.715	1.399
	Online Quizzes	.099	.051	.154	1.961	.053	.895	1.118
	Other Tools	.043	.042	.085	1.022	.309	.788	1.270

TABLE X. Regression Analysis - Coefficients
a. Dependent Variable: Overall Perception

According to the results, three variables; namely Lecture Notes, Announcements and Online Quizzes are statistically significant, while Discussion Forums, Self Tests and Other Tools are statistically insignificant. The multiple linear regression equation can be written as follows.

Overall Perception = 1.671 + 0.213 (Lecture Notes) + 0.196(Announcements) + 0.099(Online Quizzes) + ei ……. (1)

According to the equation 1, highest magnitude of the coefficient is 0.213. Which is the coefficient value of the lecture notes, indicates that the highest effect to the overall perception of students. Other two variables; namely, Announcements and Online Quizzes recorded next highest values respectively and contribute to the overall perception of students accordingly. The impact of above three variables on overall perception of students is illustrated in Fig 8.

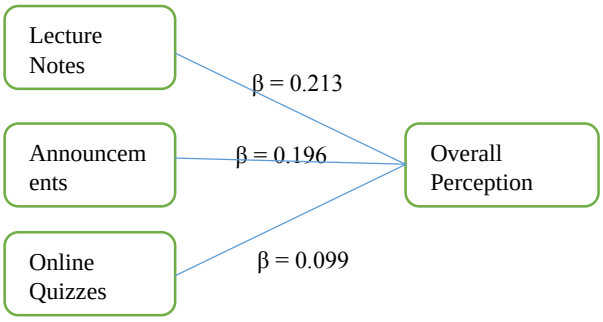

Fig 5.8. Impact of significant variables to the overall perception

The final part of the questionnaire was to measure the Students' perception on LMS driven by computer literacy skills and access to technology. The session consisted with five questions with five scale Likert scale to rate their opinion. Table XI below shows the mean score for the above mentioned five questions.

TABLE XI. Computer Literacy Skills and access to Technology

N	Valid	103
	Missing	0
Mean		3.7612

The mean score for this session was 3.76, which was close to 4; hence indicating that the majority of the respondents

'agree' to the questions in the session. Table XII demonstrates the average result for each individual question as "Agree".

TABLE XII. Ability to use VLE as a result of Computer Skills and access to Technology

Prior computer literacy is essential to use LMS.	Agree
High amount of computer resources are essential to use LMS.	Agree
You are getting a proper training on LMS from the course lecturer.	Agree

Proper infrastructure facilities are available for students to use LMS. (Computer Labs, Internet access facilities, etc.)	Agree
VLE is reliable in the learning and evaluation process.	Agree

VI. SUMMARY AND CONCLUSION

The main objective of this study was to determine the overall student perception on integrating a Virtual Learning Environment in to first – year accounting course units. To conduct the study, we develop a standard questionnaire and distributed among first year students in a Sri Lankan university. To measure the usefulness and the overall perception, we used accounting related course units. The sample size was 105 students and 103 responses were collected. The questionnaire consisted with five main sections. Further, six main VLE resources were used to measure the total influence on overall perception of students on VLE. Those six resources were, provision of lecture notes, discussion forums, online quizzes, self- tests, announcements and other tools.

According to the findings, three variables were identified as main influential factors for the overall perception of students; namely Lecture Notes, Announcements and Online Quizzes. These three variables had a positive significant relationship on overall perception of students on VLE. These results were further confirmed by the descriptive results. According to the student log analysis of the LMS, most number of logs were for resource view, course view and quiz attempt respectively.

Logs comparison of four months (from September to December) of the last semester was used to identify trends in VLE usage of students, by month and the day of the week. Accordingly, the highest number of student logs were recorded in the month of November and Monday. The main reason for the highest number of student logs to the VLE on Monday is that the selected computerized accounting course unit was fallen on every Mondays. Results suggest that the student involvements to discussion forums should be further enhanced and it should be improved as an interactive learning tool among students and lecturers. In addition, one further explanation for the lack of usage of 'other tools' is that, unavailability of different tools. Lecturers should provide a platform to use more other tools like, WIKIs, Chat sessions, Glossaries, external tools, Questionnaires (to gather student data) and so on.

A comprehensive descriptive analysis was conducted to measure the Overall usage of VLE (LMS) by students. It was evident that the usefulness of the VLE is 'large extent' and 'very large extent' among majority of the students in the sample. It was resulted over 91% from the total sample.

To measure the final or the fourth research question, we used final section of the research instrument with 5 likert scale questions. According to the results, majority of the respondents 'agreed' with questions in the section 4, to measure the Ability to use VLE as a result of computer skills and access to technology. So majority of the respondents, believed that, they should have prior computer literacy and High amount of computer resources to access LMS. They further believed that they are getting a proper training on LMS from the course lecturer and proper infrastructure facilities are available them to use LMS, such as Computer Labs and Internet access facilities, hence most of them were ranked LMS as a reliable tool in learning and evaluation process. Overall, the findings of this study show, the high amount of student involvement and satisfaction towards the VLE as an interactive learning tool. They further requested from open ended questions, to available more additional readings and to upload lecture materials prior to the lecture session.

One of the main limitations of the current study was the limited number of participants (103). Involvement of more participants would always provide better and meaningful results. The research findings of the current study provide number of opportunities for future research. One is to evaluate the influence of VLE to the final grade of the students. Second, future researchers can expand the sample to all four years and go for more comprehensive analysis. And also researchers can investigate student log reports using advance data mining tools to identify hidden patterns and accordingly they can suggest new pedagogical approaches for integrated learning.

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Evaluation of Medical Record Completeness Based on KARS (KomisiAkreditasiRumahSakit) Standard 2012 at Muhammadiyah Hospital of Ponorogo Indonesia

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Abstract- The completeness of medical records is very important in the provision of health services, especially to improve the quality of service and patient safety. As an effort to improve the quality of service Muhammadiyah Hospital of Ponorogo has followed the KARS 2012 accreditation with a plenary achievement in August 2016. Although the status of accreditation plenary has been achieved but efforts to maintain improvements in patient care and patient safety should still be done. This study aims to determine the description of medical record completeness at Muhammadiyah Hospital of Ponorogo. This research is an observational analytic, quantitative approach with cross sectional design. Data analysis using univariate and bivariate analysis with Chi Square test. In the sample prior to the accreditation survey, the standard that was not achieved was PFE (Patient and Family Education) 2.1, while for samples after the accreditation survey, the unreachable standards were PFE 2.1, MCI (Management of Communication and Information) 19.3 and ACC (Acces to Care and Continuity of Care) 3.2.1. There are some standards that have statistically significant differences in the completeness of the medical record between before the accreditation survey and after the accreditation survey ie PFR (Patient and Family Right) 6.4 (p = 0.001), ASC (Anasthesia and Surgical Care) 7.1 (p = 0.018), AOP (Assesment of Patient) (1.6 (p = 0.020) , ASC 7.4 (p = 0.005), MCI 19.3 (P = 0.001).

Index Terms- Medical record completeness, KARS (KomisiAkreditasiRumahSakit) 2012 standard.

I. Introduction

Hospitals are health care institutions that provide full-scale personal health services that provide inpatient, outpatient, and emergency care services. Each Hospital has the obligation to provide safe, quality, anti-discrimination and effective health services by prioritizing the interests of the patient in accordance with hospital service standards; create, implement and maintain health care quality standards in hospitals as a reference in serving patients and organizing medical records [1].

As an effort to improve the quality of Hospital service, it is obliged to make periodic accreditation at least 3 (three) years [2]. The implementation of accreditation based on KARS 2012 standard includes several stages of preparation of accreditation, accreditation guidance, accreditation implementation and post accreditation activities [3]. The implementation of the KARS (KomisiAkreditasiRumahSakit) accreditation survey includes steps such as the individual patient search and the patient's medical record of being closed (the patient has returned). This study was conducted to ensure hospital compliance provides track records of medical records [4].

A medical record is a file containing records and documents about the patient's identity, examinations, medications, actions and other services that have been provided to the patient [5]. In the medical aspects, medical records are used as a basic for planning care provided to a patient and in order to maintain and improve the quality of care through medical audits, clinical risk management and patient safety [6]. Mentioned by David Karp *et all* (2008)[7] that good documentation will protect the patient. So, good documentation in medical record is an important aspect in realizing patient safety. The completeness of medical records is very important in the implementation of health services, especially to improve the quality of patient care and safety.

Muhammadiyah Hospital of Ponorogo (RSUM Ponorogo) is a type C hospital in Ponorogo. This hospital has followed KARS 2012 standard accreditation and has been declared a plenary pass based on a decree dated August 23, 2016 [8].

A preliminary study conducted by researchers in January 2017, of the 10 files studied did not find complete files as a whole according to the standards set by KARS 2012. Among them is the standard of PFR 6.4 only reached 18.5%, standard ASC 7.1 reached 22.2%, ASC 6 standard was achieved at 55.5% and several other standards.

Although the status of accreditation plenary has been achieved by RSUM Ponorogo, but efforts to maintain service quality improvement and patient safety should still be done. Seeing the importance of medical records documentation especially for patient safety and to maintain the quality of service and there are still some improvement suggestions from the medical record-related

accreditation team and the finding of incomplete medical record in the months after the accreditation, it is necessary to evaluate the completeness of medical record based on KARS standard 2012 at RSUM Ponorogo.

II. MATERIAL AND METHODS

This research uses analytic observational research type with quantitative approach. The research design used is cross sectional to see the completeness of medical record before and after survey of accreditation.

This research was conducted during January-May 2017 at RSUM Ponorogo. The subjects used are medical records of patients at RSUM Ponorogo with the criteria used are medical records of inpatients in July and December 2016, medical records of patients who get surgery, medical records of patients who get general and spinal anesthesia.

In the research variables to be studied in this study is the completeness of each medical record accreditation standards and the time of filling out the medical record file (before and after the accreditation survey). Statistical analysis using computer with SPSS 2.0.0 application, which will be done in this research is two kinds of data analysis that is univariate and bivariate analysis. The statistical test that will be used in this research is Chi Square.

III. RESULTS

This research was conducted at Muhammadiyah Hospital of Ponorogo (RSUM Ponorogo) during January to May 2017. Data was collected during February to April 2017, taking samples of patient's medical record in the months leading up to the accreditation survey, ie patient files in July 2016, which were 30 patient medical records files. After the accreditation survey that is the patient file of December 2016 as many as 30 files. The study was conducted using closed medical record review format according to KARS 2012 standard.

Table I :Results of Bivariate Analysis

No.	**Standard**	**July 2016**		**December 2016**		***P value***
		Completeness		Completeness		
		Σ	**%**	**Σ**	**%**	
1.	PFR 6.3	28	93,33	27	90	1,000
2.	PFR 6.4	29	96,66	9	30	0,000 *
3.	PFR 8	0	0	0	0	-
4.	ASC 5.1	30	100	30	100	-
5.	ASC 7.1	17	56,66	8	26,66	0,018 *
6.	AOP 1.3	30	100	30	100	-
7.	AOP 1.4.1	30	100	30	100	-
8.	AOP 1.5	30	100	30	100	-
9.	AOP 1.5.1	16	53,33	18	60	0,432
10.	AOP 1.6	9	30	18	60	0,020 *
11.	AOP 1.7	30	100	29	96,66	1,000
12.	AOP 1.9	0	0	2	100	-
13.	AOP 1.10	30	100	30	100	-
14.	AOP 1.11	30	100	27	90	0,237
15.	AOP 2	25	83,33	19	63,33	0,080
15.	COP 2.1	23	76,66	26	86,66	0,488
16.	PFE 2	30	100	30	100	-
17.	ASC 3	0	0	0	0	-
18.	ASC 4	30	100	29	96,66	1,000
19.	ASC 5	25	83,33	29	96,66	0,195
20.	ASC 6	8	26,66	13	43,33	0,176
21.	ASC 7	27	90	25	83,33	0,448
22.	ASC 7.2	9	30	10	33,33	0,781
23.	ASC 7.4	30	100	22	73,33	0,005 *
24.	MMU 4	27	90	28	93,33	1,000
25.	MMU 4.3	30	100	30	100	-
26.	MMU 7	27	90	29	96,66	0,612
27.	PFE 2.1	0	0	3	10	-
28.	MCI 19.3	24	80	0	0	0,000 *
29.	ACC 1.1.3	0	0	0	0	-
30.	ACC 2.1	30	100	28	93,33	0,492
31.	ACC 3.2.1	6	20	4	13,33	0,488
32.	ACC 4.4	18	60	14	46,66	0,301

Description: * Results are statistically significant

Sampling in this study was divided into two groups of samples, they are samples taken before the accreditation survey which are July 2016 samples and samples taken several months after the accreditation survey are samples in December 2016. It is intended to see if there are differences in completeness before and after accreditation to see the consistency of hospitals in maintaining and improving the quality of hospitals. To see whether or not there were differences, the researchers performed bivariate analysis for two unpaired groups. Bivariate analysis test use chi square, if not meet the requirements of chi square test then use Fisher test as an alternative. To test these two groups in pairs we present for each standard in KARS 2012.

In the July 2016 sample there are some standards that not all sample files require the form so that the sample number is zero. These standards include PFR 8, AOP 1.9, ASC 3 and ASC 1.1.3. Standards that have a percentage of 100% completeness are AOP 1.3, AOP 1.4.1, AOP 1.5, AOP 1.7, AOP 1.10, PFE 2, ASC 4, ASC 7.4, MMU (Medication Management and Use) 4.3 and ACC 2.1.The standard that has the lowest completeness is PFE 2.1 at 0%, meaning that all samples taken for standard filling of PFE 2.1 are incomplete. Sampel in December 2016, there are some standards that not all sample files require the form so that the sample number is zero. These standards include PFR 8, ASC 3 and ACC 1.1.3. Standards that have a percentage of 100% completeness are ASC 5.1, AOP 1.3, AOP 1.4.1, AOP 1.5, AOP 1.9, AOP 1.10, PFE 2 and MMU 4.3. The standard that has the lowest completeness is MCI 19.3 of 0%, meaning that all samples taken on the standard is not complete. From Table 4.1 it can be seen that there is an increase and decrease of medical record completeness before and after the accreditation survey. They are some standards that have statistically significant differences between before and after the accreditation survey, they are the standard of PFR 6.4, ASC 7.1, AOP 1.6, ASC 7.4 and MCI 19.3.

IV. DISCUSSION

There are some standards that not all sample files require the form so that the sample number is zero. These standards include PFR 8 on approval of research, examination and clinical trials, AOP 1.9 on assessment and reassessment of patients with end-of-life conditions, ASC 3 on pre-sedation assessments, monitoring during sedation and recovery criteria and ACC 1.1.3 on delay in management.

In relation to PFR standard 8, Muhammadiyah Hospital of Ponorogo did not provide a special form, because the hospital was not involved in the research hospital. To fill the standards of AOP 1.9, Muhammadiyah Hospital of Ponorogo provides a form in annex 44 B.1 which contains the records of the patients' end-of-life care patients. Standard ASC 3 is provided in an attachment form 24. This form is used to record patient assessments prior to sedation, monitoring during sedation as well as sedation patient recovery criteria. To comply with ACC 1.1.3 standards regarding delays in management, Muhammadiyah Hospital of Ponorogo does not have a special form.

According to Wuryandari (2013) [9] that the availability of medical record form can affect a result of medical record completeness, ideally can format medical record that available enough hence more complete filling of medical record. Conversely, when the availability of the form has not been good then it will affect the measurement of the non-imbalance of medical record by the registration officer, the nurse and the doctor medical recorder.

According to the 2012 KARS guidelines, the assessment requirements of each element of the assessment of each standard are stated as fully achieved, partially achieved, not achieved and not applicable. It is said as fully acheved if 80-100% of the sample findings are met, partially achieved if 20-79% of the sample findings are met, not achieved if only ≤19% is found, and can not be applied if not included in the assessment and calculation process [2].

From the results of this study, the assessment elements of the July 2016 sample were fully achieved including PFR 6.3, PFR 6.4, PFR 5.1, AOP 1.3, AOP 1.4.1, AOP 1.5, AOP 1.7, AOP 1.10, AOP 1.11, AOP 2, PFE 2, ASC 4, ASC 5, ASC 7, ASC 7.4, MMU 4, MMU 4.3, MMU 7, MCI 19.3 and ACC 2.1. In December 2016 samples were fully achieved including PFR 6.3, ASC 5.1, AOP 1.3, AOP 1.4.1, AOP 1.5, AOP 1.7, AOP 1.9, AOP 1.10, AOP 1.11, COP (Care of Patient) 2.1, PFE 2, 4, ASC 5, ASC 7, MMU 4, MMU 4.3, MMU 7 and ACC 2.1.

In July 2016 samples, the standard elements were partially achieved are ASC 7.1, AOP 1.5.1, AOP 1.6, COP 2.1, ASC 6, ASC 7.2, ACC 3.2.1, ACC 4.4. In December 2016 samples, the standard elements were partially achieved are PFR 6.4, ASC 7.1, AOP 1.5.1, AOP 1.6, AOP 2, ASC 6, ASC 7.2, ASC 7.4 and ACC 4.4. In July 2016 sample, standard elements were not achieved include PFE 2.1 (0%). For the sample of December 2016 standard elements that were not achieved include PFE 2.1 (10%), MCI 19.3 (0%) and ACC 3.2.1 (13.3%).

Another research by Kristianto&Ernawati (2015) [10] in RS. DR. Karyadi Semarang obtained the result of completeness with AOP percentage. 1.7 for incomplete 2.5% pain screening, PFE 2 standard for incomplete 8.75% patient education, ACC 3.2.1 standard on home residence of 11.25% incomplete and standard ACC 4.4 for patient transfer of 10% incomplete. Other research by PagelaPascarellaRenta (2016) [11]in the hospital of PKU Muhammadiyah Yogyakarta Unit 1 got the result of percentage of incomplete standard that is AOP. 1.6 (43.2%), ASC 5.1 (22.7%), ASC 7.1 (22.7%), MMU 4 (38.6%) and MMU 7 (50%).

The results of medical record completeness of each hospital are different, this is influenced by many factors. First, health personnel resources, especially doctors, paramedics, nurses and other officers in compliance with medical records of each hospital are different. Second, the means of infrastructure are the availability of complete and effective medical record forms, places and facilities

for filling medical records. Third, the standard procedure of filling medical records of each hospital, although the general guidelines used the same according to the law, but the implementation of each hospital has a different policy according to the conditions of each hospital. Fourth, financing and supervision, the need for adequate budget for medical record data processing and supervision conducted continuously and consequently [12].

Based on the results of research that has been done in Muhammadiyah Hospital of Ponorogo before and after the accreditation survey, the researchers found some differences in the level of completeness. From result of analysis using Chi Square test with SPSS got result that there are some standard having statistically significant difference in completeness of medical record between before and after accreditation survey. These standards are PFR 6.4 (p = 0.001), ASC 7.1 (p = 0.018), AOP 1.6 (p = 0.020), ASC 7.4 (p = 0.005), MCI 19.3 (P = 0.001).

Patient and Family Rights 6.4 contains informed consent obtained before surgery, anesthesia, use of blood or blood products and other risk measures and treatments. In this standard there is a decrease of 66.66%, and statistically obtained significant differences before and after accreditation survey. Informed concern or approval of medical action is the approval given by the patient or immediate family after full explanation of the action of medicine or dentistry to be performed on the patient [13].

Anesthesia and Surgical Care 7.1 contains information on risks, benefits and alternatives discussed with patients and their families or people authorized to make decisions for patients. This standard has decreased by 30%. Statistically have significant differences between before and after the accreditation survey. The importance of adequate information provided to patients and families is that they can participate in making care decisions and give consent or informed consent to the actions to be given. The information in question includes the risks of planned procedures, the benefits of planned procedures, potential complications and alternative surgical and non surgical measures available to treat patients [2].

Assessment of Patient 1.6 contains nutritional screening and functional requirements and is consulted for further assessment and treatment is required. At this standard increased by 30%, it was statistically concluded that there was a significant difference between before and after the accreditation survey. This difference is in the form of an increase, which means the improvement of service. Based on short interviews to nursing staff and midwives in the treatment room, it was found that the functional requirements form was a new form of physical distribution and the information had not yet reached all sections. Making this new form is a process of improvement in providing services to patients, in addition to meet the accreditation standards. Functional assessment is important to identify patients requiring medical rehabilitation services or other services related to independent functional ability or to the best potential condition [2].

Anesthesia and Surgical Care 7.4 contains patient care after surgery that is planned and documented. This standard has decreased by 26.66%, and there are statistically significant differences. Medical care and post-surgical care of each patient need to be differentiated. Forms at RSUM Ponorogo have also differentiated for medical and nursing plans. The postoperative medical plan is performed by an anesthesiologist in collaboration with the surgical doctor, while the treatment plan is performed by the operating room nurse in collaboration with the room nurse. Post surgical care planning may be initiated before surgery based on the patient's condition and patient assessment. The planned care is documented in the patient's status to ensure continued service during the recovery or rehabilitation period [2].

Medical records in this regard are particularly important for patient safety, as the medical records in this standard are typically used as an effective means of communication between healthcare professionals. Documentation in medical records is used to reduce the potential of medical errors in providing services to patients [14].

MCI 19.3 contains the author, date and time (if required) for each writing in the medical record. RSUM Ponorogo also requires to write date and time of writing medical record, so for every writer who fill the medical record must include name, date and time of writing. This standard has decreased by 80%, and there is a statistically significant difference between before and after the accreditation survey.

Research by Linda Widyaningrum (2013) [15], result that there is influence pre accreditation to the completeness of medical record data of resume of inpatient in hospital Dr. Moewardi Surakarta with very strong influence power. Pre accreditation is the process of preparing to make evidence on the application and development of quality standard of service and patient safety to prepare preparations according to the standard that has been set. The result of this research shows that there is influence with very strong influence strength and correlation of positive influence, it means that the bigger influence of pre accreditation hence the bigger the completeness of medical record data of resume of inpatient. In contrast to this study, there are several standards relating to patient records that have differences in completeness between before and after the accreditation survey, but the difference is due to the number of completeness which are decreased, the difference should be the increase in the number of completeness, as evidence of improvement or at least maintain the quality of service.

In this study the sample used in assessing the completeness of the medical record is before the accreditation survey and a few months after the accreditation survey. In that range there are several factors affect the completeness of medical record in RSUM Ponorogo that changed. Factors that can cause a decrease in the completeness of medical records one of them is human resources. Human resources related to the filling of medical records include doctors, nurses, medical recorders.

In the study by Pamungkas, et al (2015) [16] in RSUD NgudiWaluyoWlingi mentioned that the main cause of incomplete medical record document of inpatient patient is disciplinary of doctor in filling of medical record document. This is because the main priority of doctors is the service so doctors are too busy and less time to fill medical record documents. Another study which is also in line with this reason is by Pamungkas, et al (2010)[17] in hospital of PKU Muhammadiyah Yogyakarta mentioned that the factors causing the occurrence of incomplete medical record is the limited time of charging caused by high physician workload so that the

time spent to fill the complete medical record becomes very limited, and the lack of awareness of doctors about the importance of medical record completeness.

Research by Aisyah (2013) [18] in RS YAP Yogyakarta, concluded that the incomplete factor of filling out the informed consent sheet is the human resources factor in this case that is the doctor and the nurse caused by some things so that the discipline is not maximal in executing the filling of informed consent sheet. In addition, because there is no punishment and reward so that the sense of responsibility and discipline of doctors is still lacking in terms of completeness of medical record.

Based on research by Mawarni&Wulandari (2012) [19]in RS MuhammadiyahLamongan, stated that one of the causes of incomplete medical records is the absence of monitoring on the completeness of medical records, so the process of filling the complete medical record can not be controlled. Monitoring aims to measure or assess a process to achieve the expected output. Good monitoring is must be done continuously. In addition, the monitoring also obtained information about obstacles or obstacles faced by officers during the filling of medical records [19].

Medical records are very important to maintain its completeness, accuracy and credibility, because good documentation in the medical record will protect the patient. The medical record contains information the doctor needs on the medical history given to the patient. So the incompleteness in the medical record will increase errors in the provision of therapy that can cause patients injury or threaten patient safety [7].

Efforts to maintain the quality of service is one of the obligations of every hospital. Accreditation is one of the efforts to maintain the quality of service. Maintaining the quality of service is a continuous program so that both before and after accreditation survey, the quality of services provided should always be maintained on an ongoing basis.

V. CONCLUSION

The completeness of the medical record at Muhammadiyah Hospital of Ponorogo based on KARS 2012, which achieved partially are ASC 7.1, AOP 1.5.1, AOP 1.6, COP 2.1, ASC 6, ASC 7.2, ACC 3.2.1, ACC 4.4 for sample ahead of accreditation survey, While in the sample after the accreditation survey, the standards achieved partially are PFR 6.4, ASC 7.1, AOP 1.5.1, AOP 1.6, AOP 2, ASC 6, ASC 7.2, ASC 7.4 and ACC 4.4. In the sample ahead to the accreditation survey, the standard that is not achieved is PFE 2.1, while for samples after the accreditation survey, the standards that are not achieved are PFE 2.1, MCI 19.3 and ACC 3.2.1.

There are some standards that have statistically significant differences in the completeness of the medical record between before and after the accreditation survey, they are PFR 6.4 ($p = 0.001$), ASC 7.1 ($p = 0.018$), AOP 1.6 ($p = 0.020$), ASC 7.4 ($p = 0.005$), MCI 19.3 ($P = 0.001$).

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Variation in Compressive Strength of Handmade Adobe Brick

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***Abstract*—**The construction of houses with adobe brick is common practice among the developing communities of the world. The adobe is well known to have good compressive strength, according to the researches the compressive strength value varies and depends on the factors therefore soil proportion, curing age, form and dimensions. In order to examine the influence of these factors the experiment has been performed by conducting compressive strength test on five adobe masonry specimens of same soil texture, same curing age and of similar dimensions and shape. The experiment shows the greater variation in the compressive strength of each brick. The strength values shows 59.21% coefficient of variation 'CV'. By comparing the experimental results with the reviewed researches the study concluded that the adobe is a handmade brick; the variation in strength value may still occur, even though the bricks are prepared under similar factors.

***Key Terms*—**Adobe, compressive strength, variation factors.

INTRODUCTION

Spanish word "adobe" referred to a sun dried brick, which are prepared by molding the mud manually. However machines are also used to mold adobe, but molding manually is an old practice. Construction with adobe is still highly practiced among the communities of developing countries as it is affordable and economical [1]. Local people use their experiences and rough estimation in producing bricks manually [2]. To produce adobe brick, soil is required which is comprised of three main contents, sand, silt and clay [3]. Soil is available locally in almost every part of the world and also its manual production makes it cheaper for the people who lack economic resources. Production of adobe bricks compared to the other bricks requires less energy. Apart from these benefits adobe stores heat in winter and transmits heat in summer to maintain the indoor temperature. These benefits fulfills the requirement of an adequate house, which is why it has been adapted by 50% population of world [4, 5]. Building with adobe without reinforcement is common in rural communities, where construction is limited to single stories, while in some areas adobe has been adopted to build up to three stories and also been adopted to build luxurious houses especially in middle east such as Iran [6].

However, adobe houses are not properly maintained which in result leads to the failure when environmental consequences and natural disaster triggers [3, 5, 7]. It has been observed that adobe houses cannot bear the excessive dead loads due to limited compressive strength property, as in monsoon it collapse on the increase of dead load of roof due to rains [8, 9].

Consequently, the compressive strength properties of earthen materials have not been specified, as per researches the strength values vary with different aspects. In order to analyze the former researches the study examines the adobe specimens which were prepared manually under similar aspects.

VARIATION FACTORS OF COMPRESSIVE STRENGTH OF ADOBE:

Adobe brick generally lacks strength, as it is low in tensile strength but compressive strength is comparatively high [5]. The compressive strength of un-stabilized adobe brick is suggested minimum of 1.5 Mpa and maximum 2 Mpa [10]. However these strength values may vary and depends on several factors which are briefed below.

In the experimental researches, it is noted that the compressive strength of adobe brick depends on the content of soil therefore sand, silt & clay. The research conducted by Arvind Kumar [11] andNapat Sriwattanaprayoon[2] shows the variation in compressive strength with the addition of sand content in the soil.

Along with the soil proportions, the compressive strength of adobe also depends on the time of curing and temperature at which it is cured. Following researches [12-14] observed the increase of compressive strength with the increase of curing time at atmosphere temperature. On increasing the atmosphere temperature the reduction in compressive strength is possible with the increase of curing age [14]. Whereas the study conducted by C.T.S.Beckett & C.E.Augarde[15] shows the increase in compressive strength with the increase in temperature. The study also shows the

variation in compressive strength with curing time [16]. The increase in compressive strength with the increase of curing time has been observed by Ramadhan W. Salim[17], while the research by Vandna Sharma a[18], proves that the strength may vary up till 28 days of curing but the specimen of 28, 56 and 90 days age found to have same compressive strength and comparatively more than those of 7 and 14 days curing age.

It has also been noted that the moisture content also affects the compressive strength of adobe. Adobe may lose the compressive strength if the moisture content exceeds the balance moisture content of adobe. The moisture content may vary from 1-3% depends on the proportion of soil especially quantity of clay [13, 14, 19]. James R. Clifton[14] tested three different soil textured adobe specimens, the results shows a greater change in compressive strength, the strength tends to reduce with the increase of moisture content. The tests conducted were simulated with the adobe absorbs moisture from ground water/or rain water and the water absorption due to relative humidity.

Apart from these factors, the wetting and drying of adobe may also affects the compressive strength of adobe [14, 20]. The research mainly focuses on the soil proportion, curing time, form and size factor on the compressive strength of adobe.

The literature on experimental researches involving variation in compressive strength of adobe specimen/brick of different factors has been concluded. The table below shows the coefficient of variationof results obtained by other authors.

Table I: Compressive strength results from reviewed researches.

#	Source	Soil texture/ Classification	Compressive strength test type	Variation factor	CV (%)
Variation due to soil content					
R1	[11]	CH (as per "USC" system)	Unconfined compressive strength 'UCS'	Difference in Sand particles	8.51
Summary of R1: The research shows increase in compressive strength with the increase of sand in soil. The strength increased by adding sand up to 10%; however the sand above 10% decreases the strength of adobe specimen.					
R2	[21]	Clayey soils Classification Soil A= CL Soil B= CL Soil C= CH	Unconfined compressive strength 'UCS'	Difference in sand clay and silt particle	23.20
Summary of R2: The experiment conducted on three soils of same texture but the ranges of soil content is different. The result shows variation in compressive strength due to the difference in the quantity of sand, clay and silt.					
R3	[14]	N/G	N/G	Two collected soil A & B; soil C is a modified soil A.	26.84
Summary of R3: The research conducted test on two different soils, while the third soil was simulated to check the effects of reduced silt and clay particle on compressive strength. The result shows high compressive strength of the soil contains more clay.					
Variation due to curing age and temperature.					
R4	[14]	Sand=18% Clay=27% Silt=55%	N/G	Specimens tested at the curing age 7 days up to 35 days at 21 °C.	0.89
				Specimens tested at the curing age of 1 to 4 days at 60 °C.	8.66
Summary of R4: The test conducted to observe the influence of drying temperature and curing time on the compressive strength of adobe. Results shows increase in strength with the increase of curing time when it was dried under normal environmental temperature therefore 21 °C. Whereas at high temperature of 60 °C the strength tends to reduce with the increase of curing age.					
Variation due to curing age.					
R5	[17]	Sandy loam	Dry compressive strength test	Difference in curing time.	4.27
Summary of R5: The research shows the little change in the compressive strength, the strength increases with the time of curing.					
R6	[18]	Sandy clay SC (as per Indian standard classification 'ISC')	Unconfined compressive strength	Difference in curing time.	11.32
Summary of R6: The research also shows the increase in strength with the increase in curing time up till 28 days. A result illustrates the strength remained same after 28 days of curing.					
Variation due to form					

Table I: Compressive strength results from reviewed researches.

R7	[18]	Sandy clay/ SC (as per India standard classificatio 'ISC')	Unconfined compressive strength	Difference in specimens' form.	28.51
Summary of R7: The test conducted on two specimens of same soil but different form, the results shows a greater influence of forms on compressive strength.					
R8	[22]	Adobe brick collected from 3 different sources	imple compressio test	Difference in forms of adobe brick 1	9.08
				Difference in forms of adobe brick 2	14.96
				Difference in forms of adobe brick 3	5.88
Summary of R8: In this research three different adobe brick were tested with two different forms therefore cube & cylinder. Result illustrated the difference in strength in both cube and cylindrical formed specimens of all 3 adobe bricks					
Variation due to size					
R9	[23]	N/G	N/G	Difference i specimen's slenderness ratio.	18.26
Summary of R9: Compressive strength test conducted on prism specimens of different slenderness ratio. The variation in strength value was observed from the results of this research.					

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EXPERIMENTAL PROGRAM ON ADOBE SPECIMEN

A. *Soil consideration*

The content of soil to produce the quality adobe brick has been recommended by several authors, however the soil recommended in Australian earth building handbook has been followed [24]. The soil contents' limits are; Sand 30-75% "particle size 20mm", Silt 10-30% and clay 10-40%. The experiments were conducted in Naresuan University Thailand, so the soil from nearby site was taken and identified by conducting three site tests therefore sedimentation test (1), ribbon test (2) and dry strength test (3) as shown in figure 1. After conducting these tests, the soil was found to be clayey and the proportion of each content was; sand 24.65%, Silt 18.6% & clay 56.74%. To simulate the available soil with the recommended proportion, the sand was added and the soil was retested. The test shows the increase of sand particles while silt and clay was in single layer in 2nd sedimentation test. The illustrated percentages of soil content are as follows; sand 48% and silt plus clay 52%.

Fig1: Site test to identify the soil.

B. *Preparing the specimens:*

After simulating the soil, the specimens were prepared, wooden mold of 300 x 200 x 100 mm was used for molding, two bricks were obtained from one mold by cutting it half. These half bricks were dried partially for one week to make masonry prism specimen according to Australian standards As 3700 for compressive strength test of masonry prism/earth wall. Total five specimens were prepared, each specimen consist of three courses of bricks and were cured for 28 days under shades. Fig 2 illustrates the specimens prepared and cured for test.

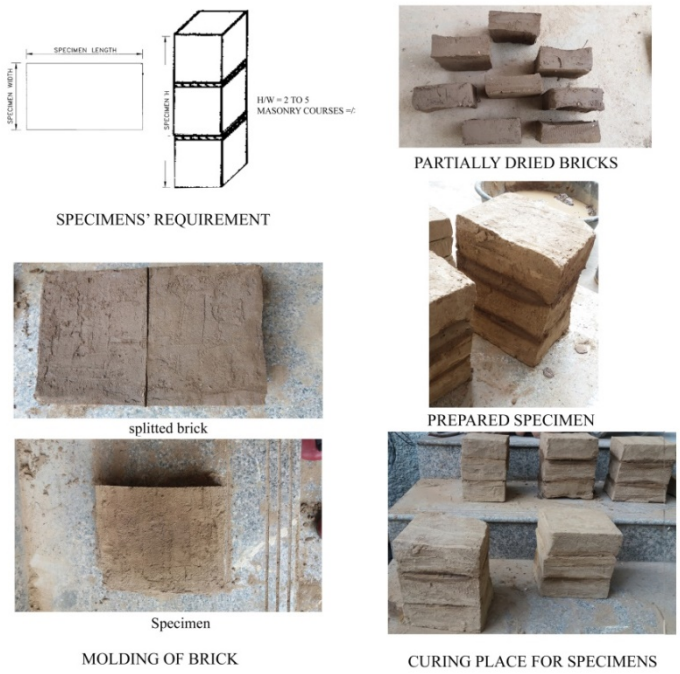

Fig2: Specimens prepared and cured for test.

C. *Compressive strength Test set up*

After curing the specimens for 28 days, each specimen was measured and weighed. According to the Australian standards, the height to width ratio was calculated for each specimen 'shown in Fig 3' in order to find the correction factor. The parameters of each specimen are shown in table II below.

Fig3: Prepared specimens for compression test

Table II: Parameters of specimens

SPECIMEN TAG	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	WEIGHT (KG)	H/W RATIO	CORRECTION FACTOR Ka
CP1	178	127	249	13.89	1.96	0.70
CP2	167	131	258	12.74	1.969	0.70
CP3	174	123	251	13.04	2.04	0.70
CP4	175	122	248	13.16	2.03	0.70
CP5	176	132	268	14.20	2.03	0.70

These specimens were tested in compression testing machine "Technotest KL200". Following the standards the loads applied on the specimen was even with the travelling rate of 1-5 mm/min and force applied was 1N.

Fig4: Test setup

D. *Results*

The maximum force at which each specimen survived was recorded. The chart below showing the survival forces for each specimen.

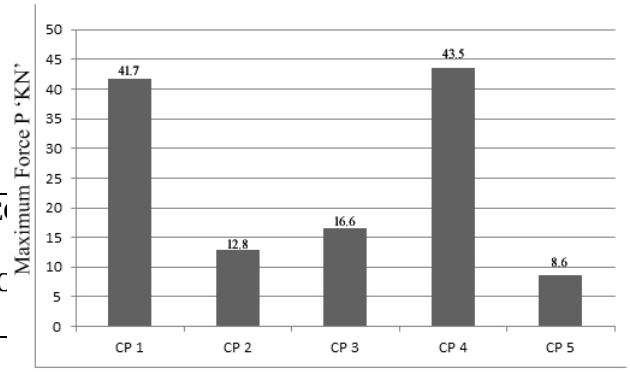

Fig5: Force at which each specimen survived.

Following the standard; the forces and the parameters of each specimen was putted in the equation 1, to calculate the compressive strength C. Fig 6 shows the compressive strength of each specimen.

Equation 1: $C = Ka(P \div A)$

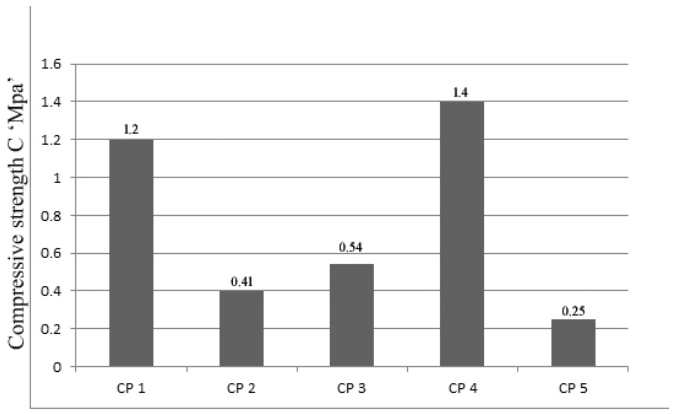

Fig6: Compressive strength of specimens

The experiment shows the difference in compressive strength. The standard deviation calculated for all five specimens is 0.45; it shows the maximum strength value of 1.21 MPA and minimum 0.25 MPA. While the coefficient of variation, therefore as CV, of all the specimens is 59.21 %.

COMPARISON OF EXPERIMENTAL RESULTS WITH REVIEWED RESULTS:

The reviewed results in Table Ishow the variation in compressive strength of specimens due to the factors therefore, soil proportion, curing time, form and dimensions of specimens. However the 'CV' of all these reviewed researches are up to 28.51%. Comparing the reviewed results with the results obtained by experimenting the specimens that were prepared from same soil, cured for 28 days, carries similar form and specimens are of proportionally equal in dimensions. The result shows a greater variation in compressive strength with 59.21%.

These specimens were prepared manually with rough calculations. The possible factor of strength variation assumed to be the compaction of mud while molding. In the manual molding, the forces applied for compaction were rough so the level of reduction of porosity differs in each specimen.

CONCLUSION& RECOMMENDATION

Comparing the experimental results with the results of reviewed researches it is concluded that, the compressive strength of adobe can't be specific even though they are prepared under the similar aspects. These are hand-made bricks so the strength may vary as the bricks are molded manually by using rough estimations. Further research is needed to analyze the influence of rough molding on the compressive strength of adobe, it is also recommended to analyze the solid reasons behind the variation in compressive strength of roughly prepared adobe specimens.

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Comparison of the Effect of Condensed Moisture on the Breakdown Voltage and Dissipation Factor (tan δ) of RBDPO as an Alternative Transformer Coolant

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Abstract- In this study, an investigation was carried out to evaluate the effect of condensed moisture on refined bleached and deodorized palm oil as an alternative dielectric transformer coolant. Dielectric response measurements were carried out temperatures of between 20°C to 140°C. The breakdown voltage and dissipation factor (tan **δ**) of the oil samples were systematically investigated under the influence of moisture and results compared using ASTM, VDE and IEC standard procedures. Owing to comparable results in the RBDPO and mineral oil (Shell Diala D) studied, it is suggested that treated vegetable oils is a suitable alternative to mineral oil.

Index Terms- Breakdown voltage, Dissipation factor (tan δ), Mineral oil (Shell Diala D*)*, RBDPO,

I. INTRODUCTION

Oil is used as an insulator and coolant in transformers and by monitoring its condition the transformer's overall health is determined. The oil fills up various spaces between turn to turn, layer to layer, coil to coil, phase to phase, and phase to ground in a transformer and serves as electrical insulation. Because of easy circulation, oil also plays an important and effective role in heat dissipation and hence cooling of transformer, apart from its functioning as insulation. Among all of the transformer components, the insulation system plays a significant role in the transformer life, because most of transformer failures were caused by insulation problems according to the statistics of transformer failures in USA from 1997 to 2001[1]. There are two basic transformer insulation types, solid and liquid. Solid insulation can be made of paper, pressboard, epoxy, and wood. Among them, kraft paper is widely used as solid insulation in the transformer, which is made from unbleached softwood pulp .Oil insulation, provides three main purposes in the transformer operation [2];

i. To act as a coolant with the main task of absorbing heat from the core and windings, then transmitting it to the outer surface of the transformer.
ii. To insulate the different parts at different electrical potentials. Oil makes a good contribution to transformer insulation by penetrating into and filling the spaces between wound insulation layers.
iii. To minimize the evaporation losses, the oil volatility should remain low. Oil temperature in service should be maintained below its flash point.

Accelerated thermal ageing

The Arrhenius law is a mathematical empirical law which concerns the influence of temperature on the velocity of chemical reactions. According to this rule, reactions are generally dependent on temperature and the following relation expresses the reaction time:

$$t = A \exp^{\frac{B}{T}}$$

Where:
t = Time
T = Temperature
A and B = Experimental constants which are based on the reacting materials, reaction conditions and the system of units.
Meshkatoddini *et al*. [3]concluded that accelerated ageing tests have been accomplished on pressboard by Montsinger during a 70 week period at temperatures ranging from 70-110°C, by Dakin during 100 weeks at temperatures of 100-135°C, by Shroff during 16weeks at temperatures of 110-140°C, by Moser during 57 weeks at temperatures of 90-135°C and again by Moser during 3 weeks at temperatures of 145-190°C and finally by Oommen during one week at temperatures of 120-180°C. All these experiments have proved the validity of the Arrhenius law for the degradation phenomena in the insulation study of pressboard.

Requirements for Insulating Oils

The capability of electrical systems and devices in which insulating materials are used, depends to a high degree on the insulating ability of the materials used. The insulating ability may vary depending on the type and quality of these oils; this means that for the construction of electrical devices the thickness of insulation varies with the quality of the oil used.

The requirements for insulating oils are specified by international standards, these standards represent minimal requirements that have to be fulfilled by insulating oils.

In DIN 57310 / VDE 0310 the following requirements of new insulating oils are specified:

- breakdown voltage
- dielectric loss factor
- density
- kinematic viscosity
- resistance against aging
- ignition point neutralization
- number corrosive sulphur
- purity and appearance

II. EXPERIMENTAL SETUP

The sample bottles and the test cell were cleaned by following the standard procedure established by IEC 60156 [4]

Sample Preparation

In this experiment, RBDPO and mineral oil (Shell Diala D) were used as samples. In order to observe the effect of water on the insulating liquid, 1ml of distilled water was added to both oil types per sample prepared. The use of distilled water is analogous to the water that condenses in an actual power transformer during service [5].

The Breakdown voltage measurement was based on VDE 03070/ IEC 60296; [6] and the Dielectric losses measurement was based on IEC 60247; [7].The samples arrangement inside the oven is shown in Figure1

Figure 1: Photo of oil samples in the oven for accelerated aging process

The accelerated thermal ageing process is arranged for approximately 140 hours at an ageing temperature of between 20°C - 100°C.

Figure 2:Breadkdown test set for oils

Determination of breakdown voltage

According to standard IEC 60156 insulating liquid - determination of the breakdown voltage at power frequency, there are several procedures that should be followed:

The breakdown test set up for oils is illustrated in Figure 2 and the description of the setup is explained below:

First voltage application is started approximately 5 min after completion of the filling and there should be no air bubbles which are visible in the electrode gap. The applied voltage uniformly increases from zero at the rate of 2 kV/s ± 0.2kV/s until breakdown occurs.

The measurements are carried out until 6 breakdowns on the same cell filling have occurred, allowing a pause of at least 2 min after each breakdown before reapplication of voltage or until there are no gas bubbles present within the electrode gap.

The final result is calculated from the mean value of the 6 breakdowns in kV.

In order to get an accurate result, IEC 60475 gives the additional requirement for the final result that the range of the measurement results must not exceed 10% of the mean value.

Determination of dielectric losses (tan δ)

The dielectric dissipation factor (tan δ) measurement in this project follows the standard IEC 60247 procedure including preparation of measurement tools.

The design of the test cell was slightly modified to reduce the complexity. Figure 3 shows a picture of the test apparatus.

Figure 3: Tan δ test cell

This test cell consists of two main parts, high voltage (HV) and low voltage (LV) electrodes. All electrodes are made of stainless steel that qualifies for its high heat resistance. The cover on the top of the LV electrode is made of epoxy as an insulator and equipped with a potential guard which is put inside it. The potential guard has a function to minimize the effect of any leakage current on the measurement. Two additional parts, the small hole in the cover of LV electrode and a long air junction pipe connected on the side of HV electrode, are intentionally designed in order to ensure that no air is trapped inside the test cell after it is filled with the oil sample. The test cell was measured with empty condition and a capacitance value of 133.58 pF and 3.60 $x10^{-4}$ of tan δ value at 600 V applied voltage were measured.

The tan δ in insulating oil can be measured using the Schering Bridge and other related equipment. The balance condition and the capacitance value are observed by the Tettex C_tan δ bridge.

The test cell is connected in parallel to a standard capacitor C_n at the HV side which has a nominal value of 100 pF. It also connects to a balanced detector Tettex at the LV side.

The test cell and oil samples are measured at ambient temperature. The test cell should be rinsed at least three times with a portion of the oil sample. The filling process of oil samples is carefully done to minimize air bubbles.

The test ac voltage should be applied to the liquid within the electric stress between 0.03kV/mm- 1kV/mm. The applied voltages are slowly increased to the test voltage, and then tan δ value can be determined from an adjustment of the Schering bridge variable (capacitance, resistance).

The final result is calculated as the mean of two consecutives values for tan δ, and agrees to within 0.0001 plus 25% of the higher value of two values being compared.

III. RESULTS AND DISCUSSION

Dielectric breakdown voltage U_B

The results of dielectric breakdown voltage measurements are presented in Figure 4

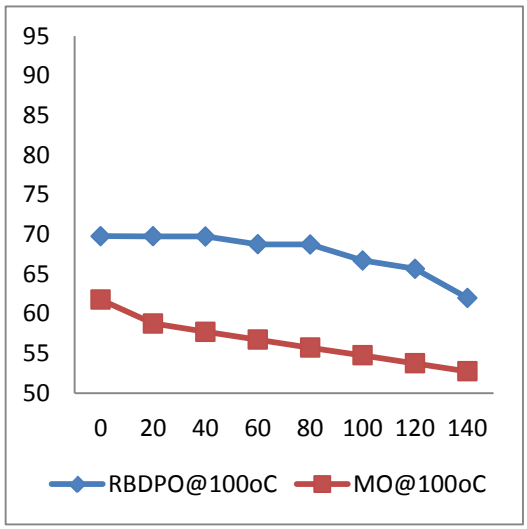

Figure 4: Breakdown Voltage vs. Ageing Time

Figure 4 shows a steady decrease in the BDV of both oils, when this result is compared with an earlier work done by Obande [8], it will be observed that due to the inclusion of water the BDV of both oils never exceeded 70kV and 62 kV respectively.

Dielectric dissipation factor Tan δ

The results of dielectric dissipation factor Tan δ measurements are presented in Figures 5

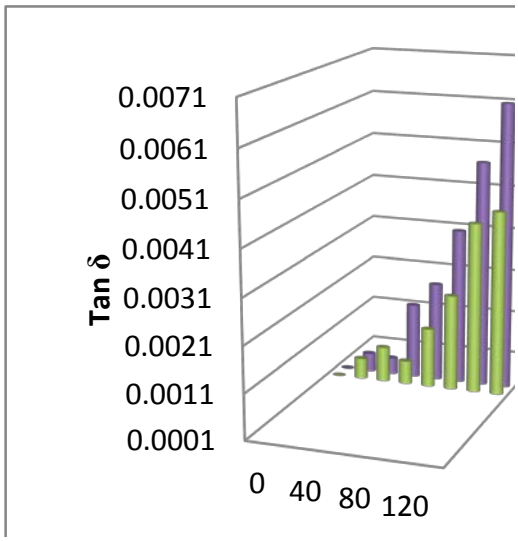

Figure 5: Graph of Tan δ vs. Ageing Time

The tan δ results of both types of oil along the ageing time were calculated from the mean of two consecutive measurements for each temperature.

The value of tan δ was determined using the loss factor measurement bridge.

The value of tan δ is strongly temperature dependent. IEC 60247standard requires for new insulation oils tan δ to be ≤ 0.005 at a temperature of 90°C. The graph shows an increase of tan δ which is an indication that the presence of

contaminants like water can considerably increase the value of tan δ this again is in agreement with Obande [8]. A rising dissipation factor is an indication of oil ageing or contamination. The dissipation factor is strongly influenced by polar components and is therefore a very sensitive parameter.

IV. CONCLUSION

The dielectric strength of transformer oil is defined as the maximum voltage that can be applied across the fluid without electrical breakdown. The dielectric breakdown voltages of the oil samples showed a decrease along the accelerated ageing process but were within the required range as per IEC60296 and VDE 03090 which stipulates that transformer-insulating oil must have a dielectric breakdown voltage of ≥50kV.

The measurements of tan δ showed an increase along the accelerated ageing process which implies that the presence of moisture in the oil samples is responsible for this increase.

The result clearly shows that if RBDPO is properly treated to remove moisture, it can be used as a transformer coolant.

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Antibacterial Screening for Selected Medicinal Plants in Northern Province.

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Introduction:

Siddha system of Medicine has so many preparations for diseases. Siddha drugs are herbal based medicine. We use the herbal plants for preparing the drugs. All the plants are the backbone of Siddha Medicine. Several medicinal plants are used in skin disease. Siddha drugs are very effective for skin diseases. Piththa thosam is imbalanced from itsordinary level in skin disease and also raththa thaathu (blood) is affected by particular causes. We should give the causative and symptomatic treatment. The drugs can liberate the toxin from the body, purify the blood and neutralize the thosam.

The emergence of new infectious diseases, several infections that appeared to have been controlled and the increase in bacterial resistance have created the necessity for studies directed towards the development of new antimicrobials. Considering the failure to acquire new molecules with antimicrobial properties from microorganisms, the optimization for screening methods used for the identification of antimicrobials from other natural sources is of great importance.

Antibacterial property meanshaving the ability to suppresses their growth or their ability to reproduce and destroy the bacteria. Heat, chemicals such as chlorine, and antibiotic drugs all have antibacterial properties.

The shelf life of the products can be extended by taking hygienic measures during the manufacturing process. As the consumer trend today is towards preservative-free foods with a long shelf-life, industry is being forced to rethink its manufacturing methods. A clean and hygienic manufacturing environment is an essential prerequisite in order to keep contamination-related reject rates low.

Justification

- Following plants are commonly available in Northern Province. So we can easily collect the plants.
- Selected medicinal plants are commonly used to treat skin diseases without any side effects and their action has not been proved scientifically.

Literature Review

Heliotropium indicum is a medicinal plants known as thel kodukku (Njs;nfhLf;F).A coarse annual herb , 30-60m tall. Stems stout, erect with ascending branches, hispid

with with long spreading hairs, internodes 3-6cm long hispid. Leaves are Simple, often sub opposite, 3.5-6 cm broad ovate, often unequal sided. Rounded and suddenly contracted to a decurrent base, acute or margin, bristly hairly on both sides with longer hairs on prominent veins beneath. Petides 1-2cm long. Winged, bristly hair.

“thq;Fj;jp dPu;thq;Fk; thj FUthFk;

Jq;fj;ij fhz;gpf;Fk; el;ghW vq;f

Kupr;R tplhky; tsu;f;Fnkd; - ehSk;

tpUr;rpfs; $ykpJ nka;”

“Njs; nfhLf;Fs; lhapw; wpstlq;Fj; jg;ghJ

ehl;gl;l Gz;fug;ghz; ehrkhk;- fPl;gl;l

khw;;w fzKkWk; rpy;tplk; Nghk;

Nghw;w kUe;jhFk; Gfy;”

*Cassia alata*is medicinal plants known as vandu kolli (tz;Lnfhy;yp) in Englishwinged alata. Description - A large shrub with very thick , finely downly branches. Leaves – large , sub sessile , 30-60 cm long , pinnate , leaflet 8 – 12 pairs , each 5 – 15 cm long , oblong obtuse , minutely mucronate , rigidly subcoriaccous , glabrous OR odscurely downly beneath , broadly rounded and oblique at the base , rachis narrowly winged on each side of the base , stipules deltoid , rigid , persistant , articulate , 6mm long. Leaves are commonly used in medicine.

*Aristolochia bracteolata*is medicinal plants known as aadutheenda paalai (MLjPz;lhg;ghiy**).**A weak prostrate perennial herb with slender branched glabrous stem.Leaves : Simple, alternate, 1.2-5cm long and as broad , reniform/ broadly ovate , deply correlate at base, rounded but often apiculate at apex, minutely crisped on margin , petioles 1.2-1.8cm long. Leaves and roots are commonly used in medicine.

*Thespesia populnea*is medicinal plants known as poovarasu (g+tuR)**.** Description: A small tree 10-15cm high with arough lenticelled bark and dense top all parts covered with peltate scales. Leaves, bark and flowers are commonly used in medicine.

Ehw;whz;L nrd;wnjhU Ehz;g+ turk;Ntu;

Jhwhz;l Fl;ilj; njhiyf;Fq’fhz; - tPwpg;

gOj;j ,iy tpijg;g+g;gl;;lapit fz;lhe;

GOj;j Gz; tpNur;rdKk; Nghk;”

*Azadiracta indica*is medicinal plants known as vembu (Ntk;G) in Englishneem. A tall tree with spreading branches a straight brown barked trunk glabrous young parts leaves alternate. Leaflet 2-8 pairs. Ovary superior 3 lobular , with 2 collateral ovules stigmas 5 – lobed. Leaves, bark, flowers and seeds are commonly used in medicine.

“fpUkpFl;l khe;jq; nfLtplRuq;fs;

nghUkpak; #upifapd; Gz;fs; xUkpf;f

epk;gj;jpiyapUf;f ePLyfpy; ePq;fhky;

jk;gj; jpiyapUf;ff; fhz;”

Plants are a potential source of antimicrobial compounds and several researchers throughout the world are investigating the

antimicrobial activity of medicinal plants, which are utilized in the traditional or alternative health systems. Screening of medicinal plants for therapeutically active bio-molecules including those with antimicrobial properties has gained an unprecedented importance in the recent years and World Health Organization (WHO) has recently shown genuine interest in promoting the development and utilization of indigenous medicinal plant resources in the developing countries so as to extend safe and effective healthcare to maximum number of population in those countries. Therapeutically active principles are extracted from all parts of the plant body, but the concentration of these components varies from part to part. Normally, parts known to contain the higest concentration of principles are preferred to therapeutic purpose and it can either be the leaves, stems, barks, roots, flowers and seeds. It is therefore important to consider the commonly considered or preferred part of the target plant by the traditional healers while exploring effective therapeutic agents.

Methodology

Plants were collected from the field visit in Jaffna district.Collected leaves were dried in shadow, ground well finely powdered. Then packed and labelled at the pharmacy in Unit of Siddha Medicine. The powders were sent to laboratory of Botany for the antibacterial screening. ProfessorPiyal A. Marasinghe, Scientific Officer in charge, Medicinal plant garden, Haldummulla authenticated the taxonomy of plants.

In the Antibacterial screening, Chloroform and Ethanol extracts of *Azadirachta indica,Aristolochia brachteolata,Heliotropium indium, Thespesia populnea*and *Cassia alata* were used. Dried powders of the leaves of the above plants were sequentially extracted using Chloroform and Ethanol and the solvents in the extracts were evaporated using rotavapor at 50 °C . Then test concentrations were prepared by dissolving the dried crude extract in DiMethySulfoxide (DMSO) and Acetone mixture in 1:1 ratio. Inhibitory capability was detected by agar well diffusion method. Each extract was tested for all selected bacteria *Proteus sp.*, *Pseudomonas sp.*, *Bacillus sp.,Staphyllococcus aureus* and *Streptococcus sp.* on triplicate plates and the data were analysed statistically using Minitab (one way ANOVA followed by LSD).

Result and Discussion

Extract	Bacteria				
	Proteus sp.	*Pseudomonas sp.*	*Bacillus sp.*	*Staphylococcus sp.*	*Streptococcus sp.*
CA	_	_	14.90±0.36^{e}	_	_
CA1	_	_	16.77±0.25^{d}	9.97±0.15^{c}	9.50±0.10^{f}
CT	_	_	13.00±0.20^{f}	_	9.53±0.06^{f}
CP	14.07±0.21^{d}	13.93±0.30^{a}	15.00±0.20^{e}	15.90±0.10^{a}	13.77±0.21^{c}
CV	_	11.90±0.36^{b}	8.97±0.15^{i}	_	_

EA	_	14.03±0.15[a]	13.00±0.20[f]	16.00±0.20[a]	13.10±0.27[d]
EA1	_	_	11.87±0.23[g]	9.03±0.21[c]	_
ET	_	9.730.12[cd]	9.93±0.21[h]	14.00±0.10[b]	13.03±0.25[d]
EP	_	_	21.07±0.21[c]	_	_
EV	_	10.00±0.10[c]	9.43±0.12[i]	_	9.57±0.21[f]
A	15.00±0.10[c]	_	38.93±0.40[b]	_	12.03±0.25[e]
S	19.97±0.15[b]	_	40.67±0.67[a]	_	17.03±0.15[b]
C	18.87±0.51[a]	_	20.97±0.15[c]	10.03±0.25[c]	20.07±0.31[a]

CA,CA1,CT,CP,CV - Chloroform extracts of *Azadiracta,Aritalochia,Heliotropium,Thespesia*, *Cassia alata*

EA,EA1,ET,EP,EV – Ethanol extracts of *Azadiracta,Aritalochia,Heliotropium,Thespesia*, *Cassia alata*

A,S,C –– Amoxycilin,Streptomycin, Chloxyciline

If we look at the results of Chloroform extracs, *Azadirachta indica*,inhibits only*Bacillus sp*. and other bacteria were not atall inhibited. *Aristolochia brachteolata*, inhibits Bacillus *sp*. *Staphyllococcus aureus*, and *Streptococcus* sp. and not others. *Heliotropium indium*, inhibits only Bacillus *sp*. and *Streptococcus sp.Thespesia populnea* inhibits all tested bacteria. *Cassia alata* inhibits only*Pseudomonas sp*. and *Bacillus sp.* If we look at the Ethanol extracts,*Azadirachta indica* inhibits all the bacteria except *Proteus sp.Aristolochia brachteolata*,inhibits *Bacillus sp*. and *Staphyllococcus aureus.Thespesia populnea* inhibits all the bacteria except *Proteus sp. Heliotropium indium*,inhibits only *Bacillus sp.* and *Cassia alata*inhibits *Pseudomonas sp*., *Bacillus sp*. and *Streptococcuc sp.*

Chloroform extract of poovarasu shows inhibition effect on all tested bacteria. Ethanol extract of vembu and poovarasu also inhibit most of the bacteria tested except *Proteus sp.* Although Chloroform and Ethanol extracts of poovarasu is efficient in controlling a wide spectrum of gram (+)ve and gram (-)ve bacteria, inhibitory effect is greater with chloroform than ethanol.Inhibition of bacteria by standardantibiotics(Amoxyciline,Streptomycin,Chlo -xyciline) vary widely.

Some bacteria were not at all inhibited by standard antibiotics. *Pseudomonas sp*. was not inhibited by all three antibiotics used in the study as positive control.But inhibition by Chloroform extract of *Thespesia*,*Cassia* and Ethanol extract of *Azadiracta,Heliotropium* and *Cassia.Staphyllococcus aureus* was not inhibited by Amoxyciline and Streptomycin, but Chloxyciline showed some inhibition.*Staphyllococcus aureus* was inhibited by Chloroform extract of *Aristalochia*,*Thespesia* and Ethanol extract of *Azadiracta,Aristalochia* and *Heliotropium.Bacillus* sp. was inhibited by all plant extracts (chloroform andethanol).

Streptococcus sp also variably inhibited by Chloroform and Ethanol extracts of some

plants.But the inhibition by Chloroform extract of *Thepesia* and *Cassia alata* and Ethanol extract of *Heliotropium* was found to be higher than the inhibition by Standard antibiotic Amoxyciline.The higher inhibitory effect of some plant extracts may be due to the synergistic effect of the compounds present in the crude extract.

Further investigation to report the active ingredients in the crude extracts would be very useful to address the control of diseases.

Conclusion

Speciality of Siddha System is preventing and treating chronic diseases by means of natural herbs.In this skin diseases are important.There are many herbs used in treating and caring skin diseases.Most of them consistanti-microbial activity .Use of these herbs in certain cosmetics, perfumes,herbal body lotions, facial creams, packs, bath powder etc reduce the act of skin infections by eradicating certain organisms .Even in this centuary the folks mostly prefer natural and herbaceous products other than artificial substances . In our vicinity the herbs that used in skin problems are with high Anti microbial activity .In case it is much useful in using these herbs as they are readily available from natural habitats like waste lands,river valleys and coastal region etc. and they are free from harmful chemical residues which may be present in herbs from cultivating them using conventional methods.

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Waiting Time Analysis of Pharmaceutical Services with Queue Method In PKU Muhammadiyah Hospital Bantul

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Abstract- The increasing number of patient visits in the Outpatient Pharmacy Installation of Pku Muhamadiyah Hospital Bantul in 2016, impact on the number of recipes that should be served by the higher staff. This leads to long queues due to the slow service process that also affects long waiting times. Knowing the picture of waiting time of outpatient pharmacy service, Identify model of queuing system, and identify any factors influencing waiting time of outpatient pharmacy service. This research is a quantitative research with descriptive observational research method from samples taken and to support this approach, the researcher also conducted qualitative observation by doing observation interview. The average waiting time of outpatient pharmacy service is 39.23 minutes with the longest service time reaching 54.08 minutes and the fastest time of 19.04 minutes. The process of service delay at the time prior to delivery of the drug is the most contributing greatly affecting service time. From result of analysis using queuing method obtained queuing system Pharmacy Outpatient PKU Muhammadiyah Hospital Bantul have pattern of arrival of Poisson distributed patient, time of patient service of Poisson distribution and result, as follows: Lq = 14,27; L = 16.15; Wq = 0.3036; W = 0.3436; Po = 3.09%, and Officer busyness level is 94%. The percentage of unemployed time officers whose value is 6% then the number of IFRS of PKU Muhammadiyah Bantul is not ideal yet. There are factors that influence the service time, among others; Availability of tbsp means of infrastructure, delay, and peak hours of service. The level of busyness of the officers is very high 94%, need additional staff to decrease workload (utility) officer and waiting time service.

Index Terms- waiting time, outpatient pharmacy, queuing system

I. INTRODUCTION

The hospital is one of the important networks of health services, the conditions with the tasks, burdens, problems and hopes that are hung on it. The development of number of hospitals in Indonesia, followed by the development of disease patterns, the development of medical technology and health and the development of public expectations of hospital services. It should be realized that the main purpose of hospital activities is to serve patients and their families, in various forms of service [1]. One part of the hospital service that is busy every day is outpatient pharmacy service. The large number of patients served by the number of officers who serve also affects the speed of service. If the service personnel is too little while the patient must be served greater then it will impact on service quality and patient satisfaction. On the other hand, if the service personnel is more than the optimal number, this means needing excessive capital investment, but if the amount is less than optimal result is delayed service [2]. Increased outpatient visits, especially in the Outpatient Pharmacy Installation service in 2016 with an average visit of 118,838 per month. The impact is the number of recipes that the officer must serve higher. This leads to long queues due to the slow service process that also affects long waiting times.

The average waiting time depends on the average rate of service. The queuing process is a process associated with the arrival of a customer at a service facility, then waits in a row (queue) if all the maids are busy, and finally leaves the facility. A queuing system is a set of customers, servants, and a rule governing the arrival of customers and processors of the problem [3].

There are several important factors that are closely related to the queuing system. Factors that affect the queue and service line according to Kakiay are as follows:

1. Distribution of arrival In queue system,
2. Time Distribution Service Distribution time of service related to how many service facilities that can be provided.
3. Service Facilities Service facilities are closely related to the line of queues to be established.
4. Service discipline
   Service discipline is closely related to the order of service for that customer. The discipline of service is divided into four forms, namely:
   a. First come, first served (FCFS = first come first service)
   b. Last come, first served (LCFS = last come first service)

No	Recipes Flow	Fastest Time	Oldest Time	Average (minutes)
1	Reception prescription(verification)	1,57	5,32	3,39
	Delay	1,00	4,57	3,10
2	Material Taking	1,52	4,37	3,21
	Delay	1,00	4,27	2,26
3	Writing Etiquette	0,30	2,01	1,03
	Delay	3,49	10,57	7,27
4	Counseling	0,48	1,59	1,11
	Average Waiting Time Overall	22,37		

c. Service in random order (SIRO = random service)
d. Priority service which means the service is done specifically on the main customer (VIP customers) [4].

5. Size in Queue
The amount of queue of customers who will enter the service facility also needs to be considered. There are two designs to choose from to determine the magnitude of the queue:Unlimited arrival size (infinite queue) and limited arrival size (finite queue)

6. Calling Resources
In service facilities, which serve as a source of calling can be either machine or human. If there are a number of machines that are damaged, then the source of the call will be reduced and can not serve the customer. There are two types of calling sources:Finite calling source (finite calling source) and unlimited calling source (infinite calling source)

II. METHODS

This research uses quantitative approach and supported by qualitative. Quantitative method is used in observation of prescription service waiting time to be analyzed using queuing method, while qualitative research with direct observation and in-depth interview to know the factors that influence service waiting time.

III.RESULTS AND DISCUSSION

1. **Outpatient pharmacy service waiting time**
Based on the observation of outpatient pharmacy waiting time for non-concrete recipes, it is known that the average waiting time is 22.37 minutes, can be seen in Table 1 below
Table 1. Waiting Time of Non-Raised Prescription Service of PKU Muhammadiyah Hospital Bantul

While the result of direct observation of waiting time of pharmacy service of special outpatient of prescribed concoction known mean waiting time is 41,22 minutes, with the longest service time reach 54,08 minutes, can seen in table 2.

Table 2. Description of Waiting Time Prescribed Prescription Service

No	Recipes Flow	Fastest Time	Oldest Time	Average (minutes)
1	Reception prescription(verification)	2,31	6,58	4,59
	Delay	2,56	6,57	4,62
2	Material Taking	2,51	5,37	3,58
	Delay	1,25	4,58	3,33
3	Compounding (indirect)	3,00	9,06	6,32
	Delay	1,13	5,36	3,30
4	Writing Etiquette	0,49	2,52	1,22
	Delay	3,54	16,56	11,37
5	Counseling	0,57	2,34	1,29
	Average Waiting Time Overall	41,22		

From the observation and calculation of service waiting time of IFRS of PKU Muhammadiyah Bantul, both direct recipes and recipes must be made mixed, the most contributing part causes the waiting time to be long can be seen in table 3.

Table 3. Percentage Average Waiting Time Match Flow

Size of System Performance	**System Performance**
Probability no customers (Po)	3,09 %
Average Number of Customers in the system (L)	16 people
Average Time spent in system (W)	0.3436 hour
Average number of subscribers in the waiting queue served (Lq)	14 people
Average time spent in line to wait served (Wq)	0.3036 hour
Employee's busyness level ()	94 %

The most delayed service time causes the waiting time to be longer, with the average delay time reaching 57.06%, the delay time before the delivery of the drug to the patient (counseling) is the longest delay time with the average delay time reaches 11, 37 minutes or 28.74%.

Prescription Flow	Average Wait Time	Percentage%
Reception prescription(verification)	4,59	11,58
Delay	4,62	11,6
Material Taking	3,58	9,03
Delay	3,33	8,40
Compounding (indirect)	6,32	15,95
Delay	3,30	8,32
Writing Etiquette	1,22	3,07
Delay	11,37	28,74

2. Queuing Analysis

The outpatient pharmacy instalation unit of PKU Muhammadiyah Hospital Bantul is the place to be analyzed to determine the queuing model. An analysis of the steady-state size of the performance is presented in Table 4. An analysis of the queuing system model is presented in Table 5

Table 4. Measures of Steady State Pharmacy Unit Outpatient PKU Muhammadiyah Hospital Bantul

Installation	C	Λ	μ	$\rho = \frac{\lambda}{c \times \mu}$	Steady-state
Counseling			1,29		3,25
Pharmacy	1	47	25	1,88	Not Fulfilled

From the results of the above table was found outpatient pharmacy unit PKU Muhammadiyah Hospital Bantul condition is not steady-state, the state is not steady state then the queue model and performance of pharmacy outpatient queue system can not be known because it does not meet the requirements.

Table 5. Measurement Queue Performance System with Multi Channel

The outcome measure of queue pharmacy queue system performance with multi-channel that is probability no customer (Po) is 3.09%. The average number of subscribers in the system (L) is 16.14 people and the average number of subscribers in the waiting queue served (Lq) is 14.26 people. The average time spent in the system (W) is 0.3436 hours and the average time spent in the queue to wait served (Wq) is 0.3036 hours. Employee's busyness level is 94%. The waiting time of prescription service both non-concoction drug and concoction in IFRS PKU Muhammadiyah Bantul is 39.23 minutes.

From the result of performance calculation, we get the best queuing model structure with the characteristics of IFRS PKU Muhammadiyah Bantul is M / M / 2: FCFS / ∞ / ∞, which means arrival rate following poisson distribution (M) and service level following poisson distribution (M) . Number of servers receiving 2 recipes with First Come First Serve (FCFS) service rules. Unlimited queue length (∞) and unlimited population size (∞). In accordance with the results of research Wahyuningtyas (2013), obtained queue model at the pharmacy of Dr.Kariadi Hospital Semarang is M / M / 2: FCFS / ∞ / ∞ with service level berpistrubusi poisson or random and level of poisson distribution service, The number of server 2 with the rule of First Come First Serve (FCFS). Unlimited queue length (∞) and unlimited population size (∞).

3. Factors that affect service time

The cause of the long waiting time of prescription service process at IFRS PKU Muhammadiyah Bantul was analyzed by qualitative data collection method (observation), among others;

a. Employee

There are several service points that the number of employees is less, especially during peak hours of service, among others at the time of drug compounding (AA) and drug delivery (pharmacist). Lack of employee resulted in a longer service delay time. According to Margaret, the way to reduce delay time is by increasing the number of "payment units" or servers, especially during peak hours [5]. It has considerable potential to decrease the lag (delay) time. The addition of workers can streamline services to IFRS PKU Muhammadiyah Bantul, but also need further consideration with the addition of employees or workers require a fee, so that the addition of employees can be done at peak hours just to be more effective.

b. Infrastructure

The area of the building (room) IFRS PKU Muhammadiyah Bantul narrow, has not fully provide comfort to employees. At the time of many concoctions recipe, employees alternately disperse the drug due to a less extensive area.

c. Service Hours

One of the external factors affecting waiting time is the practice of concurrent Doctors, especially poly-recipes making polishes such as poly diseases, child poly, and skin poly.

According to Nurjanah, as for the problem of waiting time of prescription service to be long that is the availability of labor and visiting hours of patients [6]. So these factors have an impact on patient satisfaction in terms of waiting time service

IV. CONCLUSION

Based on the results and discussion then it can be concluded:

1. Outpatient pharmacy service waiting time at IFRS PKU Muhammadiyah Bantul as follows:
   a. Waiting time of service either direct recipe or recipe indirectly got average time 39,23 minutes
   b. The longest service time reaches 54.08 minutes, while the fastest service time is 19.04
   c. The point of the waiting time of prescription service is seen in the delay process before the drug administration (counseling) is 9.32 minutes. The existence of a delay component that contributes greatly causes the process to be long. Delay is caused, among others, lack of officers for pursuing other activities.
2. Characteristics of IFRS model of PKU Muhammadiyah Bantul
   a. The best queue model for IFRS Pku Bantul is (M/M/2):(GD/∞/∞)
   b. The performance of the IFRS Pku Muhammadiyah Bantul queuing system, the probability of no customer (Po) is 3.09%. The average number of subscribers in the system (L) is 16.15 people and the average number of subscribers in the waiting queue served (Lq) is 14.27 people. The average time spent in the system (W) is 0.3436 hours and the average time spent in the queue to wait served (Wq) is 0.3036 hours. Employee's busyness level is 94%.
   c. The level of busyness of the officers is very high 94%, need additional staff to reduce workload (utility) officer and waiting time service.

V. SUGGESTION

Outpatient pharmacy service waiting time at IFRS PKU Muhammadiyah Bantul, especially indirect drugs, has not yet reached the indicator of waiting time of IFRS PKU Muhammadiyah Bantul. This is due to the lack of stability, between the patient's arrival rate and the number that can be served. It is expected that the management should pay more attention to the following matters:

1. Review the number of employees available today,especially on shifts when service is busy.
2. Seeking repair or improvement of infrastructure facilities especially outpatient pharmacy room, for the convenience of

employees and pay attention to waiting room of patient because still found patient standing did not get seat while waiting for drug service.

3. Coordinate with your doctor or clinic regarding the practice schedule

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To Compare the Knowledge and Attitude towards Hand Washing Technique among School Children in Urban and Rural Area

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ABSTRACT

Background:- Children love to play with mud and sand, which host a lot of germs which can cause illness. Teaching them the significance of proper hand washing is a very crucial step towards living a healthy life. Encouraging children from an early age to wash their hands will help to ensure that this practice becomes a lifelong habit. The transmission of common communicable infections such as colds and flu can be prevented by following good hand hygiene. **objective :-** a)To assess the knowledge and attitude towards hand washing technique among school children in urban area. b)To assess the knowledge and attitude towards hand washing technique among school children in rural area. c)To compare the knowledge and attitude of school children towards hand washing technique in urban and rural area. d)To associate knowledge and attitude of school children with selected demographic variables in urban and rural areas. **Material and method** :-the study was conducted in selected urban and rural area of wardha district. exploratory research approach was used in this study.100 school children were selected for the study. Structured knowledge questionnaire were used to collect the data .**Result:-** the school children 33(66%) of sample having very good level of knowledge,10(20%) of the children were having good level of knowledge,6(12%)of sample having excellent level of knowledge in urban area whereas 24(48%) of sample having very good level of knowledge,20(40%) of sample having good level of knowledge, 4(8%) of sample having excellent level of knowledge,2(4%) were having average level of knowledge in rural area. When dealt with attitude all rural school children 50(100%) of had strongly positive attitude towards hand washing technique and in urban area 49(98%) of school children had strongly positive, 1(2%) of children were having positive attitude. **conclusion :-** after detailed analysis, it was found that significant difference was found in knowledge and attitude score between urban and rural school children towards hand washing technique. **Key words** :-knowledge; attitude; school children; hand washing technique.

Introduction

Our hands do so much for us. They are capable of a wide variety of functions: touching, grasping, feeling, holding, manipulating, caressing, and performing daily activities and more. They are a vitally important part of who we are and how we see ourselves [1].

Keeping hands clean through improved hand hygiene is one of the most important step one can take to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean running water. The use of soap and available water is the best way to keep hands clean and free of micro-organisms[2] .

Common childhood infections like childhood diarrhea, respiratory illnesses and bacterial skin infections can be averted by simple hand washing with soap before eating and after using the toilet. In India, a survey carried out by UNICEF among school children revealed that about half the ailments found were related to unsanitary conditions and lack of personal hygiene. It is important for grade-schoolers to practice good hygiene particularly hand washing because they spend so much of their time in close contact with each other in the classroom, sharing everything from desks and chairs to germs. In a low-income area of India, where families could not afford soap. Through donations, they supplied the families with soap and taught them correct hygiene practices. This reduced childhood infections in that region to 50 percent[3]. The objective of the study is To assess the knowledge and attitude towards hand washing technique among school children in urban area. To assess the knowledge and attitude towards hand washing technique among school children in rural area. To compare the knowledge and attitude of school children towards hand washing technique in urban and rural area. To associate knowledge and attitude of school children with selected demographic variables in urban and rural areas. The assumptions of study are Urban and rural school children may have some knowledge regarding hand washing technique. Urban and rural school children may have different attitude towards hand washing technique.

Background :

Children love to play with mud and sand, which host a lot of germs which can cause illness. Teaching them the significance of proper hand washing is a very crucial step towards living a healthy life. Encouraging children from an early age to wash their hands will help to ensure that this practice becomes a lifelong habit. The transmission of common communicable infections such as colds and flu can be prevented by following good hand hygiene. Teaching

proper techniques of hand washing to children will not only help to influence their hand washing practices at home but also at school[4].

Hand washing helps stop the spread of germs and illnesses. Once the bacteria and germs are on a child's hands, they can travel to other areas of the body easily. Children spread germs by touching their eyes and mouth. They can also spread germs by shaking another person's hand, sharing toys and other articles. From a young age, children need to learn when and how to wash their hands[5]

A majority of hand washing education programs begin with explaining how, why and when to wash hands. The CDC (2009b) recommends washing hands by rubbing together for at least 10- 15 seconds using warm water and soap. All surfaces of the hands, wrists, palms, back of hands, fingers and under fingernails should be washed. After washing, a hand lotion is 10 recommended to prevent dry skin. Studies have utilized presentations and discussions as part of a multi-activity hand washing program that results in positively influence hand washing behaviors in children[6].

Materials And Methods:

The exploratory Research approach and descriptive study design was used in this study. The study was conducted in the selected urban and rural area in Wardha district during year 2015 to 2016. The population of the study was school children. The sampling technique used was non-probability convenience sampling. The study was approved by the institutional ethical committee and the study was conducted in accordance with the ethical guidelines. A structured questionnaire was used for data collection. The analysis was done with the help of SPSS software for statistics.

Results

It shows that, 21(42%) samples of urban area and 20(40%) samples of rural area were from age group of 11-12 years. 27(54%) samples of urban and 26(52%) samples of rural area of the subjects were females. 14(28%) samples of urban area and 13(26%) samples of rural area had 6th class education of child. 23(46%) samples of urban area and 17(34%) samples of rural area had higher secondary education of father. 22(44%) samples of urban area and 25(50%) samples of rural area had higher secondary education of mother.

The findings show that, all school children 33(66%) of sample having very good level of knowledge,10(20%) of the children were having good level of knowledge,6(12%)of sample

having excellent level of knowledge in urban area whereas 24(48%) of sample having very good level of knowledge,20(40%) of sample having good level of knowledge, 4(8%) of sample having excellent level of knowledge,2(4%) were having average level of knowledge in rural area. When dealt with attitude all rural school children 50(100%) of had strongly positive attitude towards hand washing technique and in urban area 49(98%) of school children had strongly positive, 1(2%) of children were having positive attitude.

In urban area, mean and percentage of knowledge score was 14.20 and 71 whereas in rural area, it was 12.82 and 64.1.So, it is concluded that urban school children had more knowledge regarding hand washing technique than rural school children. In urban area mean and percentage of attitude score was 46.18 and 92.36 whereas in rural area it was 47.86 and 95.72. So, it is concluded that rural school children have more attitude towards hand washing technique than urban school children.

The findings show that there is significant difference in knowledge and attitude score between urban and rural school children towards hand washing technique. Thus the H_1 and H_2 are accepted.

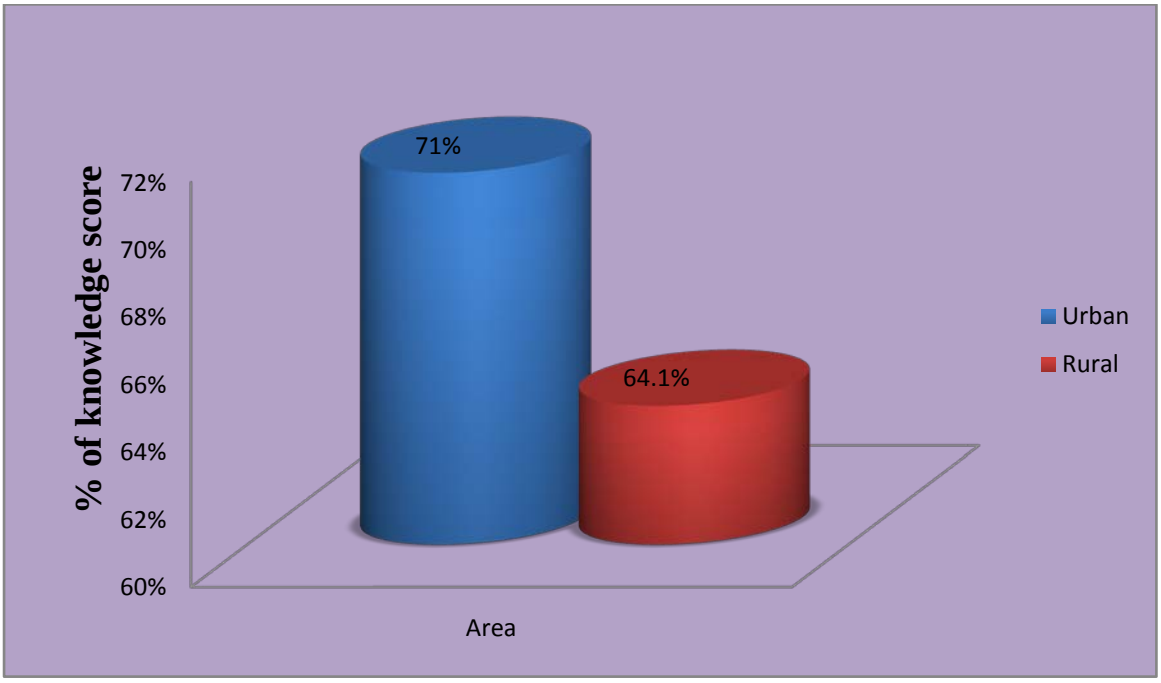

Figure 1: Comparison of percentage of mean knowledge score of school children's in urban and rural areas

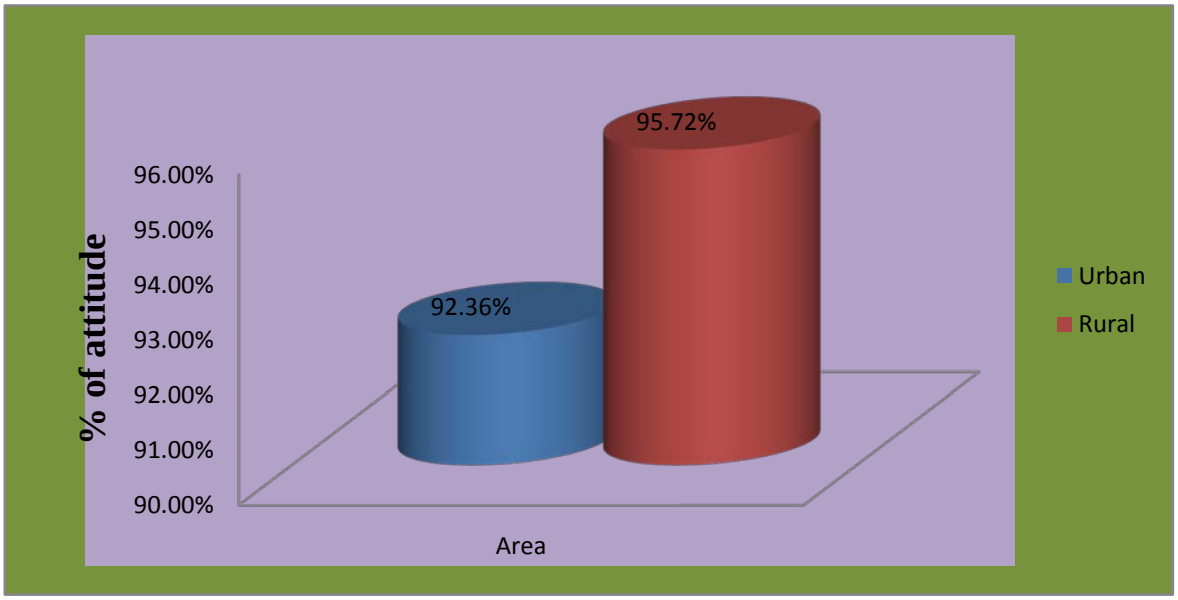

Figure 2: Comparison of percentage of mean attitude score of school children's in urban and rural areas

Discussion

The finding of study shows that in urban area mean and standard deviation was 14.20 and 2.41 whereas in rural area, mean and standard deviation was 12.82 and 2.73 respectively. And also the mean percentage of knowledge score of urban and rural school children was 71 and 64.1 respectively. so it is concluded that urban area school children had more knowledge regarding hand washing technique than rural area school children.

Coming to attitude score, in urban area mean and standard deviation was 46.18 and 2.98 whereas in rural area, mean and standard deviation was47.86 and 1.84 respectively. And also percentage of attitude score of urban and rural school children was 92.36 and 95.72 respectively. So it is concluded that rural area school children have more attitude towards hand washing technique than urban area school children.

Childhood is acknowledged as the best time to adopt new behaviours. After the family, schools are potentially very important places for learning new behaviours[5]. Schools can provide a stimulating environment to learn about hand washing and other hygiene behaviours, and they can initiate change, with teachers and other students acting as stable role models. Children are potential agents of change within their families and community[6].

Recommendations

- A similar study may be conducted on a larger population for generalization of findings
- Studies can be replicated with a control group and on large population
- Comparative studies can be done to assess the practices in various regions of the country.
- Studies can be conducted to assess the practice regarding hand washing technique among mothers.
- Studies can be conducted to evaluate the effectiveness of planned teaching on similar problem.
- A similar study can be conducted considering different age group of children.

Conclusion

The present descriptive study findings shows that significant difference was found in knowledge and attitude of urban and rural children, among those urban school children are having more knowledge than rural school children whereas the rural school children were having more attitude towards hand washing technique than urban school children.

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The Dynamic Connections between Theory and Qualitative Approach

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Abstract- This paper takes stock of the role of theory in the humanities away from the usual notion that it has no place in qualitative inquiry. The paper then maps the broader view of qualitative approach in an academic writing, it goes further to diffuse some misunderstandings, analyses the specifics of qualitative research, and outlines some practical significances of theory in the humanities as a paradigm, or that which may inform our understanding of the phenomenon under exploration. The use of theory in an academic writing is seen as that which underpins research design, as a lens which may emerge from studies usually viewed as new knowledge. Some recommendations were made on how best to use a theory when reporting qualitative inquiry.

Index Terms- Qualitative Approach, Method, Theory

I. Introduction

This paper is a portion of a study I conducted for my doctoral researchin which qualitative approach was adopted. Here, I intend to focus on the importance and appropriateness of theory in qualitative inquiry.This is because; researchers using such approach do not consistently articulate how theory should be applied (Yin, 2012). This is unlike the fact that there is hardly any discrepancyor heated debate on the role and position of theory in quantitative research.In my initial research, an exploration was undertaken on the influence of socio-cultural values on girl-child education in Yobe State, and the broad objective was not to make a generalization, but to explore the research problem with a view to establishing a detailed meaning of the central phenomenon from the informants' viewpoints. The fact is that most scholars seeking to answer questions about culture and meaning in a detailed manner have found quantitative and experimental methods to be inadequate on their own in explaining the phenomenon they wish to study (Cibangu, 2012). However, the most contentious issue, researchersare often beset with have to do with the role of theory in a qualitative inquest.

II. QUALITATIVE APPROACH AND METHOD IN AN ACADEMIC WRITING

Generally, humanities research has been likened with the endeavour to interpret the meaning and/or study subjective and none measurable phenomenon. As such, a clear definition of the qualitative approach is necessary so as to justify its usage in an academic writing. Ordinarily, it has been challenging to give an exact and acceptable definition when discussing qualitative inquiry. However, among the available definitions accessible in many books, Merriam (2014); Creswell (2013); Yin (2009 & 2011) Krauss (2005); Shank (2002); Bogdan &Biklen, (1992) offered a relatively comprehensive explanation on some terms. For instance, Shank (2002) outlines qualitative research as a form of systematic and empirical inquiry into meaning. In this regard, he viewed the word "systematic" as something "planned, ordered and public", which follows agreed rules. By empirical, he means that this type of inquiry is grounded in the world of experience. While the inquiry into meaning speaks volume of how researchers try to understand how others make sense of their experience(s). Also, Krauss (2005) defined qualitative inquiry as one of the ranges of approaches through the exploration of both behaviour and human experience. So, the submissions made by Krauss (2005) show how a researcher using a qualitative approach seeks to inquire and explore what others do and say. It is an inquiry which seeks to understand social phenomena through in-depth exploration and interpretation of the meanings people attach to, and make sense of their experiences of the social world. For instance, in my earlier research which specifically focused on inquiry about the socio-cultural context of a particular social group, an ethnographic method was thus adopted which sought and understood the research problem from the viewpoints of the native people involved (Merriam, 2014). It was a kind of narrative procedures and descriptions of the cultural behaviour of the group or an individual by describing and interpreting their roles. Under such a scenario, a researcher grasps, cached, heard, and at the same time comprehends the informants' viewpoints regarding their socio-cultural values. Accordingly, the meaning would always be the essential concern of the researcher which is an integral part of aqualitative inquiry. Nevertheless, whatsoever the meanings and importance resulting from the information received during data collection, there should never be an attempt from the researcher to influence the informants if not for domineering ones. For instance, during the heydays of my research, some informants during the focus group discussion appeared to dominate the discussions. In this case, one has to assume the role of a "moderator"in which I tried to moderate the process which is a commendable role expected of a qualitative researcher (Creswell, 2013).

Furthermore, the choice of qualitative approach is essential when every aspect of the research typically consisted of a set of visible narrations, descriptions, and interpretations practices based on the viewpoints of the informants. The whole process would pave the way for the researcher to involve in interpretive, descriptive, and naturalistic undertakings of the world of the targeted informants (Denzin & Lincoln, 2005). This means that the informants were being studied within their natural settings while struggling to make sense of the phenomenon and the

meaning they attached to their values (Lillis, 2008). Likewise, Schwandt, Lincoln, & Guba (2007) have confidence in this kind of approach as understanding in itself is a much better impression that is core in qualitative inquiry. Therefore, researchersfrom the humanities unnoticeableargued that the selection of qualitative approach and ethnography method are highly appropriate for understanding such social issues. It is worth mentioning here that, such researcher only tried to understand the overall setting and ultimately or at least in part helped others gain a better understanding of how the informants involved were seen in that specific situation. Besides, complex reality can only be understood as amalgam and not as simply a sum of its parts (Cibangu, 2012). On the other side of the spectrum, qualitative researcher(s) further contended that the approach preferred to create more pictures which covered the whole image with it, while quantitative approach normally deals with survey and measurement which does not represent the fieldwork scenario (Creswell, 2013). Thus, the process will enable a researcher to generate reliable and sufficient data over time based on underpinning theory(s).

However, the question arises here as to how can one collect data to describe social phenomena? What are data collection techniques appropriate to the methodology? It is important to point out that the means by which one explore the context (methodology) and the means by which researchers gather evidence (methods) were instrumental when writing a qualitative research. So, in qualitative inquiry data is primarily collected either through participant observation, interviews, focus group discussions, or through available data to describe social phenomena not to test the theories. The strategies of inquiry are appropriate to ontological/epistemological position, whether descriptive, confirmatory, explanatory, or exploration of other cultures (Creswell, 2013).

III. SOME DEFINITIONS OF A THEORY

But before dwelling into the details, it is imperative to throw more light on what a theory is all about when undertaking a qualitative inquiry. A theory is a generalized explanatory statement that asserts a connection between two or more types of phenomena (Tavallaei&Talib, 2010). It is an assembly of interconnected ideas or concepts that guide and organizes knowledge about the world. In this case, the theory becomes stronger as more supporting evidence is gathered; and it provides a context or framework for the capacity to generate new research. It is a framework or model for observing and understanding, which shapes both how we think, what we see and how we see it. This has shown that the theory is not fixed; it is provisional, open to revision and grows into more accurate and comprehensive explanations about the makeup and operation of the social world. As Ospina (2004) pointed out, theory enables us to connect a single study to the immense base of knowledge to which other researchers contribute. In other words, the aforementioned literature has shown that theory has the capacity to generate new ideas and research.

IV. THE CONNECTIONS BETWEEN THEORY AND QUALITATIVE APPROACH

Over the years, few books have addressed the theoretical status of the Arts and humanities as a whole. Of specific, one reason is that the field of humanities and the choice of qualitative research has been considered inferior in academic writing or scientific research. Another reason is that theory is simply understood as a purely intellectual exercise withdrawn from human progress and reality. As a result, misunderstandings concerning humanities research have increased (Malterud, 2001).

In this regard, some scholars Bogdan &Biklen, (1992) contended that qualitative inquiry is purely inductive and that its credibility could, therefore, be judged by the extent to which preconceived theory is absent from it. Specifically, Stake (1995) has stated that there should not be preconceived notions; frameworks or expectations guide the researchers when using a qualitative approach. Such authors explicitly insisted that the development of any kind of knowledge through qualitative approach should actually start in the absence of any theory. In addition, such a research requires a kind of withdrawal from the world and a willingness to lay aside existing theories is what is required from a qualitative researcher. Hence, a theory should not be applied.

Conversely, Mitchell & Cody, (1993) have not neglected the role of theory related to methodology and thus noted that most often with a qualitative research, one does not begin with a theory to test or to verify. Instead, they further acknowledged that consistent with the inductive model of thinking, a theory may, therefore, emerge either during the data collection and analysis phase or to be used relatively late in the research process as a basis for comparison with other theories. Thus, a researcher chooses the qualitative method for his or her work when there is little information about the topic and a relevant theory base is missing (Denzin & Lincoln, 2011). This has proved that the use of theory(s) in qualitative approach is important as it allows the researcher to make links between the theoretical and the empirical; thought statements and observational statements, etc. This informs our understanding of issues, which in turn, assists in making research decisions and making sense of the world (Mitchell & Cody, 1993). In the same regard, the theories and the approach are significant as they influenced the design, including decisions about what to research, and the development of research questions. In addition, the theories support the methodology, method adopted which at the end has implications for how data isanalysed and interpreted. Besides, people's behaviour has to be studied in everyday contexts, rather than under experimental conditions created by researchers. Consequently, the approach will provide in-depth information mainly generated from the few key informants, which facilitated considerable presence in the field. Moreover, the approach relied more on gathering data through spoken words from the key informants in order to understand their views about the case being studied. Thus, the approach is a non-statistical one which involved documenting real events and recording the informants' expressions, what they say or do through gesture and tones.

As it appears from the above summations, the qualitative researcher uses an appropriate theory which suits the topic by using the inductive method. In this regard, the standpoints of Anfara& Mertz (2006) have highlighted three distinct

understandings about the role of theory in qualitative researchers: (a) Either the chosen methodology underlying it relates to the researcher's theory (b) or in the qualitative research, the use of theory when compared to the methodology, has a relatively more broad role, and (c) the theory do not typically have a solid relationship with qualitative research. Therefore, the understandings are not finalized in this field of Arts and humanities, as well as and social sciences. This is because,some experts have acknowledged that there are no clear boundaries among such opinions.

V. CONCLUSION

Consequently, the fact that there is no clear consensus that exists regarding the appropriate application of theory in qualitative studies, I have intentionally chosen to use theory as it provides basic concepts which aided in deliberating the findings, discussions, and debate of my earlier study. To sum it up, whenever a researcher embarks on ethnography as a method, then the use of theory would serve as a tool for selecting the observed items, and will also be a guiding principle for the researcher in interpreting and limiting the role of cultural biases in the research (Maxwell, 2012, Guba & Lincoln, 1994).

In conclusion, as a consequence, the data obtained through ethnographic research findings are interpreted based on informants' assertions and according to the theories rather than using the researcher's own experiences and insights as a means for describing, interpretations and in reporting the research discussions.

VI. RECOMMENDATIONS

To cap it all, it is recommended that the use of theory(s) in qualitative inquest is important as it allows the researcher to define specific questions,make links between the theoretical and the empirical; influence the research design, define setting, identify the informants, collect initial data through observation, interviews, thought statements etc.

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Factors associated with the nutritional status of adults in Batticaloa district

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Abstract- Poor nutritional status is a chronic condition and the adult overweight and obesity is increasing rapidly worldwide due to environmental and behavioral changes such as urbanization and modernization. Data on nutritional status among adults in developing countries including the different regions are needed for primary prevention. This study was undertaken to assess the nutritional status among adults (above 18 years) in Batticaloa district and to examine the association of socio-economic, nutritional and lifestyle factors with weight distribution. A Cross-sectional survey was conducted among 400 adults aged above 18 years. Multi-stage sampling method was approached. Data on socio-economic, nutritional and lifestyle factors were collected and anthropometric measurements of weight, height and waist circumference were measured by using appropriate measuring scales. Under weight, normal weight, over weight and obesity were defined as Body Mass Index (BMI) <18.5 kg/m^2, 18.5-23 kg/m^2,> 23 kg/m^2 and > 27.5 kg/m^2 respectively. Nutritional status of adults and distribution of BMI by socio-demographic and lifestyle characteristics were assessed. Among 400 adults 11.7 % were underweight, 40.5 % were normal weight 30.3 % overweight and 17.5% were obese in Batticaloa district. In urban areas among 80 adults 6.3% were underweight, 31.2% were normal weight, 35.0% were overweight and 27.5% were obese. In rural areas among 320 adults 13.1% were underweight, 42.8 % were normal weight, 29.1% overweight and15.0% were obese. In the overall district, females were more overweight (17.3%) and obese (11.5%) than males. Adults belong to the age group of 35-44 years were more overweight and obese than others. Gender, age, marital status, ethnicity, occupation, smoking, alcohol intake, family history of overweight and obesity, sleeping habit after the meal in the evening, following weight reduction methods were the significant factors ($p<0.05$) associated with nutritional status of adults. As overall, majority of adults were in normal weight. In urban areas nearly one third percentage of adults were overweight and in rural areas most of the adults were in normal weight.

Index Terms- Nutritional status, Urban, Rural, Adults, Batticaloa.

I. Introduction

Poor nutritional status is a chronic condition which is caused by physiological, social, cultural, psychological, genetic, metabolic and behavioral factors (Kelly et al., 2008). The prevalence of poor nutritional status is increasing worldwide and the prevalence of adult obesity is increasing rapidly due to environmental and behavioral changes (Ramachandran & Snehalatha, 2010). Body Mass Index (BMI) is the indicator to identify whether a person is in underweight or normal weight or overweight or obesity. According to the Asian cut-offs BMI <18.5 kg/m^2 is under weight, 18.5-23 kg/m^2 normal weight, >23.0 is overweight and BMI >27.5 is obesity (Katulanda et al., 2010). Physical inactivity, dietary habit, smoking, alcohol use and high socio-economic status are some of the risk factors of overweight and obesity (Janssen, Katzmarzyk & Ross, 2002). Poor nutritional status leads to serious health problems mainly for non-communicable diseases (Janus et al., 2007). There were many studies regarding nutritional status conducted in Sri Lanka; however there were no studies on nutritional status among adults in the North and East provinces. Batticaloa has high prevalence of overweight and obesity among adult women (DCS &MOH, 2009). Therefore it was essential to conduct the study to assess the nutritional status and to examine the association of socio-economic factors, lifestyle factors and nutritional factors with weight distribution among adults to provide enough awareness and education to maintain a good nutritional status and to prevent the complications of poor nutritional status.

II. METHODOLOGY

A Cross-sectional study was conducted among 400 adults (above 18 years old) including 213 females and 117 males from five Divisional Secretariat divisions in urban and rural areas in Batticaloa district. From Manmunai North, Eravur Pattu, Porathivu pattu, Manmunai south and Eruvil Pattu and Koralai Pattu South administrative divisions 40 Grama Niladhari divisions were selected according to the population. Families from each Grama Niladhari divisions were selected by systematic random sampling method. One adult from each family was selected by the tossing method as a respondent. Data were collected from those who were willing to participate in the study and respondents who were not present at the time of study, who refused to participate in the study, who were physically disabled, adults who were mentally disabled, pregnant mothers and adults who were not a permanent resident of study areas were excluded from the study. The respondents were thoroughly explained about the study and written consent was obtained before the data collection. Anonymity was ensured throughout the study. Data were collected by investigators through a structured interviewer administered questionnaire and anthropometric measurements of weight, height and waist circumference of adults were measured by investigators. All anthropometric measurements were performed by standard procedures; weight was measured with a mechanical personal scale (model- CAMRY, model number –BS 2014); weighing scale was calibrated by taking an average of more than one measurement for a known weight and the difference was adjusted nearest to 100g. Height was measured in a standing position, without shoes and waist circumference was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest with the nearest 1cm using a non-stretchable steel measuring tape and the BMI was computed as Weight (Kg) / Height^2 (m^2).Collected data were transferred to SPSS 19 statistical software and analyzed based on the research problem, objectives and variables. Gender and age related prevalence and overall prevalence were estimated for urban areas in Batticaloa district with the use of following equations.

III. RESULTS AND FINDINGS

Table 1: Description of the socio-demographic variables of adults in Batticaloa district

Variables	No.	(%)
Area		
Urban	80	20.0
Rural	320	80.0
Gender		
Male	187	46.8
Female	213	53.2
Age		
19-24	48	12.0
25-34	90	22.5
35-44	102	25.5
45-54	75	18.7
55-64	55	13.8
>64	30	7.5
Ethnicity		
Tamils	392	98.0
Muslims	8	2.0
Sinhalese	-	-
Religion		
Hindus	355	88.8
Islamic	8	2.0
Christians	37	9.2

Buddhist	-	-
Education		
Primary	72	18.0
Junior secondary	78	19.5
Senior secondary	189	47.3
Tertiary/Collegiate	52	13.0
No education	9	2.2
Family income(monthly)		
<15 000	148	37.0
15 000-30 000	175	43.7
30 001-50 000	63	15.8
>50 000	14	3.5
Smoking habits		
Yes	56	14.0
No	344	86.0
Family history of overweight and obesity		
Yes	87	21.8
No	307	76.8
Don't know	6	1.5
Following weight reduction		
Yes	62	15.5
No	338	84.5
Sleeping habits in evening		
Yes	215	53.8
No	185	46.2

The study was conducted among 400 adults who were above 18 years old in urban and rural areas of Batticaloa district. Out of them 80% (n=320) were from rural areas. 53.2 % (n=187) were males. Tamils (98 %, n=392) were the majority among the study samples. 25.5% (n=102) of adults come under the age group of 35-44 years; 47.3% (n=189) had senior secondary education, 37 % (n= 142) adults had family income of less than 15 000, 3.5% (n=14) had more than 50 000 and others had middle income. 14 % (n=56) were smokers; 21.8 % (n=87) adult had family history of overweight and obesity and 76.8 % (n=307) had no any family history of overweight and obesity; 84.5% (n=338); 53.8 % (n=215) adults had the habit of sleeping in evening after the meal.

Out of 400 adults 11.7 % were underweight, 40.5% were normal weight, 30.3% (n=121)were overweight and 17.5% (n=70) were obese.

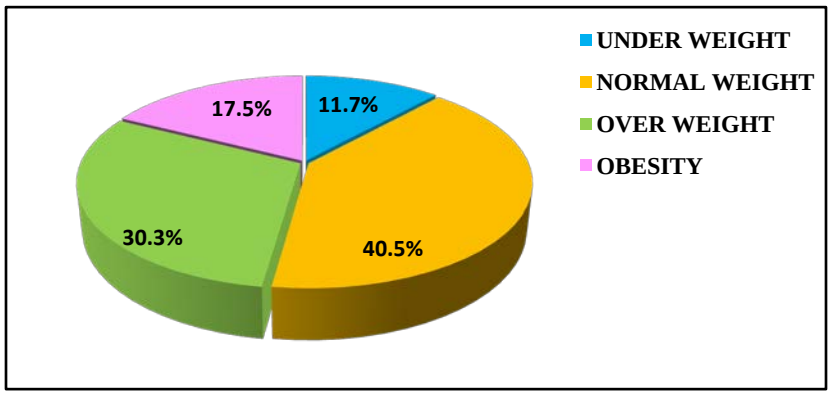

Fig 1:- Weight distribution of adults in Batticaloa district

Table 2: Nutritional status of adults in urban areas

Variables	Underweight		Normal weight		Overweight		Obesity	
	No	(%)	No	(%)	No	(%)	No	(%)
Gender								
Male	1	(1.3)	16	(20.0)	16	(20.0)	7	(8.8)
Female	4	(5.0)	9	(11.3)	12	(15.0)	15	(18.8)
Age								
19-24	-	-	5	(6.3)	1	(1.3)	-	-
25-34	3	(3.8)	6	(7.5)	6	(7.5)	4	(5.0)
35-44	1	(1.3)	7	(8.8)	9	(11.3)	10	(12.5)
45-54	-	-	3	(3.8)	7	(8.8)	6	(7.5)
55-64	-	-	3	(3.8)	4	(5.0)	2	(2.5)
>64	1	(1.3)	1	(1.3)	1	(1.3)	-	-
Over all status	**5**	**(6.3)**	**25**	**(31.3)**	**28**	**(35.0)**	**22**	**(27.5)**

In the urban areas 6.3%(n=5) were underweight; among them 5%(n=4) were females and 3.8 %(n=3) of adults were in the age group of 25-34 years. 31.3%(n=25) of adults were normal weight; among them 20%(n=16) were males and 8.8 %(n=3) of adults were in the age group of 35-44 years. 35% (n=28) of adults were overweight; among them 20% (n=16) of adults were males and 11.3% (n=9) of adults were in the age group of 35-44 years.27.5% (n=22) of adults were obese; among them 18.8% (n=15) of adults were females and 12.5% (n=10) of adults were in the age group of 35-44 years.

Table 3: Nutritional status of adults in rural areas

Variables	Underweight		Normal weight		Overweight		Obesity	
	No	(%)	No	(%)	No	(%)	No	(%)
Gender								
Male	22	(6.9)	72	(22.5)	36	(11.3)	17	(5.3)
Female	20	(6.3)	65	(20.3)	57	(17.8)	31	(9.7)
Age								
19-24	12	(3.8)	18	(5.6)	10	(3.1)	2	(0.6)
25-34	9	(2.8)	29	(9.1)	24	(7.5)	9	(2.8)
35-44	5	(1.6)	19	(5.9)	30	(9.4)	21	(6.6)
45-54	7	(2.2)	27	(8.4)	15	(4.7)	10	(3.1)
55-64	3	(0.9)	27	(8.4)	11	(3.4)	5	(1.6)
>64	6	(1.9)	17	(5.3)	3	(0.9)	1	(0.3)
Over all status	**42**	**(13.1)**	**137**	**(42.8)**	**93**	**(29.1)**	**48**	**(15.0)**

In the rural areas out of 320 adults 13.1% (n=42) were underweight; among them 6.9% (n=22) were males and 3.8 %(n=12) of adults were in the age group of 19-24years. 42.8% (n=137) of adults were normal weight; among them 22.5% (n=72) were males and 9.1 %(n=29) of adults were in the age group of 25-34 years. 29.1% (n=93) of adults were overweight; among them 17.8% (n=57) of adults were females and 9.4% (n=30) of adults were in the age group of 35-44 years.15.0% (n=48) of adults were obese; among them 9.7% (n=31) of adults were females and 6.6% (n=21) of adults were in the age group of 35-44 years.

Table 4: - Significant levels of significant variables for rural area.

Significant variables	p value
Family history	0.045
Activities to reduce the weight	0.000
Sleeping habit in evening	0.001
Duration of sleeping in evening	0.006

Activities taken to reduce the weight (p=0.000) was more significantly associated and family history was less significantly associated (p=0.045) with overweight and obesity than other significant variables among the adults in rural area. There were no any significant associations of variables with weight distribution in the urban area.

Table 5: - Significant levels of significant variables for Batticaloa district

Significant variables	p value
Gender	0.008
Ethnicity	0.003
Religion	0.013
Smoking	0.010
Family history	0.002
Following weight reduction	0.000
Sleeping habit in evening	0.000
Frequency of meal intake in a day	0.034

When assess the significant levels of significant factors for Batticaloa district, following weight reduction (p=0.000) and the sleeping habit in the evening after the meal (p=0.000) were highly significant and frequency of meal intake in a day (p=0.034) was the less significant with overweight and obesity of adults in the Batticaloa district.

IV. DISCUSSION

Poor nutritional status is a chronic condition, caused by physiological, social, cultural, psychological, genetic, metabolic and behavioral factors (Kelly et al., 2008). The prevalence of overweight and obese people is increasing worldwide and the prevalence of adult obesity is increasing rapidly due to environmental and behavioral changes (Ramachandran & Snehalatha, 2010).Nutritional status of adults and the associated risk factors of weight distribution were assessed for Batticaloa district. The present study reveals that majority of adults present with normal weight as well as overweight and not obese or underweight. Similar association was seen in other studies done in Vietnamese adults (Trinh et al., 2009) and done in young adults in Uganda (Balawa et al., 2010). at the same time some other studies show the opposite association, done in adults from rural and urban areas of United States (Michimi &Wimberly, 2010) and in Mississippi (Zhang & Mozee 2014).

The present study reveals that in the urban area, males were normal weight and overweight and obesity was high in females, and similar finding was there in a study which was done in China among rural adults (Tian et al., 2009). There are no any significantly associated risk factors to overweight and obesity in the urban area. Another study shows the associated risk factors of overweight and

obesity of adults in the urban area, such as social and lifestyle factors; done in north Iran (*Hajian-Tilaki&Heidari, 2007*). Majority of rural women presented with overweight and obesity; a study done in Thailand rural areas shows that prevalence was low in women (Aekplakorn et al., 2007) and family history of obesity, activities for weight reduction, sleeping habit after the meal in evening and the duration had significant association with overweight and obesity in rural areas.

Overweight and obesity was high among both males and females those who were between the age of 35-54 years and less in the age group of 19-24 years and above 64 years and underweight or normal weight adults come in the age group of 19-34 years; as similar, a study which was done among Shanghai adults in china reveals that BMI was significantly high in age group of 35-44 years and low above 65 years (Hou et al., 2008); another study done in Indian women shows the higher prevalence in the age group of 40-49 years(Garg et al., 2010) and a study done in province of Vojvodina, Serbia shows the higher prevalence in both males and females of 60-69 years(Grujic et al., 2009).

Present study reveals that gender, marital status, ethnicity, religion, smoking habit and frequency in a day, alcohol intake, were significantly associated factors for the overall weight distribution for Batticaloa district rather than the significant variables observed in rural areas. A study done in Chinese adults in Shanghai shows that, overweight and obesity had negative association with smoking and positive association with alcoholism and having family history of overweight and obesity (Hou et al., 2008); another study done in Netherland regarding prevalence of overweight and obesity shows the similar association with significant variables of sleeping habit and weight reduction activities (Deurenberg & Hautvast, 1998).

Number of parity of women was significantly associated with overweight and obesity in Batticaloa district. A study done in urban Indian women regarding prevalence of overweight and obesity shows the association with the significant variables of number of parity and marital status (Gouda & Prusty 2014) and another study shows positive association of marital status with increased BMI in both men and women which was done in Greek adults (Tzotzas et al.,2010). Present study reveals that the dietary habit, frequency of food intake in a day and places of meal taking were significantly associated with increased weight. A study done in Swedish adult women shows, the risk of overweight and obesity was low in vegetarians than omnivorous (Newby , Tucker & Wolk 2005); and another study done among adults in United Kingdom reveals the significant association of dietary habit (Spencer., et al 2003); and a study done in adult population of United States indicates that frequency of food intake and taking meals from outsides were significantly associated with increased body weight (Yunsheng., et al 2003).

V. CONCLUSION AND RECOMMENDATION

Nearly 50% of adults were normal weight in Batticaloa district. In the urban and rural areas around 50% of adults were overweight and obese. Overweight and obesity were high in urban adults than rural adults. Females were obese than males in both urban and rural areas. Underweight and normal weight adults come under the age between19-34 years. 35-54 years adults were more overweight and obese than others. Awareness programs should be carried out in the community regarding weight reduction measures and primary prevention of overweight and obesity by eliminating risk factors. Health education programs have to be done for public regarding the consequences of overweight and obesity, especially for adults of 35-54 years age group, who were more vulnerable.

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Sub Theme; Economic and Social Dimensions of Sustainability

Enhancing the contribution of County Governments in achieving the MDGs in Kenya; A Case on Uasin-Gishu County.

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Abstract- County governments are a recent introduction in Kenya which was constituted as a result of the new constitution. They were created through the constitution of Kenya leading to 47 county governments. This number is based on the delineation of administrative districts as created under the Provinces and Districts Act of 1992**.** Achieving the Millennium Development Goals (MDGs) is only possible if county governments who are closer to the people are empowered to work towards poverty eradication and sustainable development. Given that de-centralization and the devolution of power to local governments is now a reality in Kenya, it is this sphere of government which needs to redouble its efforts. This paper aims to enhance the contribution of county governments in achieving the MDGs, in particular in addressing poverty and sustainable development. The main purpose of this working paper is to describe the major issues of county governance at the local level that are related to realization of MDGs .This assessment is based on data collected from Eldoret region which is in Uasin-gishu County. Content analysis was used for the study. The findings of this study show the potentiality of Uasin-gishu County to be among the best sustainable development sites, if the extents of participation in planning involve the locals, transparency in the planning and implementation of infrastructure projects, and level of efficiency in management of county resources and finance practices are adhered to. It is concluded that focus should be in wealth creation and planning which will have a multiplier effect on the national government.

Index Terms- devolution, devolved government, planning, MDGS, sustainable development

I. Introduction

The quest for a devolved system of governance in Kenya popularly referred to, as 'ugatuzi' has been a longstanding one. The promulgation of the Constitution of Kenya 2010 (GoK 2010) on 27 August 2010 paved way for realization of the "dream" system of governance. Chapter Eleven (Cap 11) of GoK 2010 –devolved government specifically provides for the setting up of the county governments. This chapter spells out the various principles of devolved government that includes democratic ideals and the separation of powers. County governments will be facilitated reliable with sources of revenue to enable them govern and deliver services effectively and that no more than two-thirds of the members of representative bodies in each county government shall be of the same gender.

This paper therefore, looks at ways of 'Enhancing the contribution of County Governments in achieving the MDGs in Kenya'. Achieving the Millennium Development Goals is only possible if county governments who are closer to the people are empowered to work towards poverty eradication and sustainable development. The immediate attention to this critical issue is required from all relevant government agencies, and partners to collaborate and support implementation through technical, financial, and logistical support. County governments are specifically requested to prioritize the MDGS in their budgets and programmes, (Kenya acceleration network plan, 2014.

Following the introduction in section1, the organization of the paper is as follows: Section2 is Literature review; section 3, Materials and data; section 4 is Results; section 5, discussions and findings; and section 6, concludes the paper.

II. Literature review

The concept of devolution

Devolution is actually a form of decentralization. Decentralization is about transferring of selected functions from a central authority to the lowest feasible structure. Devolution entails the ceding (legal act giving) of power from a Central Authority to Local Authority, the state powers of revenue collection and expenditure among others. In Kenyan case, the current Centralized System Government headquartered in the Capital City of Nairobi will transfer power to the 47 Counties listed on the First Schedule of GoK 2010. Each of these Counties will form the County Governments comprising of the County Assemblies and County Executives with State powers of legislature and Executive.

Muia, 2008, defined devolution as political arrangement where political, administrative, and fiscal power is distributed to the semi-autonomous, territorial and sub- national units. The

basic characteristics that devolved governments should embody are firstly, the local subunits should have autonomy and independence from the center. Secondly the units ought to have clear and legally geographical boundaries over which to exercise authority and perform public functions. Thirdly, they should be accorded corporate status and the power to raise sufficient resources to carry out functions .Lastly, the local government should be perceived by the people belonging to them. This means that in the provision of services, they satisfy the needs and remain the subject to the control, direction, and influence of locals. (Oloo, 2006)

Barret et al (2007, argued that devolution provides a more effective governance framework for advancing pro poor policies. Since the sub-national institutions are likely to be more familiar with the local circumstances and the cost conditions, they are better equipped to distribute resources equitably, in so doing they target poverty more efficiently (CKRC, 2002a) despite the sound arguments for adopting devolution system, it is not without risks. If not properly designed and implemented, devolution leads to diminish of power and value of the national government to redistribute resources which create a drawback to the less developed units. This may lead to interdependency and eventually instability. Barret et al.., (2007Devolution system-may also lead to translation of central government bureaucracies, inefficient utilization of resources, and lack of accountability at the sub national level.

Millennium Development Goals Attainment in Kenya

The Millennium Development Goals (MDGs) are universally accepted as the international commitment to sustainable development and poverty reduction. In September, 2000, at the Millennium Summit, world leaders agreed to a set of time bound and measurable goals that address the key elements of human development; and 189 countries including Kenya signed the millennium declaration. The main objective of the Millennium Declaration was to define a common vision for development by setting eight Millennium Development Goals (MDGs) to be achieved by 2015.The eight MDGs are designed to: (i) eradicate extreme poverty and hunger, (ii) achieve universal primary education, (iii) promote gender equality and empower women, (iv)

Reduce child mortality, (v) improve maternal health, (vi) combat HIV/AIDS, malaria and other diseases, (vii) ensure environmental sustainability, and (viii) develop a global partnership for development.

General Challenges facing Kenya in attaining the MDGs

Despite a fairly favourable economic outlook, overall Kenya faces numerous general challenges (not specific to individual MDGs) in meeting the Goals by 2015. One of the major challenges is inadequate financial resources which limit the capacity to sustain efforts and initiatives aimed at achieving the MDG targets. There is a counterargument that Kenya potentially has what it takes to generate adequate resources and probably can do so even quicker with greater political goodwill, reduction of public wage bill and with a serious assault on grand corruption. Another challenge is low absorption capacity of funds on the part of the government. It is ironical that on one hand there is inadequate funding and on the other, a lack of absorption capacity of the funds that are available.

This inability is mainly attributed to inefficiency and bureaucratic processes for tendering and requisition. A number of other factors exert additional constraints to the process of achieving the MDGs: The withholding of external aid in the last decade has led to increased government borrowing, which has led to higher servicing costs. As more debt matures, the government will have to fork out more money to service it, increases in fuel prices which tend to trigger inflation and high food prices. The volatility of international oil prices has more adverse effects on the poor and vulnerable, limiting successes of social protection, and poverty reduction initiatives by the government. Rapid population increase especially in urban areas the 2009 Census shows the population has grown by 10 million since the last census in 1999. HIV/AIDS figures show that prevalence rates have gone down slightly the absolute numbers of those infected remain high, putting great strain on medical services.

The MDGs and Vision 2030

The Vision 2030, which is a long- term plan to transform Kenya into a globally competitive economy at par with the Asian Tigers by the year 2030, is anchored on three main pillars i.e. economic, social, and political pillars. The Vision 2030 is being implemented on five years Medium Term Planning Framework.

Economic Pillar

The key goal of this pillar is to ensure and maintain a sustained economic growth of 10% over a period of 22 years (up to 2030) and has also been linked to the MDGs Long-Term Plan 2007-2025.The economic pillar underpins agriculture, livestock and fisheries, tourism, manufacturing, wholesale and retail trade, business outsourcing, and financial services as the priority sectors that will provide the impetus for economic growth and development. In UasinGishu County, his has been scaled through investment in infrastructure and agriculture which will achieve the twin objective of food security and market linkage. Upgrading existing roads; carry out routine maintenance of existing roads goes along way increasing returns and poverty reduction.

Social Pillar

The social pillar focuses more on the social development improvements and investments needed especially in education and health sectors to support a vibrant economy. For education, the target in the first MTP was to raise the primary to secondary transition rates to 75% and the rates from secondary to university to 15% by 2012. The programmes and projects planned under this sector have direct relationship with attainment of MDGs.The counties have to invest in equipping the existing county polytechnics and vocational institutes to prepare citizens for the labour market. Talents such as in the music industry, sports should be fully developed which contributes substantially portion of investment in the county especially in real estate development and agriculture.

iii Political Pillar

This pillar emphasizes governance, peace building, and conflict management. The Vision envisages the creation of a

peaceful Kenyan society where the rule of law is the cornerstones of individual freedoms with human rights guaranteed for every citizen. The aim is to ensure that the safety and security of Kenyans is guaranteed at all times that Kenyans from all walks of life have access to justice and that all conflicts are resolved through non-violent, amicable, and legally sanctioned mechanisms.

Linkage of Uasin-Gishu County with Vision 2030

The objectives established under the Uasin Gishu CIDP are directly responsive to the aspirations of Kenya Vision 2030. Regarding agriculture, the CIDP has earmarked the sector as having responsibility for household food security and as a source of income and employment. The CIDP has identified the potentials inherent in the sector for value addition utilizing crop, livestock, and fishery products.

Regarding education, the Kenya Vision 2030 is emphatic on the country's commitment to the attainment of education for all (EFA) and the millennium development goals. The country responded by developing the Kenya Education Support Programme (KESSP) which placed the implementation of FPE at the centre-stage of the sector's development. The CIDP has benchmarked all its educational indicators on the national targets as established in Kenya Vision 2030.

Land issues relating to population pressure and factors, such as growing population densities which are issues in Vision 2030 have been addressed under the CIDP. The unplanned settlement and continued fragmentation of land into uneconomical units have, received due attention in the CIDP as an important phenomenon in Uasin Gishu County. In the same vein, the conversion of wetlands and catchment areas into farm land leading to increased vulnerability and environmental damage has been addressed. Similarly, insecure land ownership is a major issue that has been flagged under Vision 2030 and in this CIDP. According to Vision 2030, land adjudication and registration covers only 30% of the country. The CIDP is equally sensitive to the need for security of tenure in land ownership in the Uasin Gishu County. It also deals with issues of sustainable land use and the need to automate land information to expedite land transactions and enhance the security of land records.

III. MATERIALS AND METHODS

The approach for the study comprised a number of stages, which were complementary in capturing information required to fulfill the expectations of the terms of reference for the study. These included: literature review which entailed mainly secondary data collection; quantitative data collection to assess progress on targets, proposed interventions and strategies, resources used. Interviews were conducted with government officials in Ministry of Planning, National Development and Vision 2030 and line ministries implementing MDG activities. In addition, selected CBOs and NGOs that support specific interventions provided further information; key informant interviews were held with heads of county organizations/units who by virtue of their positions have specific information and data on particular initiatives, resource allocation and target attainment; semi-structured Millennium Development Goals Assessment 2003, 2005, 2006, and 2008 interviews and focus group discussions were held at county level

3.1 LOCATION OF UASIN GISHU COUNTY

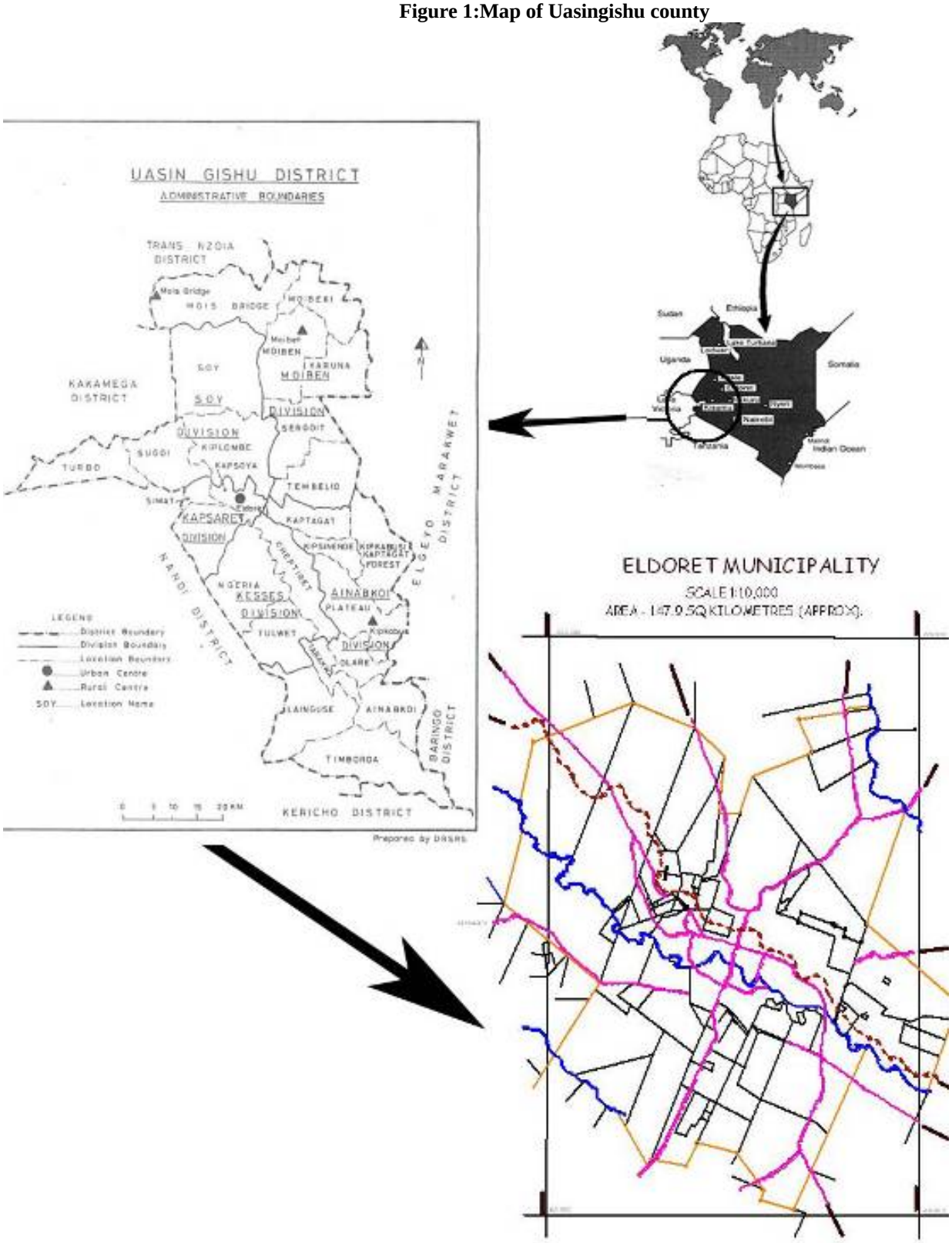
Uasingishu County is one of the 47 counties in Kenya, lies between longitudes 34 degrees 50" east and 35 degrees 37" West and latitudes 0 degrees 03" South and 0 degrees 55" North. The county shares common borders with Trans Nzoia County to the North, Elgeyo

Marakwet County to the East, Baringo County to the South East, Kericho County to the South, Nandi County to the South West,and Kakamega County to the North West

General Information (2009)	Uasin Gishu	Rank	Kenya [b]
Population	894,179	16	821,491
Surface area (km^2)	3,345	24	12,368
Density (people per km^2)	267	19	66
Poverty rate, based on KIHBS (%)	51.3	27	47.2
Urban population in largest towns			
-Eldoret	289,380	5	
-Moi's Bridge	14,596	106	
-Matunda	10,031	119	
-Burnt Forest	4,925	172	
-Jua Kali	3,427	192	
-Turbo	2,831	201	

Table 1.Source: Commission of Revenue Allocation, 2011

Figure 1:Map of Uasingishu county



IV. Results

MDG Goal 1: **Eradicate extreme poverty and hunger**

Figure 2. Source UNDP Kenya annual report 2009

Half of all Kenyans, live below the poverty line, large numbers regularly go hungry, drought is a regular event, disease across that must be borne, beggars are an accepted feature of society (many are disabled, lepers, or homeless mothers with children), and glue-sniffing, rapacious street children are just part of normal life see fig2 above. In the cities, vast markets sell mitumba secondhand clothes imported from the developed world); and the shopping for and wearing of mitumba is a favorite pastime among all levels of society.

An estimated 46% of the Kenyan population lives below the poverty line. There is also widespread unemployment, especially among the youth. Working with the government, partners and the private sector, the poverty reduction unit seeks to enhance and sustain livelihood opportunities and food security**.** The Agriculture Sector Development Strategy (2010) aims to ensure food and nutritional security for all Kenyans, the generation of higher incomes as well as employment and to position the agricultural sector as a key driver in achieving the 10% annual economic growth rate anticipated under the economic pillar. The table below shows Status and Trends of Targets in Goal 1 upto the year 2015 in Kenya.

Target 1 A	**Indicator**	**YEAR**			
		Baseline(1990)	2000	2005-2011*	2015 Target
Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	Proportion of population living below 1 USD per day	43.3 %	52.3%	45.9%	21.7%
	Poverty gap ratio	-	-	16.2 %	-
	Share pf poorest quintile (20%)in national consumption	4.8 %	4.8 %	4.6 %	9.6 %

Table 2: Targets and trends in poverty reduction Source: WMS 1997, KIHBS 2005/06

According to the County Household Welfare Monitoring Survey Report, county of Uasin Gishu Absolute poverty will reduce from 49% in 2012 to 23% by 2018.Growth in the agricultural sector is seen as the most viable strategy to reduce poverty as more than three quarters of the poor depend on subsistence agriculture and livestock for their livelihoods. About 80% of the actual spending in the agricultural sector comes from government meaning that there is a high chance of sustainability of development activities in the county level.

Fish is an important and reliable source of protein, employment and income of large a proportion of population in Kenya. To improve on food security and employment, the county of Uasin-Gishu has embarked on fish production in the county; this has improved significantly in the recent past due to increasing demand of white meat. Currently, the county has 1,728 operational fish ponds of 486,900m2 with annual fish production of 593,000kg worth KShs.285, 900,000. The county also has many public and private dams which are suitable for capture fisheries. Current production from the dams stands at 33,048 kg worth KShs.9, 914,400 per year. Investment in the sector is a back up on livestock production which has been practiced enormously in the county

MDG GOAL 2: Achieve universal primary education

Kenya has managed to significantly reduce the population below the poverty line from 56% in 2000 to 46.9% in 2008/09 and is likely to achieve full primary school enrollment by 2015, given its 110.0% primary school gross enrollment rate in 2009 up from 107.6% in 2007/08 compared to 73.7% in 2002. The net enrollment rates rose from 80.4% in 2003 to 92.9% over the same period, while the primary school completion rates improved from 62.8% in 2002 to 83.2% in 2009. The enrollment figures for boys and girls in primary school enrollment also point to a near gender parity. The table below shows the target by 2015.

According to the Uasin gishu county integrated development plan 2013-2018 report, the education facilities are fairly developed with two public universities namely, Moi University and University of Eldoret. It also has two private universities and constituent colleges of major universities. There is a National Polytechnic, a Technical Training Institute, and several private commercial colleges. In terms of basic education, there are 576 ECD centres, 422 primary schools, and 129 secondary schools. Primary school enrolment rate was 89.5%. This high enrolment rate is attributable to the Free Primary Education (FPE) strategy of the government. It is noteworthy that the enrolment rate of girls at 91% is higher than that of boys at 88%.More effort to cushion education in county levels by expanding the number of institutions will hasten the achievement of MDGs targets in the country.

Target 2 A	**Indicator**	**2000**	**2003**	**2005**	**2007**	**2009**	**2011**	**2013**	**2015 Target**
Ensure that by 2015, children everywhere, boys and girls will complete a full course of primary schooling.	2.1 Net Enrolment Ratio in Primary Education (%)	67.8	80.4	82.8	91.6	92.9	95.6	95.9	100
	2.2 Proportion of pupils starting grade 1 who reach the last grade of primary	57.7	68.2	77.6	81.0	83.2	74.6	80.3	100

	(%)								
	2.3 Literacy Rates of 15-24 year olds, women and men (%)	80.3	-	89.3	-	91.3	-		100

Table 3: The enrollment rates in Uasingishu Source: ministry of education science and technology, 2013

MDG GOAL 3: Promote Gender equality and empower women

Gender issues are being addressed by the new constitution that states women and men have the right to equal treatment including the right to equal opportunities in politics, economic, cultural, and social spheres (section 27:3).T the Women's Enterprise Development Fund and the entry into force in 2010 of Kenya's new constitution, which aims to enhance political participation of all genders in development by prescribing a representation of at least one third of either gender in the county assemblies. Supported by a presidential directive to ensure that at least 30 % of all jobs in the civil service are set aside for women, women now constitute about 30 % of the labour force in the modern sectors as part of the affirmative action to address the gender gap. This has been adhered to at the county assemblies in Kenya.

MDG GOAL 4: Reduce child mortality

In 2012 the infant mortality rate was 48 deaths per 1,000 live births while, Neonatal Mortality rate was two deaths per 1,000 live births in 2012.A reduction in child mortality rates can be addressed effectively through improved management of childhood illnesses. This is shown below

Key Health Indicators	population	Total
projection (2012)		1,022,034
Crude Birth Rate (CBR)		49.4/1,000
Crude Death Rate (CDR) -		7/1,000
Women of child bearing age (15 – 49 years)		24%
Neonatal Mortality Rate		52/1,000
Infant Mortality Rate (IMR)		48/1,000
Children under 1 year		3.71%
Children under 5 years		16.9 %
Under 5 Mortality Rate		38/1,000
Children under 5 years attending growth	Monitoring clinic	38%
Pregnant women attending at least four ANC		22%
Deliveries conducted by skilled health staff	in facility	0%
Women receiving family planning commodities		34%
Malaria Prevalence		43.4%
HIV Prevalence Rate		4.5 %
HIV+ women receiving PMTCT		20%
Targeted adult HIV+ patients receiving ART		4.8%

Table 4: Reduction on child mortality rates

Source; Uasin Gishu county integrated development plan 2013-2018

The Integrated Management of Childhood Illnesses (IMCI) is a strategy initiated by WHO and UNICEF that entails improving the management skills of health workers, the health systems, and Community structures in childhood diseases management. By extension Uasin Gishu County is committed to attaining Millennium Development Goals (MDGs) specifically Goal 4 which targets to reduce under five year mortality by 50% by 2015. The diseases responsible for the high mortality rate in County; but could be addressed through primary health care interventions. The Kenya Demographic and Health Survey, 2008/2009 shows that the death rate at 74/1000 is way above the national target of 32/1000 deaths as indicated by the table below. The table below showing performance in the heath sector in Uasin Gishu county.

MDG GOAL 5:Improve on maternal health

MDG	Indicator	Baseline (2000)	2008/9	Target 2015
Goal 5: Improve maternal health				
Target 5A: reduce by three quarters, maternal mortality ratio	Maternal mortality ratio	588	414	147
	Proportion of births attended by skilled health personnel	44	44	90
Target 5 B: achieve by 2015, universal access to reproductive health	Contraceptive prevalence rate	39%	46%	
	Adolescent birth rate	21%		
	Antenatal care coverage (at least one visit and at least 4 visits)	92%	92% 47%	100% 90%
	Unmet need for family planning	26	26	0

Table 5: Improvement on maternal health

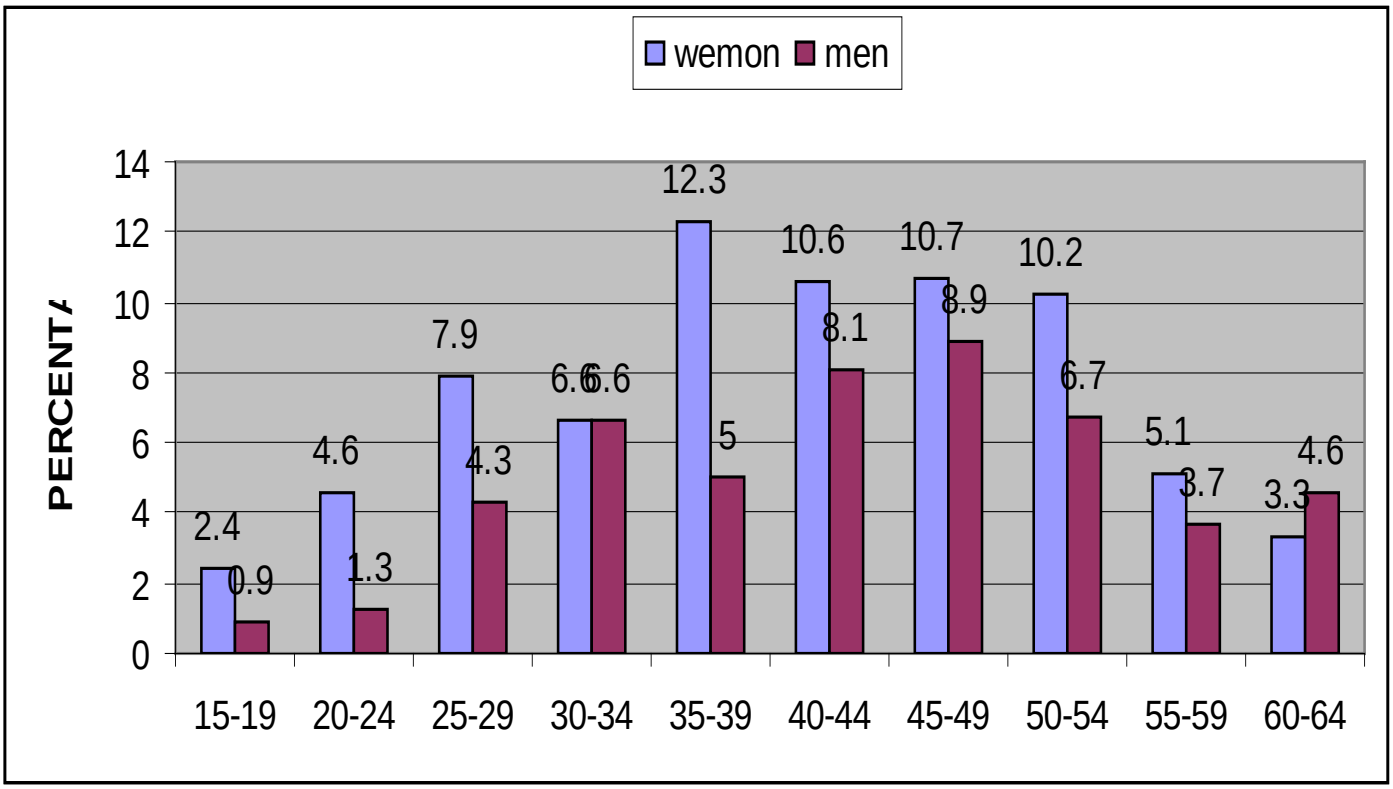
Data source KDHS 2009 and national Road for achieving MDG5

MDG GOAL 6: Combat HIV/AIDS, malaria and other diseases

A major reproductive health concern that has continued to affect a large population of Kenyans in their reproductive ages is Sexually Transmitted Diseases (STD), HIV,and AIDS. Uasin Gishu County has achieved a steady reduction in HIV and AIDS prevalence from 14 % and 8% in urban and rural areas in 2002 to 7% and 6.5% in urban and rural areas in 2007 respectively. This rate further reduced to 4.5% in 2012 and is less than the national prevalence level of 5.6%. Despite this positive development, the prevalence rate of 4.5% is still high and the county must still aim at achieving the target of 3.5% by 2017.The latest Kenya Aids Indicator Survey (KAIS 2012) reported a HIV prevalence of 5.6 % which is a decrease from 6.3 % reported in KDHS 2003. The number of new infections fragmentation reduced sharply from over 300,000 new infections to an estimated 100,000 new infections in 2013. However, the rate of decline in new infections has stabilized in the last 10 years.

There was a moderate increase in the proportion of young people aged 15-24 with comprehensive correct knowledge of HIV and AIDS in the 2003 and 2009.Though there was an increase in knowledge for both sexes, women continue to report a lower comprehensive knowledge compared to their men counterparts..

HIV prevalence by age and gender



Source: Source:KAIS (2012)

Table 6:HIV prevalence rates

MDG GOAL 7: Ensure environmental sustainability

The achievement of Goal number 7 targets reversing rate of deforestation and ensuring environmental sustainability. Land owners are being advised to put at least 10% of land acreage under tree cover. Forest resources are diminishing at a high rate due to population pressure. Forest excisions by the Government for settlement (1993) hived-off some 740 ha of Sangalo forest. The rate at which trees are being filled is higher than the replanting rate. The water supply schemes in Uasin-gishu County include Eldoret Water and sanitation (ELDOWAS), Turbo, Moi"s Bridge, Sosiani, Sambut, Kipkabus, Burnt Forest and Ngeria.Currently, the percentage of population in the County with access to potable water is 42%; although about 90% of the population has access to water within a 2 km radius. The County Intergraded Development Plan also bears a strong linkage with the Strategic Plan of the Municipal Council of Eldoret: 2008 – 2013. The Municipal Plan identified ten pillars that would steer the Council towards the achievement of its Vision. These are: decongestion of CBD; enhancement of disaster management, effective management of solid waste, promotion of environmental conservation and beautification, enhancement of revenue collection, efficient and prudent utilization of resource ensure environmental sustainability hence will go a long way in ensuring environmental sustainability.

Develop a global partnership for development.

With regard to Goal number 8, though developed countries had committed themselves to increase their aid to developing countries to 0.7% of GDP the progress in reaching this target has been slow. While Kenya has made good progress towards the achievement of the MDGs, there are several major challenges and bottlenecks that have slowed down the process thus affecting progress; these should be addressed by the county government in order to achieve the goals by 2015.

According to the integrated plan,Uasin Gishu has an extensive road network comprising of over 300 Kms of Tarmac roads, 549 Kms of marrum, 377 Kms of earth roads. It also boasts 179 KMS of railway line with eight railway stations. In addition, there is an inland container depot. The Moi International Airport and two airstrips are also located in Uasin Gishu easily making it the region's service hub. The county enjoys about 95% mobile phone coverage which is provided by all the major service providers in Kenya. It also has 16 post offices, four sub-postal offices, and nine licensed service couriers. It is connected to the fibre optic cable thus, giving it access to fast internet connectivity. The availability of these services confirms the county's potential for fast economic development and an attractive location for investment. With regard to financial services the county has also witnessed significant growth. It has a branch of the Central Bank of Kenya, 21 Commercial banks, 108 urban, and five rural Saccos: five major micro financing institutions. The table below shows data facts about the different MDGs IN Uasin gishu County. All the goals are improving except poverty; this indicates that if count governments are given attention it deserves then MDG goals will be realized within the scheduled period of time. There is a connection between poverty and variables such as social services, urbanization, and infrastructural development.

Health And Education Outcomes	Uasin Gishu	Rank [0]	Kenya [b]
Fully-immunized pop<1yr(%,2010/11)	76.2	9	64.0
Malaria (as % of all 1st out patient visits)	18.3	18	27.7
TB in every 10,000 people(2009/10)	124	46	39.0
HIV+ antenatal care clients(%,2010)	3.4	19	5.9
Population with primary education (%)	61.6	43	66.6
Population with secondary education	13.1	15	12.7
Funding per capita in ksh.(2008/2009)	**Uasin Gishu**	**Rank[0]**	**Kenya[b]**
Constituency Development Fund (CDF)	177	41	300
Local authority transfer fund (LATF)	267	9	218
Single Business Permit Revenue by Las	63	12	48
Property Tax Revenues by Las	-	-	70
Rural Electrification Programme Fund	66	31	88
Total	**573**	**35**	**725**
Access to infrastructure	**Uasin Gishu**	**Rank[0]**	**Kenya[b]**
Improved water (% households 2009)	88.9	3	66.5
Improved sanitation (% households 2009)	98.0	12	87.8
Electricity (% households 2009)	27.9	6	22.7
Paved roads (as % of total roads)	7.6	14	9.4
Good/fair roads (as 5 of total roads)	50.6	16	43.5
Service Coverage	**Uasin Gishu**	**Rank[0]**	**Kenya[b]**
Delivered in a health centre	30.1	26	37.5
Qualified medical assistant during birth	30.5	26	37.6
Had all vaccinations	72.7	29	75.0
Adequate height for age	74.9	5	59.8
Can read and and write	81.5	12	66.4
Attending school, 15- 18 years	83.0	10	70.9

Table7: Social services, urbanization, and infrastructural development **Source: Commission of Revenue Allocation, 2011.**

Except poverty rate, malaria TB and HIV, all rankings are in descending order i.e highest to lowest. All entries in the 'Kenya' column show county averages.

V. Discussion

Enhancing the contribution of County Governments in achieving the MDGs in Kenya

For devolved system to succeed, it must evolve systematically and sequentially. Planning and implementation of decentralized funds is essential. County governments need to identify and enhance their source revenue; focus should be in wealth creation and planning which will have a multiplier effect on the national government. To achieve this, there is a need for Effective County planning commissions suggested as follows by Kurt's "top 10" attributes for the most effective and successful county planning commissions.

Membership

The commission's membership is truly representative of formal organizations that are centered on the "important interests" as they exist in the county. That is to say, in Uasingishu County has a great potential to be harnessed Farming, tourism, and business harbor of different groups. The sectors should be well represented by planning commission. Membership also includes a member of the county board, and at large citizen(s). As a result, those sitting around the table at a planning commission meeting have influence and the ability to harness resources (people, time, expertise from various organizations, etc.) in order to achieve the MDG by 2015.

Research and proper Records

The county planning commission should have a very detailed and definitive "fact book" or "data book" about the county, which is the information source for all sectors in uasingishu. That becomes the source for grant writing, for the facts for public policy decisions. Policies and interventions will be needed to eliminate the persistent or even increasing inequalities between the rich and the poor, between those living in rural or remote areas or in slums versus better-off urban populations, and those disadvantaged by geographic location, sex, age, disability, or ethnicity: Data collection should be disaggregated to give these variances and fed to the, national MDG Secretariat for use and monitoring progress in the line ministries. Achieving the MDGs will require increased national attention to the welfare of the most vulnerable in the county. In addition, financial support for social safety nets to protect the poor, the unemployed and the socially marginalized should be better targeted and scaled up within the county level.

Inclusive Planning Process

The county plan should develop from a very inclusive bottom-up process. The county planning commission should view itself as a facilitator to the planning process, not the author of the county plan. The plan is literally written by stakeholders in the county (interest groups facilitating the MDGs) with a rubber-stamp approval of whatever they wrote as the adopted county master plan. The purpose is to create a sustainable integrated plan that a large number of people believe that they have an investment in, a direct say in the content of, and thus ownership in the plan.

Model Documents

The county planning commission regularly (more than one time a year) takes pro-active steps to develop and share sample or model documents (such as, a zoning amendment) to address particular issues (such as, wind energy ordinance sample, medical marijuana, groundwater protection, or new economy-friendly changes to local zoning).

Convener

The county planning commission should recognize different projects to avoid different ministries grappling with a common issue. Next, the commission uses geographic information system resources to define the geographic boundary of that issue. The commission should harmonize budgets and the devolved funds such as CDF, Women enterprise funds, youth fund to avoid duplication of resources. It is necessary for the commission to bring expertise and specialists to that meeting to provide technical assistance in that area of concern (county officials, university resources, public health, and state, federal agency expertise, and so on).

Leadership

The county planning commission set county-wide priorities should be focused and implemented in order of priorities. At this time, that one or two projects may be strategic preparation for the global or new economy. The main priority would be the subject of a county-wide summit (including county board, county department heads, staff/managers and elected and planning officials from each local unit of government), to set the case for, provide education about and facilitate the audience toward future action steps on the issue.

Technical Assistance

The county planning commission needs to provide planning staff technical assistance to local governments in the county (preparing local plans and zoning amendments). This tactic has been among the most effective means of influencing and coordinating planning and zoning in a county. In addition, a county executive committee can establish a Citizens' Service Centre at these levels: (a) the county, (b) the sub-county, (c) the Ward, and any other decentralized level.

The Citizens' Service Centre shall serve as the central office for the provision by the county executive committee in conjunction with the national government of public services to the county citizens. The governor shall ensure the use of appropriate information and communication technologies at a Citizens' Service Centre to aid in the provision of timely and efficient services to the county citizens.

Good initiatives, such as Economic Stimulus Package, Njaa Marufuku Kenya, Kazi KwaVijana, Quick Wins, Women and Youth Enterprise Fund among others, have great potential of impacting directly and effectively the livelihoods of the poor. Focus should be placed on ways of improving targeting, ensuring that the poor are not only included but also involved in protecting the gains that have been made. There is a need for a better communication strategy. Some of these initiatives are still largely unknown to many of the potential beneficiaries. Where gains have been made public communication is necessary so that stakeholders participate in safe guarding these gains and information given on identification of factors and incidences that indicate a reversal is beginning so that corrective action is taken at the lowest levels of accountability. There is some disconnect between the policy makers and planners on one hand and the poor and vulnerable on the other.

Hosts Networking

The county planning commission requires to organize and hosting regular (monthly or quarterly) meetings of professional planning staff employed by governments in the county and zoning administrators. Emerging issues in the county should be discussed. This gets shared back to the planning commission that uses the information to further implement items; eradicate extreme poverty and hunger, achieve universal primary education, promote gender equality and empower women reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability, and develop a global partnership for development.

This helps set county wide priorities and identifies needed updates or additions to the ultimately may become an amendment to the county plan.

Education

Lack of education is another major obstacle to accessing tools that could improve people's lives. For instance, poverty and unequal access to schooling perpetuates high adolescent birth rates, jeopardizing the health of girls and diminishing their opportunities for social and economic advancement. Contraceptive use is four times higher among women with a secondary education than among those with no education .For women, progress was seen over the last decade. More synergy is necessary between the ministries of health and education to link these benefits .in the poorest households and among those with no education is negligible Considering the high population of youth and knowing that the youth are unlikely to seek reproductive health services as currently provided, it is important to find serving them in a more friendly, caring, welcoming, and youth responsive environment. The county planning commission should work with its ministries planning in order to improve on literacy level in the region,

New/Global Economy

The county planning commission and county board should that in today's world job creation and economic development is a multi-pronged effort. For a county, the two factors (1) traditional economic development with tax incentives, industrial parks, business retention activities that is done by an economic development organization, and (2) efforts to attract and keep skilled, talented and entrepreneurial people through population attraction strategies, place making and asset inventories all of which become the unique quality of life for the region/county. This is best done through a coordinated county or multi-county planning and zoning effort.

VI. CONCLUSIONS AND WAY FORWARD

Planning commissions have played an instrumental role in facilitating and implementing activities in the county governments within countries which have had successful devolved system. The projections in this paper assume that

adoption of Kurt's "top 10" attributes for the most effective and successful county planning commissions will enhance the sustainability of county governments. In Kenya adoption of the attributes will facilitate the achievement of MDGs by 2015. Efforts to create a favorable investment climate infrastructure are expected to boost economic growth. Political, institutional, and social economic environment is vital in the development of county governments in Kenya. Political commitment is required from the highest levels of government. This will require lobbying through the ministers in charge of health sector ministries and ideally the commitment of the President himself. The output of this activity is an official declaration that MDGS be given priority in Kenya. This is expected to provide a basis for an increased allocation of funds and the pooling of efforts by other government agencies and development partners in support of achieving the MDGs. Political commitment is also required at the county level. County governments will be key in implementing interventions related to achieving almost all the MDGs in their budget allocations and activities. It is necessary to put in place a measure that ensures effective implementation of the new constitution. It is necessary to ensure equitable distribution of resources and local citizens participatory in county projects. County projects and role of decentralized funds should be harmonized to avoid duplication of projects and improve utilization of funds. Finally, accountability in the county can only be achieved through institutionalizing powerful mechanisms that hold public officials responsible for their actions as servants of the people.

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Prevalence and Financial Losses Associated With Bovine Fasciolosis at Assela Municipal Abattoir, Ethiopia

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Abstract- A cross-sectional study was conducted from November, 2014 to March, 2015 at Assela municipal abattoir to assess prevalence and economic significance of bovine fasciolosis. Out of 349 cattle examined at post mortem, 30.1% (105) were positive for fasciolosis. Age, Sex and body condition of the animal was not found as a significant factor ($p > 0.05$) affecting the prevalence of disease. The prevalence of *F. hepatica* was 69.5% (73), which was predominant among *Fasciola* species, causing bovine fasciolosis in the study areas. Whereas, the prevalence of *F. gigantica* was 15.24(16), and 15.24% (16) animals harboured mixed infection. There was a statistically significant association ($P=0.000$) between the different mode of affection of liver and fasciolosis prevalence. According to mode of affection, 16(15.24%) constituted severely affected livers; the rest, 43(41%) and 46(43.8%) were moderately and mildly affected, respectively. The present study showed that there was statistically significant difference ($P=0.000$) in prevalence of *Fasciola* species. The economic significance of bovine fasciolosis was also assessed from condemned liver and carcass weight loss. Thus based on the retail value of bovine liver and 1kg of beef the total annual economic loss from fasciolosis during the study time was estimated to be 2,340,576 ETB (114678 USD). It is concluded that fasciolosis is still prevalent in cattle in the study area. Hence, strategic parasite control method with an integrated approach should be implemented to improve the health and productivity of cattle in the area.

Index Terms- Fasciolosis, Prevalence, Economic Significance, Bovine, Assela, Ethiopia.

I. Introduction

Ethiopia is an agricultural country with over 85% of its population engaged in agricultural activity. It has diverse agro-ecological zones which contributes to the evolution of different agricultural production systems. Animal production forms an integral part of agricultural system in almost all ecological zones of the country (Tegegne and Crawford, 2003).

The animal production systems are extensive, semi-intensive and intensive in Ethiopia and the population of Cattle was estimated about 53 million heads (Central Statistical Agency, 2012). They serve as source of food, hides and important draught power for crop production. However, the productivity of these animals is severely reduced by malnutrition, low management system, low genetic potential and health problems. Among the livestock health problem, parasitism is major obstacle to the development of sub-sector (Malone *et al*., 1998).

Bovine fasciolosis is one of the most important parasitic diseases of cattle causing mortality and production losses in various parts of Ethiopia. It is the priority disease in the highland as well as in lowland areas of Ethiopia (Solomon and Abebe, 2007). It is caused by two liver fluke species, which are: *Fasciola hepatica* and *Fasciola gigantica*. *F.hepatica* has cosmopolitan distribution, mainly in temperate zones, while *F.gigantica* is found in tropical regions of Africa and Asia. Thus, the two *Fasciolid* species overlap in many Africa and Asian countries (Abebe *et al*., 2010).

The disease is found generally in vast water lodged and marshy grazing field condition anticipated to be ideal for the propagation and maintenance of high prevalence of fasciolosis. In Ethiopia, the highlands contain pockets of water logged marshy areas. These provide suitable habitats year round for the snail intermediate hosts which are required to complete transmission to a new ruminant host (Solomon and Abebe, 2007).

In Ethiopia, the prevalence of bovine fasciolosis has shown to range from 11.5% to 87% (Malone *et al*., 1998). *F. hepatica* was shown to be the most important fluke species in Ethiopian livestock with distribution over three quarter of the nation except in the arid northeast and east of the country. The distribution of *F. gigantica* was mainly localized in the western humid zone of the country that encompasses approximately one fourth of the nations (Tadele and Worku, 2007; Malone *et al*., 1998).

Fasciolosis causes a substantial economic loss which includes; death, loss in carcass weight, reduction in milk yield, condemnation of affected liver, decline in productive performances, cost of treatment expense and predisposes animals to other disease. Both *F. hepatica* (high land) and *F. gigantica* (low land) type of liver flukes cause severe losses in Ethiopia where suitable ecological conditions for the growth and multiplication of intermediate host snails are available (Anne *et al*., 2006; Walker *et al*., 2008). Infected cattle can exhibit poor weight gain and dairy cattle have lower milk yield, and possibly metabolic diseases (Mason, 2004). Apart from its great veterinary important throughout the world, *F. hepatica* has recently been shown to be a re-emerging and wide spread zoonosis affecting numerous human populations in the world (Phiri *et al*., 2005).

There is no vaccine against the disease, and hence chemotherapy is the only viable control method available today. Triclabendazole being the drug most commonly used due to its effectiveness against both mature and immature forms of the parasite (Brennan *et al*., 2007).

Many researchers have reported the prevalence of fasciolosis in cattle as 90.7% (Yilma and Mesfin, 2000), 37.2% (Solomon and Abebe, 2007) and 46.58% (Tadele and Worku,

2007) in different parts of Ethiopia. Assela is one of the areas where the environmental conditions and altitude is conducive for the occurrence of fasciolosis. However, little information is available about its prevalence and economic significance in the study area. Therefore, the objectives of this study were:

- To determine the prevalence of bovine fasciolosis in cattle slaughtered at Assela municipal abattoir
- To assess the various risk factors associated with fasciolosis and to identify its species
- To determine economic loss due to liver condemnation and carcass weight loss in cattle slaughtered at Assela municipal abattoir.

II. MATERIALS AND METHODS

2.1. Description of Study Area

The study was carried out in Assela municipal abattoir. Assela town is situated at 60591-8049 N latitude and 380411-400441 E longitude in central Ethiopia, 175 km south east of Addis Ababa. The altitude of the area ranges from 1780-3100 m.a.s.l and characterized by mid subtropical temperature ranging from 5^0c- 28^0c. The annual average rainfall is 1,200 mm and the area has a bimodal rainfall occurring from March to April (short rainy season) and July to October (long rainy season). The area covers 23674.72 km square and topographically has highland escapement and lowland areas. The high land areas are found centrally and the low lands dominate the periphery of the area. The livestock population of the area is 85,893 cattle, 57,118 sheep, 10,725 goats, 7841 horses, 15,642 donkeys, 517 mules and 35,489 poultry. The farmers in the area practice mixed crop-livestock farming system (APEDO, 2007).

2.2. Study Animals

The study animals were cattle that were slaughtered at Assela municipal abattoir. The cattle slaughtered in the abattoir were collected from different parts of the country which is characterized by different climato-ecological conditions mainly due to altitudinal differences. It is often difficult to trace the origin of the animals as they usually pass a chain of markets. Some animals come directly to the abattoir from grazing while others pass through feedlots where they are routinely de-wormed.

2.3. Sample size determination

The desired sample size was calculated using the standard formula described by Thrusfield, (Thrusfied, 2005). The expected prevalence was 35% according to Shiferaw *et al*., 2011. Therefore, the sample size in this study was:

$$n = \frac{(1.96)^2 \times p\,(1-p)}{d^2} \quad \text{(Thrusfield, 2005)}$$

Where;
n = Sample size
p = Expected prevalence (35%)
1.96 = the value of Z at 95% confidence level
d = Desired absolute precision = 5%. Therefore, the sample size was 349 cattle.

2.4. Sample collection and examination procedure:

Complete ante-mortem examination of the animals was carried out shortly prior to slaughter. Inspection of the animals was made while at rest or in motion for any obvious sign of disease. The body condition for each cattle was estimated according to Mari, (1989) and the age of animal was scored according to Del-Lahunta and Habel, (1986) as; adult (2 to 5 years) and old (above 5 years). A total of 349 slaughtered cattle liver were incised and grossly checked for the presence and identification of *Fasciola* parasite. The liver of each study animal was carefully examined for presence of lesions suggestive of *Fasciola* infection externally and sliced for confirmation. Each mature fluke was identified to species level according to its shape and size (Urquhart, *et al*., 1996). Besides, identification of the fluke species, assessment of the severity of liver lesions was carried out. Pathological lesions were judged to be condemned based on Herenda *et al*. (2000) guidelines on meat inspection for developing countries.

2.5. Study Design

A cross-sectional abattoir based survey was conducted from November 2014 to April 2015 on randomly selected cattle to investigate the prevalence of fasciolosis in bovine slaughtered at Assela town municipal abattoir and post- mortem inspection of liver was carried out. Economic loss was assessed using formula set by Ogunrinade and Adegoke (1982). Generally, all infected livers with fasciolosis were considered to be unfit for human consumption and if any liver was infected by *Fasciola* at the Assela municipal abattoir, it was totally condemned. Economic losses were calculated based on condemned livers due to fasciolosis.

2.5.1. Direct Economic loss

Direct economic loss was resulted from condemnation of liver affected by fasciolosis. All livers affected with fasciolosis were totally condemned. The annual loss from liver condemnation was assessed by considering the overall annually slaughtered animal in the abattoir and retail market price of an average zebu liver. Annual slaughtered rate was estimated from retrospective abattoir records of the last three years, while retail market price of an average size zebu liver was determined from the information collected from butcheries in Assela Town. The information obtained was subjected to mathematical computation using the formula:

ALC = CSR X LCX P

Where ALC = Annual loss from liver condemnation
CSR = Mean annual cattle slaughtered at Assela municipality abattoir
LC = Mean cost of one liver in Assela Town.
P=Prevalence rate of the disease at the study abattoir

2.5.2. Indirect economic loss

Indirect economic loss was associated with carcass weight reduction due to fasciolosis. A 10% carcass weight loss in cattle is due to fasciolosis. Average carcass weight of an Ethiopian Zebu was taken as 126 kg (Mari, 1989). The annual carcass weight loss due to bovine fasciolosis assessed using the following formula set by Ogunrinade and Adegoke (1982).

ACW = CSR X CL X BC X P X 126 Kg

Where ACW = Annual loss from carcass weight reduction.

CSR = Average No cattle slaughtered per annual at the study abattoir.

CL = Carcass weight loss in individual cattle due to fasciolosis.

BC = an average price of 1kg beef at Assela town

P=Prevalence rate of fasciolosis at the study abattoir.

126 kg = Average carcass weight of Ethiopian Zebu

2.6. Data Management and Analysis

The raw data that was inserted in to Microsoft excel spread sheet to create a data base. Then this data was further analyzed by using SPSS version 20 software program. Finally, the data was summarized with tables in accordance to the different age groups, sex, *Fasciola* species, mode of affection and body condition. Chi-square test was used to determine the variation in infection prevalence between sex, age, body condition, *Fasciola* species and mode of affection. Statistical significance was set at $P < 0.05$ to determine the presence of significant differences between occurrence of fasciolosis and risk factors. The total prevalence was calculated by dividing the number of *Fasciola* positive animals by the total number of animals tested or sampled.

$$\text{Prevalence (\%)} = \frac{\text{Total number of animal infected}}{\text{Total number of animal examined}}$$

III. RESULT

In this study, out of the 349 cattle examined, 105(30.1%) revealed the presence of *Fasciola* species. Among these, 73(69.6%) were infested with *F. hepatica*, 16(15.2%) by *F.gigantica* and 16(15.2%) had mixed infection. Among examined cattle 347 were male, from these, 104 (29.8%) were positive for fasciolosis and 2 of them were females from which only 1(0.3%) showed prevalence of fasciolosis.

3.1. Prevalence of Bovine Fasciolosis based on Age.

Of the total 349 examined animals, 297 were adult and 52 were old. *Fasciola* was detected in all age groups and a higher prevalence of fasciolosis was recorded in old animals (36.54%) than adult (28.95). However, statistically significant difference in prevalence of *Fasciola* was not observed among the different age groups ($p>0.05$).

Table 1: Prevalence of Bovine fasciolosis in different age groups

Category	Examined	Positive	Prevalence (%)	χ2	p-value
Adult	297	86	28.95	1.209	0.174
Old	52	19	36.54		
Total	**349**	**105**	**30.1**		

3.2. Prevalence of Bovine Fasciolosis based on sex.

The prevalence of *Fasciola* in male cattle was 29.8% and in female was 0.3% which is almost similar and the difference is not statistically significant (P>0.05).

Table 2: Prevalence of Bovine fasciolosis based on sex category

Category	Examined	Positive	Prevalence (%)	χ2	p-value
Male	347	104	29.8	0.379	0.512
Female	2	1	0.3		
Total	**349**	**105**	**30.1**		

3.3. Prevalence of Bovine Fasciolosis based on body condition score

Approximately the same prevalence was observed with cattle whose body conditions were poor (42%) and medium (38.9%). The lowest prevalence (28.75%) was recorded for cattle whose body conditions were good. The study shows that there was no significant variation.

Table 3: Prevalence of bovine fasciolosis based on body condition scores

Body condition	Examined	Positive	Prevalence (%)	χ2	p-value
Good	306	88	28.75	2.12	0.402
Medium	36	14	38.9		
Poor	7	3	42.85		
Total	**349**	**105**	**30.1**		

3.4. Distribution of *Fasciola* species found in infected liver

Table 4: Species of *Fasciola* identified during post mortem examination of slaughtered animals

Fasciola species	No of liver infected	Prevalence (%)	χ2	p-value
F.he	73	20.91		
F.gi	16	4.3	349.0	0.000
Mixed	16	4.3		
Total	**105**	**30.1**		

3.5. Distribution of *Fasciola* species according to mode of affection

The study shows that there was significant variation in the prevalence of fasciolosis and mode of affection conditions (P=0.000).

Table 5: Distribution of *Fasciola* species according to mode of affection

Fasciola species	Mode of affection(%)			Percentage (%)	χ2	p-value
	Mild	**Moderate**	**Severe**			
F.he	30(34.28)	32(30.47)	11(10.48)	20.91	377.79	0.000
F.gi	11(10.48)	5(4.67)	0(0)	4.3		
Mixed	5(4.67)	6(5.71)	5(4.67)	4.3		
Total	**46(43.8)**	**43(41)**	**16(15.24)**	**30.1**		

3.6. Economic loss assessment

3.6.1. Direct Economic loss

Direct economic loss was resulted from liver condemnation as the result of fasciolosis. Generally all infected livers with fasciolosis are unfit for human consumption. In the study abattoir the average annual cattle slaughtered rate was estimated to be 4000 while mean retail price of bovine liver in Assela town as 180 ETB. Prevalence of fasciolosis in Assela municipality abattoir estimated was (30.1%). Therefore the estimated annual loss form organ condemnation is calculated according to the formula:

ALC = CSR X LC X P
= 4000 X 180 ETB X 30.1%
= 4000 X 180 ETB X 0.301
=216,720 ETB (10618.32 USD).

3.6.2. Indirect Economic loss

Indirect economic loss was due to carcass weight reduction as result of *Fasciola* infection. In the study area the average price of 1kg beef was 140 ETB. The annual economic loss from carcass weight due to annual economic loss reduction due to bovine fasciolosis is calculated by using the formula:

ACW = CSR X CL X BC X P X 126kg
= 4000 X 10% X 140 ETB X 30.1% X 126kg
= 4000 X 0.1 X 140 ETB X 0.301 X 126kg
=2123856 ETB (104059.6 USD)

Therefore, the total annual economic loss due to bovine fasciolosis in the study abattoir is the summation of the losses from organ condemnation (direct loss) and carcass weight reduction (indirect loss) and thus a total of 2340576 ETB (114678 USD). NB: 1 USD was equivalent to 20.41 ETB

IV. DISCUSSION

In this study a prevalence of 30.1% (n=349) reported and this was in line with the report of Mihreteab *et al*., (2010) at Adwa municipal abattoir, Mulat *et al*., (2012) at Gondar ELFORA abattoir, Pfukenyi and Mukaratirwa, (2004) from Zimbabwe and Hailu, (1995) at awasa 30.43%, 29.75% 32.3% and 31.7%, respectively; and a bit higher than a work reported by Gebretsadik *et al*., (2009) at Mekelle (24.32%) and it was significantly higher than the prevalence of bovine fasciolosis reported by Fufa *et al*. (2009) at Wolaita Sodo (12.7%) , Swai and Ulicky, (2009) at Hawi, Tanzania (14.05%), Daniel, (1995) at Diredawa municipal abattoir (14.4%) and Abunna *et al*., (2009) at Wolaita Soddo abattoir (14.0%). The reason for this might be attributed to the variation in agro-ecological conditions favourable to both the parasite and the intermediate host.

The prevalence of bovine fasciolosis in the present study was lower as compared with the previous reports in different parts of Ethiopia (Tadele and Worku, 2007 at Jimma (46.58%), and Mulualem, (1998) in South Gondar (83.08%)). Similarly, Yilma and Mesfin (2000) reported a 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir which higher than present study. This wide gap might be due to the variation in sampling time which result higher prevalence in certain months and awareness of cattle owners and a wide use of antihelminthics.

This study indicates a prevalence of 28.95% and 36.54% in age group of adult and old animals, respectively. Statistical analysis however showed the absence of significant variation ($P>0.05$) in the occurrence of fasciolosis among the different age groups of animals. This indicates that there is no difference in acquiring *Fasciola* infection between adult and old which

contradicts the works of Solomon and Abebe, (2007); Yilma and Mesfin, (2000).

In the current work, no significant variation (*P>0.05*) was observed in the prevalence of fasciolosis whether the animal slaughtered is in a poor, medium or good body condition. This could be because body condition deterioration in cattle is manifested when fasciolosis reaches its chronic stage as (Solomon and Abebe, 2007).

Both species of *Fasciola* were identified during the study period; however, *F. hepatica* was the most prevalent (69.5%) species compared to *F. gigantica* (15.24%) and mixed infection (15.24%). This finding is lower when compared with that of Fikirtemariam *et al*., (2009) at Bahir Dar. Similarly, several abattoir studies in different parts of Ethiopia reported the predominance of *F. hepatica* to *F. gigantica* (Tadele and Worku, 2007); Ibrahim *et al*., (2010); Berhe *et al*., (2009). Abunna *et al*., (2009) however, recorded higher prevalence of *F. gigantica* than *F. hepatica* in cattle slaughtered at Wolaita Soddo abattoir in southern Ethiopia.

The high prevalence rate of *F. hepatica* may be associated with the existence of favourable ecological biotopes for *L. truncatula*. Relatively small proportion of cattle were found infected with *F. gigantica* alone or mixed infection with both species. Flood prone areas and draining ditches are favourable habitats to *L. natalensis* (Urquhart *et al*., 1996).The finding of mixed infection with the two species of *Fasciola* indicates that there are places in the country where the climato-ecological conditions favour the existence of the intermediate snail hosts for both species. The present study showed that there was statistically significant difference (*P=0.000*) in prevalence of *Fasciola* species which is further supported by the findings of Gebretsadik *et al*., (2009); Tadele and Worku (2007); Mebratu and Beka, (2011).

The result of present study showed that age has no significant (*p >0.05*) effect on the prevalence of bovine fasciolosis. This showed that age groups have no effect for the presence or prevalence of fasciolosis; hence, both animals were equally exposed to infection which contradicts with the work of Alula *et al*., (2013), Solomon and Abebe (2007); Yilma and Mesfin, (2000).

The mode of affection of liver due to fasciolosis was mild (43.8%), moderate (41%) and severe (15.24%) in which the variation was statistically significant (*P=0.000*). As present study revealed *F.hepatica* affects liver moderately than severely and mildly which agrees with report of Mihreteab *et al*., (2010).

The total annual economic loss due to bovine fasciolosis in Assela town was calculated as 2,340,576 ETB (114,678 USD). The present finding is by far higher than the results reported by Abdul (1992), Daniel (1995) and Alula *et al*., (2013), who reported a total economic loss of 154,188 USD (2,891,025 ETB), 215,000 USD (4,031,250 ETB), and 63,072 USD(1,182,600 ETB) annually in cattle due fasciolosis at Ziway , Dire Dawa municipal abattoir and Nekemte municipal abattoir, respectively. These higher values may be due to higher number of animals slaughtered at the Assela and increment of cost of liver and beef.

V. CONCLUSION AND RECOMMENDATIONS

As cattle slaughtered at Assela municipal abattoir originate from almost every corner of the town it could be concluded that fasciolosis is still prevalent in cattle in Assela which causes great economic losses as a result of condemnation of infected livers. The total annual economic losses due to liver condemnation and carcass weight loss due to fasciolosis was estimated to be 2,340,576 ETB (114,678 USD). The study has also confirmed *F. hepatica* was found to be the predominant *Fasciola* species causing bovine fasciolosis in the study area which in turn results in largest proportion of liver condemnation at Assela municipal abattoir.

In order to alleviate the existing problem and to promote the status of the livestock dependent people living in this area, the following recommendations were forwarded:

- ✓ Combined approach of chemotherapy with vector control should be considered more practically and economically.
- ✓ Farmers should be aware and informed about the importance of disease control programs and good management system if bright future and improvement in livestock production is needed.
- ✓ Further studies on the epidemiological conditions and seasonal dynamics of parasites in the study area should be conducted to implement integrated control strategies.

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The Role of Indigenous Knowledge in Climate Adaptation: Experiences with Farmer Perceptions from Climate Change Project in Sedumbwe Agricultural Camp of Southern Zambia

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Abstract- *Climate change is a world wide phenomenon that has huge implications on economic, social and ecological challenges to the global community and to smallholder farmers especially in low income countries. In this paper we seek to provide information on the role of Indigenous Knowledge (IK) to climate adaptation based on the experiences with farmer communities from the climate change research project which was implemented in Sedumbwe Agricultural Camp of Southern Zambia. Data were collected mainly through focus group discussions. The paper points out the common indicators used to predict drought/rainfall and how reliable they are. Possible recommendations are also provided on how the IK weather forecasting could be integrated and operationalized in agriculture policies of many countries in the sub Saharan African region to climate adaptation*.

Index Terms- Climate Adaptation*;* Forecasting; Harnessing; Indigenous Knowledge

I. INTRODUCTION

Indigenous Knowledge (IK) which is fondly known as traditional knowledge denotes knowledge which is generated by the community over a long period of time and enables them to understand and live within their environments. IK is the foundation for any decision making by the communities as regards food production and natural resources management. IK has also been referred to as the unique, traditional, local knowledge existing in a particular social setting and developed by women and men indigenous to a certain geographic location (Grenier, 1998). It is fundamental to local decision-making regarding daily activities like hunting and gathering, fishing, agriculture, animal husbandry, water conservation, health, etc. Moreover, unlike formal scientific knowledge, IK is generally transferred as oral wisdom from one generation to the other, and is seldom, if ever, documented. Combining all forms of knowledge other than the formal ones as IK would lead to its generalization and oversimplification, and down grade the role of local knowledge to sustainable development.

In general it is widely accepted that IK represents an alternative way of thinking, which has evolved through time, keeping in mind the requirement for communities to safeguard themselves and their families from variations in the local climate. In today's society, where science is playing a pivot role, many people believe that orally transmitted knowledge is non-scientific, which is totally false. IK is also as scientific as any other form of present knowledge as it evolved on the same principles of experiments and trial and error methods which are widely followed in sciences (Particularly in physical sciences). Historically, indigenous people are conspicuously amongst identified as particularly vulnerable to climate changes. Many indigenous territories are located in areas where impacts from global warming are anticipated to be both early and severe (Nayong et al., 2007). But, indigenous people have learnt the art of adapting to any changes in their climate and this knowledge or skill can help present generation to fight present form of climatic change and variability.

Climate change is a major threat to sustainable development in developing countries. According to IPCC (2007), poor communities particularly in sub-Saharan Africa will be most vulnerable because of their low adaptive capacity and great dependency on high climate sensitive resources such as water and ecosystems. Environmental and social consequences of climate variability have already jeopardized the livelihood of many populations in developing countries. However, even though it is acknowledged that poor communities will be most affected by climate change, the magnitude of this vulnerability depends heavily on ecological and socioeconomic characteristics of each community. So, given the urgency to cope with climate changes the present study is an attempt to discover the traditional skills prevalent among communities of southern Zambia that can help to build future course of action forpresent generation. The aim of this paper is to present and draw some IK experiences on climate adaptation by the communities for the project "***Lack of resilience in African smallholder farming: Exploring measures to enhance the adaptive capacity of local communities to pressures of climate change"*** which was implemented in Choma district, southern province of Zambia. The community experiences regarding how they use IK in their decision making

for agricultural production and natural resources management are discussed.

II. MATERIALS AND METHODS

A. Focus Group Discussions

In order to obtain the required information for the study, focus group discussions were held with elderly men (63) and women (42) regarding their IK and climate change prediction. The discussions provided a basis for the information collected to compile this paper

B. Description of the Study Area

This study was conducted in southern province of Zambia in 2008/09 agriculture season. The province lies approximately between latitudes 16 and 18°S, and longitudes 26 and 29°E, with a total area of about 85,283km^{2} representing 11% of the country's total land area. Southern province is among the key agricultural based provinces in Zambia and accounts for 11.0% of the total agricultural households in the country of which 83.3% and 16.7% are male and female headed respectively. At provincial level, Southern province has the highest mean agricultural household size of 6.5 compared to the national average of 5.5 persons per household (CSO, 2000).

The people of Sedumbwe Area where the project on climate change and adaptation wasimplemented are mainly Tonga speaking and live in extended families with an average size of 9. About 95% of the people in the area are actively involved in agriculture which is their major source of livelihood. Cultivation of land is done using draught power. About 85% of the local farmers are small-scale farmers who only grow crops for family consumption with a little surplus for sale.The farming systems in this area of southern province are characteristic of agro-pastoral farming, with maize being the dominant staple food crop. Other food crops include sorghum, groundnuts, millet and cowpeas. Cotton and tobacco are the main cash crops grown. The most important livestock types reared include cattle, goats, pigs and chickens. At smallholder farming level, crop production is typically rainfed and livestock management practices
are characterized by less supplementary feeding practices and communal grazing arrangements.

C. Choma District

Choma district covers an area of 4, 860 km$^{2.}$ The estimated total population is 203 305 people (48.7 percent of whom are male and 51.3 percent female) live in 33, 453 households (CSO, 2001). Choma district lie in agro ecological region II, with average annual rainfall between 800mm and growing seasons of 90 to 95 days. More than 97 percent of the total number of households are full time farmers although most of them are small scale. The major cropping systems in the district is semi commercial maize, groundnuts, sunflower, cotton and sorghum. The vast majority of farmers also keep livestock, mainly cattle and poultry, but also goats, sheep and pigs.

Figure 1: Map of southern province showing study area

III. EFFECTIVENESS OF THE USE OF IK IN TERMS OF COMMUNICATION AND DOCUMENTATION

Households and focus group discussions revealed that communities have traditional methods ofpredicting weather patterns. The findings show that 83.2% of sampled households acknowledged that they know some form of indicators that are used to predict weather patterns. A drought season is characterized by a high prevalence of some kind of special insects especially those in the family of caterpillars, winters preceding the on-set of the rain season are very cold, wind flow is also characterized by unusual direction and this is also coupled with high fruiting levels by the fruit trees.

A normal season in terms of rainfall pattern will display a combination of the following weather patterns; there will be plenty of fruits, normal wind (usual) direction, hot summers and appearance/prevalence of blank ants just before and during rain season. Flood seasons were not clearly defined due to very low incidences of such weather patterns in the study area which are more drought prone (see Table 1)

IV. COMMON INDICATORS TO PREDICT DROUGHT/RAINFALL AND THEIR RELIABILITY

In terms of degree of accuracy regarding predicting a drought/rainfall year, the households indicated that more than 80% of what they see in terms of traditional indicators turn out to be true and this makes them to start preparing for the expected weather pattern. Communities noted that on knowing that the rainfall pattern will not be favourable, they tend to prepare land early, buy early maturing maize varieties and also think of alternative livelihood strategies such as involving in piece works, sale of assets (e.g livestock) and others ask for remittances from relatives among other strategies

V. COMPARISON OF INDIGENOUS WEATHER FORECASTING AND METEOROLOGY/MODERN FORECASTS

In terms of comparison of indigenous and modern weather forecasting the table below provides a summary of categorized traditional indicators fordrought and floods and degree of accuracy as reported by the community in the study area.

Table 1: Traditional Indicators of rain seasons

Normal Rain Season	Drought Season
• Swallows (type of bird) appear around October	• Low temperatures during the months of September/October
• Mist of the hills	• Migration of "Black Ants" from one point to another
• Appearance of dark clouds during "Lwiindi Traditional Ceremony" – Harvest thanks Giving Ceremony	• High fruiting of wild fruits
• Appearance of the "Morning Star" just before the on-set of the rain season	
• Appearance of "Danga Balya" star at dusk (18:00 – 20:00hrs)	
• High prevalence of "Whirl Winds" just before on-set of rains in September/October	

Source: Author, 2008

Table 2: Drought Early Warning Indicators

Emergency	Traditional indicator in Tonga	English translation of Tonga indicator	Time when the indicator happens	Category of indicator	Degree of accuracy
Drought	Bamoomba kutalila kuseeni.	Specific birds not making noise at dawn	July-Sept	P.S.E.W.I	90%
Drought	Muyuni Siapilyo kuti mapepe kasumbula	Specific birds are not seen flying around during an eminent drought	Aug	P.S.E.W.I	85%
Drought	Matongola kuti katako	Specific birds not seen flying around	Oct-Nov	S.H.M.I	90%
Drought	Inswi zya kuwe kuti zyavula	Small fish population in rivers/streams decreases	Jan	P.S.E.I	50%
Drought	Nyenze kuti tizyalila	Mole cricket do not make noise	Sept-Oct	P.S.E.I	90%
Drought	Kutazwa kwa nseele zinji	White termites not in abundance	Nov-Dec	S.H.M.I	80%
Drought	Kutaboneka kwa nkonkoolekwa	Specific butterflies are not seen flying around	Oct-Dec	S.H.M.I	95%
Drought	Cikumbi lusele ca mupeyo	Cloud cover lasting for less than seven days	July	P.S.E.W.I	95%
Drought	Kuhula kwa micheelo minji	Abundant wild fruits	Aug-Sept	P.S.E.W.I	80%
Drought	Kumuka kumana kwa mpeyo	Long winter season	Sept	P.S.E.W.I	90%
Drought	Kutavula kwa zinkubala	Caterpillars not in abundance	Oct-Jan	S.H.M.I	70%
Drought	Mukololo kuti kutalosyi meenda ku mwaka	A particular tree does not drop water	Aug-Sept	P.S.E.W.I	98%
Drought	Kutaba kwa bunkululu	Shrubs/Plants not flowering during drought period	Sept-Oct	P.S.E.W.I	90%

Source: (MET, 2008) Note: *P.S.E.W.I means pre-season early warning indicators, S.H.M.I means season hazard monitoring indicators*

Table 3: Flood Early Warning Indicators

Emergency	Traditional indicator	English translation	Time when the indicator appears	Type of indicator	Degree of accuracy
Flood	Mukololo kuti kaulosya meenda ku mwaka	A particular tree drops water in excess	Sept	P.S.E.W.I	90%
Flood	Kuboneka kwa matongola	A lot of birds are seen flying all over	Nov	S.H.M.I	85%
Flood	Kuzyala kwa musamba	A lot of fruit from a *Pericopsis angolensis* tree	Oct	S.H.M.I	95%
Flood	Kuvula kwa majongola mapati asiya	Abundance of millipedes	Nov-Dec	S.H.M.I	75%
Flood	Maholopyo kuti kali manji		Oct	P.S.E.W.I	60%
Flood	Bamoomba kuti kabalila maningi kuseeni	Specific birds making a particular noise at dawn consistently	Nov-Dec	S.H.M.I	85%
Flood	Nkonkolekwa zinji kuti ka zizwa kujwe kuya kumbo	Butterflies moving from east to west	Nov-Dec	S.H.M.I	95%

Source: (MET, 2008) Note: *P.S.E.W.I means pre-season early warning indicators, S.H.M.I means season hazard monitoring indicators*

VI. HARNESSING OF IK POTENTIAL FOR ADAPTATION TO CLIMATE CHANGE AND VARIABILITY IN ZAMBIA AND BEYOND

From experiences in Sedumbwe regarding the IK and how it is useful in knowing the weather pattern of a particular year, it is felt that indeed there is need to harness this potential by integrating it in the work programmes of the meteorological departments of countries in the region as they also show a degree of accuracy in determining the weather pattern. For example in Zambia, most of the areas do not have weather stations and hence communities could rely on IK for weather predictions and make informed decisions on their adaptation to climate change and variability. It is also believed that the EL NINO prediction was developed from IK of fishermen in the Far East who could predict a drought/flood season using indigenous knowledge (Ngwenya, 2009 per comm.) Such kind of efforts should be developed further in other areas of the world. The realization of IK's contribution to these sectors has led to an increasing interest in it by academicians, and policymakers alike. Many government and non-governmental organizations, as well as international organizations such as the World Bank, International Labor Office, UNESCO and FAO are now appreciating the role IK can play in achieving sustainable development in a country. This interest is also apparent in the policies and programmes of various countries.

VII. EMERGING POLICY MESSAGES FROM CASE STUDY

This paper recommends that the agricultural policies in Zambia should take into account the role of IK in weather prediction. In addition issues of documentation and translation should also be emphasized so that the generations to come will learn the traditional way of predicting weather patterns for possible action to climate change adaptation.

It is very clear that southern Province in Zambia especially Choma district has a rich collection of traditional knowledge and if this knowledge is purposefully and logically applied with modern skills and technology can save the life of millions on the earth. The study has also demonstrated that southern province and other societies of sub Saharan Africa could play pivot role of Climate Adaptation and prediction of climate changes using Indigenous.Knowledge if well harnesed. It is very pathetic that under the pressure of modern science and technology, traditional knowledge is dying without due recognition from community and government. And at the same time absence of literary sources about traditional skills ishindering the dissemination of traditional knowledge.

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Sources of Stress for Nursing Students during Clinical Practice

(A Quantitative Analysis at A Public Hospital Of District Swat, Khyber Pakhtunkhwa)

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Abstract- This study aimed to identify stress factors for nursing students during clinical practice. Descriptive cross sectional study design is utilized for identifying sources of stress in nursing students during clinical practice. Study was completed in six weeks. Study setting was the public hospital (Saidu Teaching Hospital) of District Swat.

Both male and female students of generic and diploma nurses were selected for this study who performing their clinical practice at Saidu teaching Hospital Swat, Khyber Pakhtunkhwa. The tool used for data collection was self administered questionnaire, whereas selection of participants was conducted through probability sampling technique (Simple Random Sampling). A total number of selected participants were 90 nursing students. All these students were mostly belong to 2nd year, 3rd year and 4th year. Among these 90 nursing students 61% were female and 39% male. Regarding the basic sources of stress it is concluded that criticism of doctors, fear of making mistakes in the treatment of patients, criticism from the nursing supervisors and lack of opportunity to students to perform nursing skills etc all are the major sources due to which students frequently feel stress.

Index Terms- Clinical practice, nursing Students, sources of stress, stress

I. INTRODUCTION

Stress can be defined as the adverse reaction people have to excessive pressure or other types of demand placed on them [1]. Stress is a normal phenomenon and it can be defined as, it is the insight of incongruity between atmospheric strains and person's abilities to meet these strains [2]. Stress occurs when a person feel that he cannot effectively manage the demands or threats of their life [3].

Nursing profession is full of stressors. Nursing profession can be defined as a health care profession that requires expenditure of energy on many levels. They focus on individuals care , families care and community care so that they can attain, maintain and recover optimum health [4]. In nursing program the curriculum is divided into theory and clinical practice. The clinical practice is very important for both diploma and bachelor nursing students. Mostly, the students spend half of their time in clinical practice. The purpose of the clinical practice is to gain experiences and incorporate the theory with practice. There are different sources that produce stress for the nursing students during clinical practice. According to various researchers the most common stressors are time pressures, workload, making decisions, continuous changes and economic mistakes at work [5]. Similarly this study is conducted to analyze factors behind stress among nurses at clinical site in Saidu Teaching Hospital Sawat.

Saidu Teaching Hospital is the only government hospital in district Swat where both generic and diploma nursing students are performing their clinical practice. As a government hospital there is lack of facilities for the nursing students. According to our personal observations the environment of Saidu Teaching Hospital seems to be very stressful for the nursing students. Students are facing various challenges and stressors. Based on the above rational we set our objective as, to identify the factors leading to stress in nursing students during clinical practice.

II. MATERIAL AND METHOD

Descriptive cross sectional study design were used to identifying sources of stress for the nursing students during clinical practice. This study is quantitative in nature. Study setting was the public hospital (Saidu Teaching Hospital) of District Swat where both bachelor and diploma nursing students are performing clinical practice. The selected focused group for this study was both male and female nursing students of generic and diploma nurses, who performing clinical practice at Saidu teaching Hospital Swat, Khyber Pakhtunkhwa. The sample size of this study consists of 90 nursing students including both diploma and generic nurses. The information was provided to the students about the study. The purpose of the study was explained. Confidentiality of all the obtained information was guaranteed. A written informed consent was obtained from the participants who were volunteers for participation. An approval letter was obtained from the college and hospital ethical committee. The instrument tool used for data collection was self-administered structured questionnaire. Data were analyzed using SPSS (Statistical Package for Social Science) 16 version. For the description of the study variables descriptive statistics were

utilized. This research study was completed in six weeks as per requirement of the curriculum.

III. RESULTS

In this study the data were collected from 90 students. Among the students 61% were female and 39% male of which 23.3%, 43.3% and 33.3% were in 2nd year, 3rd year and 4th year respectively.

Table I: Source of stress for the nursing students during clinical practice

Sources of stress	Never Frequency (%)	Occasionally Frequency (%)	Frequently Frequency (%)	very frequently Frequency (%)
Stress due to giving care to the patient	69(76.7)	6(6.7)	12(13.3)	3(3.3)
Stress due to clinical assignment	42(46.7)	33(36.7)	15(16.7)	0(0.0)
Stress due to extra work other than nursing tasks	9(10.0)	51(56.7)	18(20.0)	12(13.3)
Stress due to new procedure	12(13.3)	45(50.0)	18(20.0)	15(16.7)
Stress due to nursing skills	69(76.7)	18(20.0)	3(3.3)	0(0.0)
Stress due to a procedure that is painful for the patient	12(13.3)	36(40.0)	27(30.0)	15(16.7)
Stress during managing a dying patient	18(20.0)	33(36.7)	24(26.7)	15(16.7)
Stress due to complex medical terminology	9(10.0)	48(53.3)	21(23.3)	12(13.3)
Stress due to criticism of doctors	18(20.0)	9(10.0)	21(23.3)	42(46.7)
Stress about fear of making mistakes in the treatment of patient	3(3.3)	27(30.0)	24(26.7)	36(40.0)
Stress due to conflict with nursing supervisor	18(20.0)	33(36.7)	39(43.3)	0(0.0)
Stress due to working with other staff	66(73.3)	15(16.7)	3(3.3)	6(6.7)
Stress due to lack of opportunity for performing nursing skills	6(6.7)	27(30.0)	33(36.7)	24(26.7)

The responses of the participants are presented in the table I. Regarding sources of stress during clinical practice the responses of the students in the table 1 reveal that criticism of doctors 46.7% and fear of making mistakes in the treatment of patients 40.0% were the main sources perceived by the students very frequently. Regarding sources which were perceived frequently by the students include conflict with nursing supervisor 43.3% and lack of opportunity for performing nursing skills 36.7% . Concerning some other sources including extra work other than nursing tasks 56.7%, new procedure 50.0%, procedure that is painful for the patient 40.0%, managing a dying patient 36.7% and complex medical terminology 53.3% were perceived occasionally sources of stress. Some responses in the table demonstrated that 76.7% students giving care to the patients, 46.7% clinical assignments, 76.7% nursing skills and 73.3% working with other staff never feel stress.

IV. DISCUSSION

Studies on sources of stress during clinical practice demonstrated that in the clinical environment students are facing various challenging issues that become as a source of stress for them [6]. Therefore the purposes of the current study were to identify the factors leading to stress in nursing students during clinical practice at Saidu teaching hospital swat, Khyber Pakhtunkhwa.

Previous literature showed that prominent source of stress for the nursing students are mostly associated with high work burden [2]. In current study 56.7% students responded that they feel stress other than nursing tasks occasionally. The finding of the current study is consistent with previous study results.

Most of students (36.7%) reported that they feel stress occasionally during the management of a dying patient. The findings of the previous study reflecting that management of a dying patient is mostly experienced source of stress in the clinical practice [7].

Findings of the current study also revealed that most of students feel stress frequently when they are in conflict with nursing supervisors (43.3%) and also due to lack of opportunity for performing nursing skills (36.7%). Comparing these findings with the previous research study the important sources of stress are conflict with health care professionals, inability to perform nursing skills, increase work demand other sources include clinical assignment work load and increase work for the home etc [8].

Criticism of doctors and fear of making mistakes in the treatment of patient are the commonly reported sources due to which students feel stress very frequently, the response rate for both were 46.7% and 40% respectively. The previous research study reflecting that activities which have the probability of making mistakes such as venous puncture, dressing and hygienic practices are the important sources of stress for students during clinical practice [9].

V. CONCLUSION

Regarding the basic sources of stress it is concluded from the study that criticism of doctors, fear of making mistakes in the treatment of patients, criticism from the nursing supervisors and lack of opportunity to students to perform nursing skills etc. are

the major sources due to which students feel stress very frequently. From the above findings it can be suggested that nursing staff need to give support and encourage their students. All other staff of the hospital is also needed to be cooperative with the students. Nursing staff and physician should not criticize the students negatively. Clinical education is necessary for the new trainee nursing students before performing any nursing procedure. Improved behavior of all staff member including auxiliary staff has a great role in relieving stress of the students. Hospital need to make a policy for the students through which they can work easily.

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The Utilization of Idle State Property in Leasing Form

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ABSTRACT *: The regulation concerning the utilization of idle state property in the form of lease in the Law of the Republic of Indonesia No. 1 Year 2004 concerning State Treasury jo Government Regulation of the Republic of Indonesia No. 27 Year 2014 concerning State property Management jo Minister of Finance Regulation of the Republic of Indonesia No. 57 Year 2016 concerning Lease Procedure of State Property jo Minister of Finance of the Republic of Indonesia Regulation No. 250 Year 2011 concerning Management of Idle State property has not able to streamline, efficiently managed, and optimize the utilization of idle state property in the form of lease. This is due to the fact that the above four laws stipulated such enormous authority to property user in determining the plan of the utilization of state property, triggering the property organizer to lose its authority to utilize state property. The lack of supervision on the utilization of state property is due to the Minister of Finance as stipulated in the Minister of Finance Regulation Number 244/PMK.06/2012 beside as an official of state property, as well as an internal supervisor in the utilization of state property whose objectivity cannot be guaranteed in conducting supervision, while external supervision has not been regulated in Minister of Finance of the Republic of Indonesia Regulation No. 244/PMK.06/2012 concerning the Supervision and Control of State property.*

KEYWORDS *: State property, utilization, lease.*

I. INTRODUCTION

In order to provide services to the public, the government requires facilities and infrastructure in various activities. Facilities and infrastructure, which is one of them, is an office building. However, not all Ministries/Institutions have a permanent office building therefore sometimes the Ministry/Institute is forced to rent or ride on other institutions, for example the Ministry of Marine Affairs Coordinator who uses the office of the Agency for the Assessment and Application of Technology as a temporary office because President Jokowi requires all Ministries/Agencies to work immediately even though the Ministry has no permanent office[1].

Anticipation upon this matter, the Ministry/Institution is allowed to propose the construction of office buildings to the government through their respective ministries/institutions with the consideration that construction of office buildings is conducted in accordance with the level of necessity of the Ministry/Institution, because not a few of offices have been built at a high cost but apparently does not used for the implementation of basic tasks and functions of Ministry/Institution, for example the National Land Agency which is a Non-ministerial Government Institution located on Jalan Cendrawasi Makassar has 3 building units for nine hundred billion rupiah (900 M). Similarly the office of the Ministry of Justice and Human Rights, located at Jalan Sultan Alauddin Makassar, has 5 units of buildings worth one billion five hundred million rupiah (1.5 M)[2]. This happens because of the lack of mature planning and may be due to the rationalization of employees and even merger (merging) of two offices into one, such as the National Land Agency and the Directorate General of Spatial Planning of the Ministry of Public Works are merged into one ministry institution named the Ministry of Agrarian and Spatial Planning[3]. Ministry of Forestry and Ministry of Environment are merged into one ministry institution named the Ministry of Forestry and Environment, Ministry of Public Works and Ministry of Public Housing are merged into one ministry institution named the Ministry of Public Works and Public Housing[4]. Hence if the procurement of office facilities is not targeted properly and executed inefficiently and not paying attention to the level of requirement of respective Ministry/institution will become fruitless and will ultimately burden the state budget both in terms of procurement and in terms of maintenance.

Due to the construction of office facilities and infrastructure is conducted through state budget (APBN), it is categorized as State property stipulated in Article 1 Number 10 of Law No. 1 Year 2004

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concerning State Treasury jo Article 1 Number 1 of Government Regulation of the Republic of Indonesia No. 27 Year 2014 concerning Management of State property[5] under the control of the state and managed by the government through the Ministry/Institution. Due to the office building is a state property intended for Ministries/Institutions as a means of providing services to the public, the Ministries/Institutions should use it for the execution of duties and functions, but if the State Property mentioned is not yet or not used it in the framework of the main task of Ministries/Institutions, it may be utilized either by the Ministries/Institutions concerned or other Ministries/Institutions or third parties in the form of rent, land use, cooperation of utilization, built operate transfer**,** and cooperation of infrastructure procurement[6].

The utilization intended is utilization of State property (Barang Milik Negara, hereinafter "BMN") which has not or has not been used for the implementation of the main tasks and functions of the Ministry/Institution hereinafter referred to as idle state property, or optimizing the State property by not changing the ownership status[7]. One of the forms of utilization intended is in the form of rent that is the utilization of State property by another party within a certain period and receive cash reward[8]. The objective is to implement the utilization of State property which is orderly, directed, fair, and accountable in order to grant the utilization of State property which is efficient, effective, and optimal as well may contribute in service matter to society because the result of the utilization is non tax state revenue (PNBP) which will of course be used by the state for the welfare of society as much as possible. In addition, the use of state property can reduce the burden of APBN, which is related to the reduction or loss of maintenance costs due to the responsibility of the lessee, and also if the state property is not utilized and left unused or unorganized, then is it possible that irresponsible parties may conduct illegal occupation due to the state property is recognized as his own, consequently the government will incur a certain amount of costs when conducting the business of returning assets through the court. Utilization of state property can also be useful for society, because the utilization can open employment and increase the income of society through utilization of rent by a third party in the form of company, it will absorb new employment because the business will be opened by utilizing state property will be able to creating needs of employees/workers, thereby society may earn income as employees or workers[9].

The legal regulation concerning the utilization of state property are regulated under Law No. 1 Year 2004 concerning State Treasury specially in chapter VII governing the Management of State property, and as the implementing regulation of Law No. 1 Year 2004 specifically in chapter VII, then The Government Regulation No. 6 Year 2006 concerning Management of State Property as amended by Government Regulation No. 38 Year 2008 on the Amendment of Government Regulation No. 6 Year 2006, but in its implementation, State Property Management is growing and complex therefore it cannot be implemented optimally due to some problems that arise as well as the existence of management practices that its management cannot be implemented with the Government Regulation, thereby with regard to it, then Government Regulation No. 38 Year 2008 concerning Amendment of Government Regulation No. 6 Year 2006 replaced by Government Regulation No. 27 Year 2014 on the Management of State/Regional Property with the consideration in order to be able to answer the problems and practices that have not been accommodated in the previous Government Regulation, such as the dynamics of the management of state property related to the lease, cooperation of utilization and State property in abroad which must Treated specifically. In addition, there are multiple interpretations of the provisions in Government Regulation No. 6 Year 2006 concerning Public Service Body (BLU), Non Tax State Revenues (PNBP), as well as cases that arise in the management of state property such as the Financial Audit Board (BPK) audit findings demanding the government to complete Government Regulation No. 6 Year 2006[10].

While specifically regarding the lease of state property as a form of utilization of state property technically is regulated in Minister of Finance Regulation No. 33/PMK.06/2012 concerning Procedures for Implementation of State property Leases as amended by of the Minister of Finance Regulation No. 174/PMK.06/2013 on Amendment to Minister of Finance Regulation No. 33/PMK.06/2012, and replaced with Minister of Finance Regulation Number 57/PMK.06/2016 concerning Procedure Implementation of State Property Leases. Article 4 paragraph (1) of Minister of Finance Regulation No. 57/PMK.06/2016 provides that "Renting of State property is conducted with the purpose of optimizing the utilization of State property which has not / not used in the implementation of duties and functions of state administration and prevent the use of state property by another party unlawfully". Furthermore, in paragraph (2) of the regulation stipulates that "Renting of state property is performed as long as it does not harm the state and does not interfere with the execution of duties and functions of state administration, thereby if any state property has not or not used in the execution of duties and functions of government then the lessee of the property must submit state property to the Ministry/Institution of the Property Management unit concerned to the Property Management in this case is the Ministry of Finance. These provisions are followed up by Minister of Finance Regulation No. 250/PMK.06/2011 concerning the Procedures of Management of Unused Property to Organize Duties and Functions of Ministries/Institution. Article 2 of Minister of Finance Regulation No. 250/PMK.06/2011 expressly stipulates that "the property user are required to submit idle state property (excess) to the property organizer", but the provisions in Article 2 are disallowed by Article 3 that although stated as Idle, but the state property cannot be submitted to the property organizer if it has been planned to be utilized by the relevant

Ministries/Institutions prior to the end of the third year or has been planned to be utilized within two years from the date the state property is indicated as idle state property. Consequently, the state property cannot be utilized by the property organizer for the ministry/ institution in any form of necessity, including its leasing to other parties because the utilization of state property must be under the notice and permission from the Property Organizer, thereby the state property actually provides benefits for non tax state revenue, on the contrary, it encumbers the state budget in terms of its maintenance. If this matter continues, then it will not only cause a loss for the state finances, but the state also fails to realize the welfare for the society because the state is suspected not yet optimal in performing its obligations in utilizing State property. Therefore, an ideal step in the utilization of State property is required.

Based on the above explanation, the problem that will be discussed in this paper is how is the nature of providing the opportunity to the property user on the plan of utilization of the idle state property? And how is the supervision to the implementation of utilization of the idle State property in the form of rent?

II . RESEARCH METHODS

Type of Research

This type of research used the type of normative-empirical legal research. Normative aspects used secondary data that is descriptive[11] and data analysis that is qualitative. For empirical research used primary data that emphasize more in interview aspect.

Research Location

This research is conducted in Jakarta and Makassar especially at the Ministry of Finance of the Republic of Indonesia, with the consideration that both locations can represent the territory of Indonesia in the case of the utilization of State property in the form of rent.

Types and Data Sources

The types and sources of data used in this study were primary data and secondary data. Primary data was data that obtained directly from the research location in the form of interviews, while secondary data was data that needed to complete primary data, such as primary legal material consisting of legislation related to the utilization of state property in the form of rent, and secondary legal materials consisting of books, papers, seminar results, scientific papers related to this research.

Data Collection Techniques

The data collection techniques used were direct observation of the utilization of state property in the form of rent, as well as interviews conducted by respondent, consisting of property organizing officials, property user officials, and third parties as the lessee.

Data Analysis

This study used a qualitative analysis of data analysis that did not use numbers, but described the findings with words[12].

III. RESULTS AND DISCUSSION

A. The Nature of Providing Opportunity of Idle State property Utilization to The property User Before 3 Years Since It Indicated as Idle.

State properties in the form of land and buildings have a strategic role in the implementation of duties and functions of government thereof they must be managed properly, effectively, and optimally. The management in practice encounters major challenges especially related to the existence of idle land and buildings, or better known as idle state property, example state property in the form of land and/or buildings that are not used for the purpose of performing the duties and functions of the Ministry/Institution[13].

The nature of providing the opportunity to the property user to utilize the idle State property is intended to: 1. Make effective use of State property in the sense that all idle state property is used to fully to support government services to society; 2. The efficiency of state finance expenditure either from procurement cost or maintenance cost and security; 3. Optimize state financial revenue from the utilization of idle state property in the form of rent. This is indispensable to ensure that limited resources can be maximally utilized by minimizing the costs incurred as minimum as possible, therefore the use of state property can contribute to the country's economic growth and improve society's lives.

To achieve the above objectives, the property user shall report and submit the idle state property to the property organizer therefore the property organizer may utilize state property for the execution of duties and functions of the Ministry/Institution in need or utilize it in the form of lease to the third party[14]. The obligation of the property user to deliver the state property shall be exempted if the property user has a plan to use the state property before the end of the third year and declared through the written application submitted by

the property user to the property organizer, starting since state property is indicated as idle state property[15]. It is intended that the Ministry/Institution as a user of property can streamline the utilization of BMN idle, in the sense that all BMN idle is used fully to support government service to the public, and also to finance the state finance expenditure both from procurement cost and maintenance cost and security, Making savings because it no longer needs to cost the construction of new buildings.

However, the plan to utilize BMN idle in the form of rental of building owned by Ministry of Transportation and Ministry of Religion which is reported by the user of property to the property manager has not been realized until the end of third year since stated idle indicated. The cause is[16]:

1. Condition of buildings that are not feasible to use so that requires funds for repairs.
2. There is a maintenance fee but is not used in accordance with its designation, because it is revised for other expenses such as shopping for property and other unexpected shopping.
3. The wrong planning, because basically the user of the property filed the proposal of utilization just to buy time to keep the cost of maintenance.
4. There is no monitoring from the property manager on the utilization plan of BMN idle by the user of the property.

The above conditions are strengthened by Nur Huseng (Section Head of State Property Management, State Property Office and Jakarta Auction IV), stated that: “The obstacles that often occur in the field over the plan of idle BMN utilization are generally caused by poor planning Mature, because basically the user of property proposed the utilization to the manager of property only to gain time for the BMN idle still get the cost of maintenance, and also there is a concern if the BMN idle is submitted to the manager of property, then there is a possibility if one day needed, Will find it difficult to get back the idle BMN”[17].

The constraints mentioned above resulted in the utilization of BMN idle ineffective and optimal, causing losses to the state, since in addition to not being able to contribute to state financial revenue, also the BMN idle still burden the country in terms of maintenance.

In order that the utilization of idle state property in the form of rent can be effective, efficient, and optimal, then according to the author, the matter that must be conducted by the property organizer as the party responsible for the utilization of state property as follows:

1. Not passive, meaning that the property organizer not only awaits the report from the property user but is active in controlling the state property in the Ministry/ Institution.
2. Not giving such wide authority to the property user in terms of determining the state property, which is included in the idle category, including the utilization plan, but the property user must remain in coordination with the property organizer in determining the status of idle state property.
3. Regular property organizers perform document and physical inspection of state property to sharpen their role in determining idle state property.

B. Supervision on Utilization of Idle State Property

Supervision of the utilization of state property as one of the cycles in the management of state property holds strategic and urgent function in optimizing the utilization of state property as part of state finance[18]. Supervision of state property contains an understanding of the process of determining the parameter of success and actions to be taken that support the achievement of expected results in accordance with the objectives set by the rules applicable in the framework of realization of proper asset management[19]. The notion of supervision of state property contains two important things namely state property supervision objectives and substance of state property supervision objectives. The target of state property supervision is "the process of determining the success of state property and taking actions that support the achievement of expected results", while the substance of state property supervision objectives is "achievement of state property management objectives that have been established in accordance with the rules applicable in the framework of realization of asset management"[20].

Supervision of the use of state property is regulated in Minister of Finance Regulation No. 244/PMK.06/2012 On the Supervision and Control of State property, which is an elaboration of Articles 90 to 95 of the Government Regulation No. 27 Year 2014, which regulates the issue of supervision and control of state property. The implementation of the supervision of state property is based on the Minister of Finance Regulation No. 244/PMK.06/2012 performing the management of state property and the officials/employees who manage the state property[21], therefore in this Minister of Finance Regulation is divided into two outlines related to the implementation of supervision, namely the implementation of supervision within the scope of authority of the property organizer, as well as the implementation of supervision within the scope of authority and obligations as the property user/power of the property user[22].

1. Supervision by the Property user/Proxy of Property Users

The property users are the officials holding the authority of the utilization state property[23]. Minister/Chairman of the institution as the head of the Ministry/Institution is the user of state property is authorized and responsible for supervising the utilization of state property under his control[24]. The proxy of property user shall be heads of work units or officers designated by the property user to utilize property in their control as good as possible[25], and hereinafter referred to as internal controllers in the utilization of state property.

The proxy of property user is an organizational unit closest to the existence of state property thereby supervision of state property rests on it. While the property user has more functions to monitor the implementation of supervision by the proxy of property user. The scope of supervisory activities undertaken by the property user/proxy of property user is in the case of monitoring and controlling on the utilization of state property. Monitoring by the property user is incidental monitoring, while the monitoring performed by the proxy of property user is incidental and periodic monitoring.

Implementation of monitoring by property user/proxy of property user is monitoring on suitability between executions of utilization of state property, which is under the control of property user/proxy of property user with the provisions of legislation[26]. Thereby, what is meant by monitoring is to compare the implementation of the activities in accordance with the existing laws and regulations whether it is appropriate or not. Therefore the implementation of monitoring by the property user/proxy of property users is focused on the obedience aspects of existing regulations[27]. That is, that the implementation of monitoring must be in accordance with Regulation of the Minister of Finance No. 244/PMK.06/2012 concerning Supervision and Control of State Property, because if when monitoring the user of the property/proxy of property user finds the conditions requiring to take the necessary action, then as soon as possible the user of the property/proxy of property user carry out the follow-up action from Monitoring, that is doing the controlling action on the condition found. For example, a form of utilization that is inconsistent with the approval of the property manager, the type of business for rent is not in accordance with the contract between the user of the property and the tenant, or if the utilization of idle BMN has not been approved by the property manager.

There are 4 (four) main objectives of the controlling of state property, namely: (1) to update the bookkeeping of state property in the State property Management Information System (SIMAK BMN), (2) to realize structuring effort in the Administration of State property in all work units (Satker) of Central government agencies, (3) presenting corrections of fixed asset value on the ministry/Institution financial reports, and (4) conducting continuation act upon the structuring effort and management of State Assets that is orderly and optimal[28]. Matters that are included in the object of controlling the state property currently the assets controlled by the Ministry/Institution, including those located at the Public Service Bodies (BLU). While the meaning of the BLU is an agency in the government environment established to provide services to the public in the form of the provision of poperty and/or services sold without prioritizing profit and in conducting its activities based on the principles of efficiency and productivity, such as assets derived from Deconcentration and Co-Administration funds, former assets of National Banking Restructuring Body (BPPN), Bank assets in Liquidation, former Foreign/Chinese used assets, ex-Contractor Cooperation Contract (KKKS) assets, and other assets, such as a grant of state property, namely the transfer of ownership of state property from the central government to the regional government or to another without reimbursement based on legislation are designated as state property[29].

The direction of the control of state property as in order the utilization of state property in every property user more accountable and transparent, therefore the state property can be optimized upon its utilization to support the service function to society, and its possibilities upon the function of budgeter in the utilization of state property can contribute state financial revenue[30]. Therefore, the use of state property must be closely monitored and controlled to avoid mismanagement, loss and unutilized, thereby to improve the supervision function, the role of government internal supervisor is very important.

The subsequent action taken by the property user/proxy of property user on the result of monitoring and control is to request the government internal monitoring apparatus in this case the Inspectorate General (IRJEN) of each Ministry/Institution as the property user or the Finance and Development Supervisory Institution (BPKP) to undergo audit over the results of monitoring and controlling in accordance with existing laws and regulations. If it is found that there are irregularities in the use of state property, and may even take legal action if the audit results are proven to be irregularities involving the property user and procurement of property and property organizers as well third party[31]. This action is conducted to hold accountable users of the property/proxy of the property if it is proven to commit acts of deviation on the use of state property.

2. Supervision by the Property Organizer.

The supervision of state property by property organizer, hereinafter referred to as the internal supervisor of the utilization of state property based on Article 26 Paragraph 1 Regulation of the Minister of Finance No. 244/PMK.06/2012 shall be carried out by the Director General, the Head of Regional Office of Directorate General of the State Administrative Office (Kanwil DJKN) and the Head Office of Ministry of State and Auction (KPKNL) of Ministry of Finance of the Republic of Indonesia.

The term "policy" means behavior or actions that reflect virtue for every official person, while "wisdom" in the sense of law has meaning as an action that leads to the goal as the exercise of the power of officials or government organs[32]. The concrete form of government policy can be attributed to Riant Nugroho D.'s opinion[33]. The matters that divide government policy into three groups: (1) policies that are macro or general, or fundamental; (2) a *meso* or intermediate public policy; (3) micro public policies. The same opinion is expressed by M.Solli Lubis[34] stating: "Policy or kebijakan contained in official documents, even in some form of legal regulation, is also implied and contained the main policy, for example in the Law, Government Regulation, Presidential Decree, Ministerial Regulations, Regional Regulation, and others.

The property organizer is an authorized official and is responsible for establishing policies and guidelines as well as organizing state property[35]. If the implementation of surveillance of state property in the domain of property users is more dependent on the power of the property user, therefore the supervision is within the scope of the property organizer, the role of the State Wealth Service Office and Auction (KPKNL) is very large, because KPKNL is a unit of property organizers in which its execution rely on interaction directly with the power of the respective property user of the Ministry/institution. Especially for the utilization of state property, which has obtained the letter of property organizer based on Article 26 Paragraph 1 Regulation of the Minister of Finance No. 244/PMK.06/2012 therefore supervision shall be exercised by the management of the property that has issued the letter of approval intended.

Supervision conducted by property organizer on the utilization of state property in the form of monitoring and investigation. Monitoring by property organizer on the utilization of state property consists of periodic monitoring which is conducted at least once a year, and incidental monitoring conducted at any time no later than 5 (five) working days after received written reports from the public or information from the mass media[36]. Investigations may be conducted by property organizer, if from the monitoring result there is any indication of irregularities, the investigation is conducted to collect evidence or information that can alter bright and clear about a problem for settlement and control, and if there is an indication of the loss of state investigation, therefore the Director General on behalf of the Minister of Finance may request the Government's internal supervisors to audit.

The existence of property organizers and the property user/proxy of property users as supervisors in the utilization of state property creates a raises doubts in terms of objectivity testing for both, where the two supervisors are no other than users of state property, so as the user of state property as well as the supervisor, the transparency of supervision is impossible. Related to this, Arifin P. Soeria Atmadja states that "when it is seen from the perspective of accounting principles that must cling to the incompatible principle, the audit function on management and responsibility in one agency or institution will have a negative impact and counterproductive to the objectivity and effectiveness of examination result that may lead to Corruption, Collusion, and Nepotism (KKN)"[37]. Therefore, in order to supervise the utilization of state property can run as expected, the independence of supervisors will determine the objectivity of inspection quality. This independence according to Yuli Indrawati shall cover[38]: Finance, resources, and organization as well as the position of the body itself in the governance structure especially to the unit that is being examined. Therefore, it is necessary to establish an external supervisor who has a position parallel to the unit that is being examined, because the supervisor with higher position will suppress the object that is being examined. In opposite way the examined object will suppress the supervisors who are under the examined. Thus, objectivity that is required in each examination result cannot be achieved maximally.

IV. CONCLUSION

The nature of providing opportunity to the property user on the plan of utilization of idle state property in the form of rent before 3 years since stated indicated as idle, intended to streamline, efficiently managed and optimize the utilization of idle state property. However, these three things have not been implemented properly, caused by several factors, among others; (1) property organizer gives full authority upon the utilization plan of idle state property to property user (2) There is no regulation regarding the requirement for the property user to report the existence of idle state property, (3) The utilization of idle state property in the form of rent has not become the main concern for Ministry of Finance as property organizer. The supervision of the utilization of idle state property in the form of rent is not enough if only performed by property user and property organizers, because the two supervisors as well as supervisors as well as users of state property, where the objectivity of both are doubtful, an external supervisor whose position is parallel to the object (unit) that is being supervised.

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Is Muhammadiyah's Teaching Hospital Ready to Face up Academic Health Center Era?

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Abstract- The issue of health development in Indonesia is an important issue that exists in today's society.Therefore it needs innovation in medical education. The Academic Health Center conducts coordinated researches , services and health education consist of integrated preventive, promotive, curative and rehabilitative at all levels, from basic health education, professional education to community in a holistic health service system.This research uses qualitative method done by semi-structured interviews to the respondents of the research face-to-face. In addition, field observation with observation guidelines will be carried out. Data will be analyzed using coding.Through the observation , Muhammadiyah's Teaching Hospital that located in Sleman district is assessed 75% which means the hospital gets B on Accreditation status, and could be awarded Certificate of Accreditation of Teaching Hospital on condition that must be reassessed in 3 years later. The theme researcher got in this reaserch is Muhammadiyah's Teaching Hospital is ready to become Main Teaching Hospital but still not obtain the legalization as Teaching Hospital. Muhammadiyah's hospital education network and 'Aisyiah's clinic are not yet ready to be educational networking hospital/ clinic. Pratama Clinic that established by MuhammadiyahUniversity is ready to become an educational networking clinic but not yet have legality preparation. The Academic Health Center system can be implemented in Muhammadiyah if there is with good coordination.Based on the results of the research, Muhammadiyah's Teaching Hospital is not ready to become accredited Main Teaching Hospital with A accreditation, required improvement and cooperation of various parties involved.

Index Terms- Muhammadiyah, Academic Health Center, Teaching Hospital

I. INTRODUCTIONS

The issue of health development in Indonesia is an important issue that exists in today's society. Issues of which arise from human resources in this case is medical personnel. The number of health workers is quite a lot but the spread is not evenly distributed. Therefore, it is necessary that a policy and curriculum based on the outcome quality of the students will have implications on the achievement of physician equality in primary services and can achieve universal coverage

The Academic Health Center or AHC is a functional organization that combines the functions of education, research functions and the function of health services from various health institutions. Public hospitals used as educational vehicles are termed "Teaching Hospital" (RSP) which can be defined as a government or private hospital in cooperation with a government college or private college that interprets its Faculty of Medicine into cooperation.

Researchers are interested to conduct research on this hospital of education because to get good quality of health personnel required quality education as well. Quality education can be supported by adequate learning facilities and good integration between universities, medical faculties, and educational hospitals. Then now many hospitals that are used for medical education do not have a Decree of the Minister of Health as an Education Hospital..

II. METHODS

This research uses descriptive qualitative research design. In the design of this descriptive study by conducting semi-structured interviews on the subject of research in a face-to-face manner interpersonally.

Samples in this study include President Director, Medical Service Manager and Medical Supporter, Director of Al Islam Kemuhammadiyahan SDI and Diklitbang and AIK and SDI Manager. Samples for hospitals and network clinics are the management of Muhammadiyah's hospital education network , Pratama Clinic that established by Muhammadiyah University and 'Aisyiah's clinic. In addition, also conducted a brief interview on SPV Diklit Doctor Profession.

Sampling in this research use purposive sampling technique. This is done by putting the subject is not based on strata, random or regional but based on the existence of a certain purpose. The researcher determines the sample with certain considerations. In this case the researchers took a sample based on the role of respondents to the achievement of Muhammmadiyah's Teaching Hospital as an teaching hospital.

Interview guidelines are used to obtain data from respondents so that interviews can be structured and obtain the desired data by the researcher. In addition, field observation with observation guidance will also be conducted. The observation guidelines are prepared under the regulation of the health minister concerning the guidelines of the teaching hospital. Quantitative data were analyzed descriptively, while qualitative data were analyzed using coding

III. RESULTS

Table 1. Theme of Preparation of Muhammadiyah's Teaching Hospital became Teaching Hospital

Theme	
Preparation of Muhammadiyah's Teaching Hospital became Teaching Hospital	Muhammadiyah's Teaching Hospital is ready to become Main Teaching Hospital but still not fulfill for legalization as Education Hospital
Preparation for educational networking hospital and clinic	• Muhammadiyah's hospital education network is not

	ready to be used as educational networking hospital • 'Aisyiah's clinic is not yet ready to be an educational networking clinic • 'Aisyiah's clinic can already be used for midwife education • Pratama Clinic that established by Muhammadiyah University is ready to be used as an educational networking clini • Pratama Clinic that established by Muhammadiyah University has not been legally prepared
Implementation of Academic Health Center in Muhammmadiyah	With good coordination , concept of Academic Health Center can be Implemented in Muhammadiyah

Based on the results of the research Muhammadiyah's Teaching Hospital is ready to become a Main Teaching hospital but the need for legalization in the form of Decree of Minister of Health. Muhammadiyah's hospital education network is not ready yet still need to make various improvements. These improvements are mainly improvements in human resources. Aisyiah's Primary Clinic also has various limitations to become an educational networking clinic. The Pratama Clinic established by Muhammadiyah'sUniversity is one of the clinics in this study that is ready to be used to become an educational networking clinic in the AHC concept but there needs to be improvement in terms of legality.

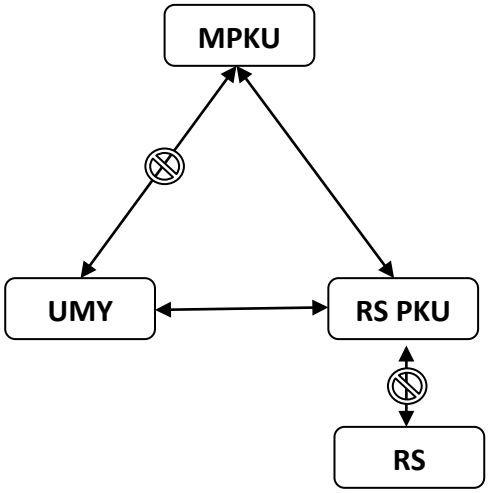
Table 2. Recapitulation Result of Main Teaching Hospital Assessment of Muhammadiyah's Teaching Hospital

STANDARD	PARAMETER	MAX VALUE	VALUE	PERCENT
Vision, Mission, Commitment and Requirements	6	12	8	67%
Management and Administration	21	42	31	74%
Human Resources For Clinical Education Program	7	14	8	57%
Educational Support	5	10	9	90%
Designing and Implementing a Qualified Clinical Education Program	14	28	24	86%
Amount	**53**	**106**	**80**	**75%**

Muhammadiyah's Teaching Hospital through is assessed 75% which means the hospital gets B on Accreditation status, and could be awarded Certificate of Accreditation of Teaching Hospital on condition that must be reassessed in 3 years later. There is a difference between the results of the observation with the results of the interview because through interviews preparedness of Muhammadiyah's Teaching Hospital can only be knownsuperficially not as a whole. But overall the interviews have been many facilities and supporters who have prepared Muhammadiyah's Teaching Hospital to become the Education Hospital

There are various reasons to support the achievement of this concept within Muhammadiyah but there needs to be an improvement among these elements. Reasons that support the implementation of this concept in Muhammadiyah, among others, Muhammadiyah has a concept of networking, clinics owned by Muhammmadiyah also many. But it needs improvement in every aspect. There needs to be a cooperative relationship between parties that are mutually sustainable so as to form a chain that never breaks.

Picture.1Implementation of Academic Health Center in Muhammmadiyah



IV. DISCUSSION

Based on the results of research that has been described in the previous chapter Muhammadiyah's Teaching Hospital not ready

to become main teaching hospital accredited A, need improvement in some standards. In addition, hospitals and networks that are planned to become educational networks are also not ready as well and need improvement, especially improvements in terms of legality and policy.

Muhammadiyah's Teaching Hospital can be accredited B if assessed by the assessment of Teaching Hospital and entitled to Accreditation Certificate of teaching Hospital , but within a period of 3 (three) years must be done reappraisal. There is a difference between the results of observation premises interview results because through interviews preparedness Muhammadiyah's Teaching Hospital can only be known superficial just not as a whole. But overall the interview is already a lot of facilities and supporters who have been prepared Muhammadiyah's Teaching Hospital to become the Teaching Hospital.

An educational hospital sometimes leads to a bad perception in the eyes of the community because the public considers that the patient education hospital is used as a learning material. A study evaluating service in educational hospitals with non-educational hospitals especially in elderly educational hospitals offers better care. And the results of the study showed no difference in the quality of service[1]

A clinic used for medical education must have qualities that must be met. In a journal a clinic applies various criteria to become a medical education clinic. A clinic must have a high-quality staff who is guided in accordance with the clinical culture and is always rewarded for its contribution. Professional health staff with strong work, ethic, special skills, and dedication are also one of the criteria. In this case a doctor is also required to be a leader in a clinic. The scientific research and education environment is crucial in building an educational clinic. Supporting facilities are also taken into account among them is about medical records. Medical record must be integrated. It also needs uniqueness in the clinic environment as an example of unique uniform, polite and unique layout. [2]

The management of the teaching hospital is very complex because management must be able to balance between service and education. An educational hospital is an attractive organization, one of the leading health care providers dedicated to improving quality of life and reducing morbidity. Educational hospitals have education, training for medical school graduates. They are a good center of research and a place to discover diseases, and a place to find new medical devices, techniques and latest medicines. Educational hospitals also employ many employees, so there will be a lot of money circulation in it. In addition there will be many customers or customers who will come to the hospital every day. In short, an educational hospital is also a business. Healthcare is one of the mature industries and organizations; to be successful they must have a difference for a competition.[3]

The Academic Health Center (AHC) is an integration of traditional medical faculties, hospitals, and other professional health education institutions. AHC is a complex organization that strives to provide superior, innovative services, education and research that are different from ordinary hospitals. So, AHC is not an ordinary hospital. AHC serves to:

Providing health services for health problems referred from primary care facilities and highly specialized medical services. Innovative health services to improve community health status is one of the goals of the Academic Health Center one of its programs based at the University of New Mexico School of Medicine, which changed the paradigm of thinking in accordance with the AHC mission of changing from traditional fee for service to service The health of this networking program is called Extension for Community Healthcare Outcomes (ECHO), which enhances the cooperation of physicians, health service, health, and community education to provide health care protocols in rural areas. Through telemedicine and internet connections enables specialist doctors to communicate patients with complex diseases, using case-based knowledge. So that patients who are far away with health facilities that require specialist doctors can be served. All medical records can be recorded and accessed by a specialist. [4]

Provide medical services that are scarce and not provided in other health care facilities. In a journal looking for a link between integrated services at a university hospital or a health-related quality of life (HRQoL) education hospital it is concluded that integrated health care at a university hospital can significantly improve health quality or health- Related quality of life.[5]

Educate health professionals to meet current and future healthcare needs. Health care needs are obtained with a good quality of human resources as well. Institutions increasingly consider interprofessional education (IPE) as a means to improve health care and reduce medical errors in the United States. Effective implementation of IPE in health professional education requires a strategic institutional approach to ensure longevity and sustainability. In 2007, the University of Medicine of South Carolina (MUSC) established Creating Collaborative Care (C3), an IPE initiative that takes a multifaceted approach to weaving interprofessional collaborative experiences across the MUSC culture to prepare students to participate in interprofessional, collaborative health care and professional settings.[6]

Translational research for the development of science and technology that can improve the quality of human life. Research in medical education is highly contingent in translational research when the outcomes not only impact on educational settings, but also outcomes include better patient care and better outcomes. [7]

In the United States age and management of chronic diseases is one of the dominant health needs. It's important to handle that. Academic health centers have a positive and significant impact on health. Within a decade, many Academic Health Centers in the United States have created programs in their communities designed to influence health status there. Many of these programs are successful but some programs are limited in scope. [8 9]

Many factors that inhibit programs from the Academic health center so that coverage is limited. These factors are among the academic schedules of different learners of different professions so that it can make it difficult for learners to gain the ability to organize and conduct interprofesional training well [10]. In addition, increased competition among educational institutions can affect the relationship between educational institutions [11].

Infrastructure between universities and hospitals that are fragmented education can inhibit harmony among these elements so as to impede collaboration between both [12]. Regardless of the economic, cultural and historical differences of an international health community have much in common with working together they can achieve a common goal to improve health and wellbeing worldwide. There are three principles that can be done to achieve that goal is the alignment of teaching, research and service to the patient so that they can work synergistically with each other. The second is having to have a real commitment to a partnership. In addition there must also be collaboration with various parties [13].

V. CONCLUSION

Based on the results of research Muhammadiyah's Teaching Hospital ready to become an main education hospital that accredited B, need improvement. In observation by document tracking and tracing facilities Muhammadiyah's Teaching Hospital hospital can be accredited B if judged by the votes entitled to a teaching hospital and teaching hospital accreditation certificate, but not later than 3 (three) years to do a reassessment

Muhammadiyah's hospital education network and 'Aisyiah's clinic clinic based on the results of this study not yet ready to become a hospital/ clinic education networks. While Pratama Clinic that established by MuhammadiyahUniversity in the implementation is ready to become an educational clinic but not all policies can be fulfilled.

The concept of Academic Health Center is very suitable to be applied in Muhammadiyah. But in its implementation the concept of AHC is still not applicable in Muhammadiyah because it is still less its socialization of this concept. Not many know about the concept of Academic Health Center. Through observation and interviews can be seen that there has been no good cooperation between elements. In addition it also requires cooperation and communication between parties.

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ACTIVITY STUDIES OF SELECTED TUBER AND VEGETABLE POWDER MIX

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Abstract- Dioscorea alata (yam), Phyllanthus emblica (fruit) Colocasia esculenta(taro) and Momordica charantia (vegetable) has been used for this study. All are powdered and PE: DA and MC: CE are mixed in various ratios like 1:0, 1:2, 1:5, 1:8 and 0:1. Nutritional analysis were done for all the samples and moisture content, ash content, iron, phosphorous, starch and crude protein, crude fiber, carbohydrate, tannin, crude fat, vitamin c, iron, calcium were determined and are analyzed for DPPH, metal chelating and Phosphomolydenum antioxidant assays. Best of the mixed ratios of PE: DA and MC: CE has been selected for the development of product through extrusion process using two different temperatures 100ºC and 110ºC using a moisture of 12 % and 13% and the sample has been extruded and that extruded product has been analyzed for their functional properties. PE: DA (1:8) and MC: CE (1:8) ratio can be employed as a good nutritional and antioxidant extruded product among all the other ratios.

Index Terms- *Colocasia esculenta, Dioscorea alata, Momordica charantia, nutritional analysis, Phyllanthus emblica.*

I. INTRODUCTION

Tubers and roots are important major food sources in tropical and sub-tropical countries (Liu *et al.*, 2006). Taro corm is an excellent source of carbohydrate, and it contains starch ,17- 28% of amylase, low in fat and protein, however the protein content of taro corm is slightly higher than that of yam, cassava or sweet potato. The size of taro starch grain is one-tenth that of potato and its digestibility has been estimated to be 98.8%. Because of its ease of assimilation, it is suitable for persons with digestive problems (Onwueme *et al*., 1978).

Yam is the second important tropical root crop and it is a good source of energy and mainly composed of complex carbohydrates and soluble dietary fiber. Together, they raise blood sugar levels rather very slowly than simple sugars and therefore recommended as low glycemic index healthy food. In addition, dietary fiber helps in reducing constipation, it lowers bad (LDL) cholesterol levels by binding to the intestines and prevent colon cancer risks by preventing toxic compounds in the food from adhering to colon mucosa (Kritikar *et al*. 1956).

Fruits and vegetables are the most important natural products very much beneficial on the human health point of view. Bitter gourd fruits are a good source of carbohydrates, proteins, vitamins, and minerals and have the highest nutritive value among cucurbits. Considerable variation in nutrients, including protein, carbohydrates, iron, zinc, calcium, magnesium, phosphorous, and ascorbic acid has observed. (Soni *et al*., 1993). *P. emblica* (Amla) Linn fruit is commonly used for the treatment of anorexia, constipation, piles, leucorrhea, inflammatory bowls, cough, hemorrhoids, fever, thirst, toxicity of blood and atherosclerosis and It has significant antidiabetic and hypotriglyceridemic activities (Thakar *et al.*, 1984)

2. MATERIALS AND METHODS

2. 1 Sample preparation

Colocasia esculenta, Dioscorea alata, Momordica Charantia and Phyllanthus emblica was collected from local markets of Coimbatore. The tubers and the fruits were washed separately, and the non edible portions were discarded. The tuber and the fruits were then peeled, cut in to pieces and dried in hot air oven and powdered by passing through 60 mesh sieve and stored in air tight container till further use. Different ratios were prepared by mixing Colocasia esculenta, Momordica charantia powders and Dioscorea alata and Phyllanthus emblica in the ratios of (1:0), (1:2), (1:5), (1:8) and (0:1) and it was named PE: DA, MC: CE respectively. The samples were labelled as PE: DA (1:0) to PE: DA (0:1) and MC: CE (1:0) to MC: CE (0:1)

2. 2 Chemical analysis

Moisture, ash, crude fiber, Iron, calcium, crude fiber analysis of the samples is determined by following AOAC (2000) method. Proteins content analyzed by Micro Kjeldahl (AACC, 1990) method. Carbohydrate estimated by following the procedure of Raghuramulu *etal.*, 1983. Fat percentage estimated by soxhlet– extraction, (Pearson *et al*., 1985). Phosphorous determined by spectrophotometrically method following methods reported by Helrich,1990. The ascorbic acid content is quantitatively analyzed by the method by Ranganna *et al*.,1997. The starch and tannin content was determined by the methods reported by M Crae. J. C, 1971 and Joslyn, 1970 respectively.

2. 3 In vitro Antioxidant Assays

2. 3. 1 Sample preparation for antioxidant assay
All the samples were packed in soxhlet separately and extracted with methanol. The solvent extracted is concentrated by rotary vacuum evaporator and then dried in vacuum oven.

2. 3. 2. Phosphomolybdenum assay
The antioxidant activity of samples was evaluated by the green phosphomolybdenum complex formation according to the method of Prieto *et al.*, 1990.An aliquot of 100 µL sample and ascorbic acid in 1 mm dimethyl sulphoxide (standard) or distilled water (blank) is added with 1 mL of reagent solution (0.6 M sulphuric acid, 28 mm sodium phosphate and 4 mm ammonium molybdate) in a test tube. The sample is incubated at 95˚C for 90 min. The samples are cooled and absorbance of the mixture was measured at 695 nm. The Total antioxidant capacity is expressed as mean values in mg of ascorbic acid equivalents/ gram extract.

2. 3. 3. DPPH radical scavenging activity
The antioxidant activity of the extract was determined in terms of hydrogen donating or radical scavenging ability using the stable radical DPPH, according to the method of Blios (1958). The sample extracts at various concentrations is taken and the volume is adjusted to 100 µL with methanol. About 5 mL of 0.1 mm methanolic solution of DPPH was added to the aliquots of samples and standards (BHA, BHT, Rutin and Vitamin E) and shaken vigorously. Negative control was prepared by adding 100 µL of methanol in 5 mL of 0.1 mm methanolic solution DPPH. The tubes were allowed to stand for 20 minutes at 27°C. The absorbance of the sample was measured at 517 nm against the blank. Radical scavenging activity of the samples was expressed as IC50 which is the concentration of the sample required to inhibit 50% of DPPH concentration.

2. 3. 4. Metal chelating activity
The chelating of ferrous ions by various extracts of sample was estimated by the method of Dinis *et al.* (1994). 100 µL of the extract and BHT (standard) were added to 50µLsolution of 2 mm $FeCl_2$. The reaction was initiated by the addition of 200 µL of 5 mm ferrocene and the mixture was shaken vigorously and left kept for 10 min. Absorbance taken at 562 nm against blank. The metal chelating capacity of the extracts is evaluated using the equation:
Metal chelating capacity (%) = $[(A_0 - A_1) / A_0] \times 100$,
where, A_0 is the absorbance of the control,
A_1 is the absorbance of the sample extract/standard.

2. 3. 5. Product development
The procedure for product development is given in Fig. 1

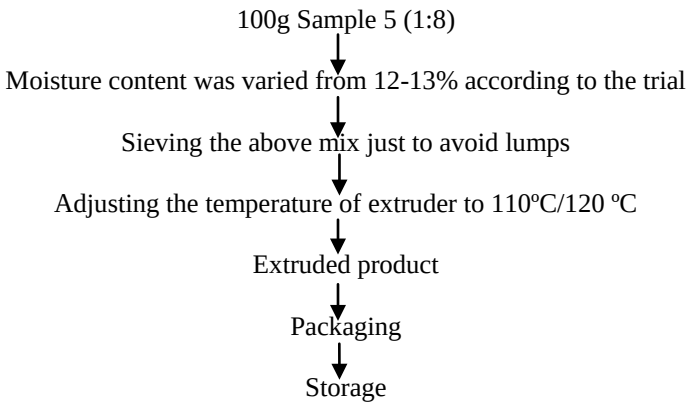

Figure 1: Flow chart for the development of product is as follows

2.3. 6. Extruded product analysis

Mass flow rate was determined by the method described by Singh *et al*., 1996.Bulk density was determined by the method described by Udensi *et al*. 2000. Swelling power and percent solubility was determined by the method described by Schoch 1964.

3. RESULTS AND DISCUSSION

3. 1 Chemical characteristics of various mixed ratios of PE: DA

The results indicate that moisture content of PE: DA (1:8) showed a highest moisture content of 6.18% when compared to the other mixed ratios. The observed high moisture levels of the tubers may influence the textural quality of *D. alata* food products or the stability. The higher the moisture content, the higher will be the rate of spoilage**.** The yam tuber, in general has high moisture content and a low level of dry matter which makes it difficult in preserving for a long period but it can be stored by converting it into various food products. (Opara, L. U. 1999).

PE: DA (1:8) was found to have an ash content of 4.38% which was higher when compared with other ratios. A comparable range of 13.68-37.4% dry matter content for *D. alata* varieties has been reported in the literature (Maziya-Dixon, B *et al*.,2003). Lebot *et al.,2005,* observed that *D. alata* varieties of good quality are characterized by high percentage of dry matter and starch contents. Ash content is a reflection of mineral status, and presently in both the tubers mixtures reflects high amount of mineral. Comparable ash content of 2.50-4.90% has been reported for *D. alata* tubers. The amount of ash in a tuber depends on the type of soil from which it was harvested, the moisture content and the maturity of the crop (Lebot *et al.,2005).*

Iron is required for blood formation and it is important for normal functioning of the central nervous system of carbohydrate, protein and fats. (Adeyeye *et al*., 2005). Analysis of iron content of PE: DA (1:8) powder is reported to have highest iron content of value 0.51mg/100g.

Calcium is vital for the development of healthy bones and normal functions of bones. It helps in muscle contraction and regulation of heartbeat, and it has major function during blood clotting. Shortage of calcium can lead to osteoporosis, that makes bones brittle and break easily (Umar *et al.*,2005). PE: DA (1:2) is found to have a highest calcium content of 20.18mg/100g.

Phosphorous content of PE: DA (1:8) was found to be 59.94mg/100mg which was higher when compared to the other samples. Phosphorus (P) is present in higher amounts in most foods because it is a critical component of all living organisms. About 800 mg of P is recommended for adults per day. Yam starches are reported to contain 3-4 times as much phosphorus as found in cassava and aroid ones (Johansen, H. N.*et al.*,1993). Moorthy and Nair, 1989 reported 0.11 and 0.015% phosphorus in *D. rotundata* grown in India. When compared calcium and phosphorous, phosphorus is the most abundant mineral required for body. About 85% of phosphorus in the body can be found in bones and teeth, but it is also present in cells and tissues throughout the body. Phosphorus helps to filter out waste in the kidneys and plays an essential role in storage of energy in the body. It helps in reducing muscular pain immediately after a hard workout (Johansen, H. N.*et al*.,1993).

Vitamin C is a highly effective antioxidant which helps to prevent damage caused to body cells by free radicals. The loss in vitamin C during drying involves oxidation and hydrolysis and it is more prone to degradation at high temperatures (Gregory *et al*.,2008). Amla is well known for its nutritional qualities. It is rich in polyphenols, minerals and is regarded as one of the richest source of vitamin C (200-900 mg per 100 g of edible portion). In this study PE: DA (1:2) has the highest amount of vitamin C of 38.9mg/100g as it is having Phyllanthus emblica alone.

Starch is known to account for about 80% on a dry weight basis of yam carbohydrate, starch content determines the physicochemical, rheological and textural characteristics of yam food products as reported by Moorthy, S.N. 1994. PE: DA (1:8) records the highest starch content of 5928mg/100g.

Tannin content was found to be high in PE: DA (1:2) which is having a value of 0.45mg/100g. Tannins have been reported to form complexes with proteins and reduce their digestibility and palatability (Eka, 1985). Tannins serve as a natural defense mechanism against microbial infections. The antimicrobial property of tannins can also be used in food processing to increase the shelf-life of certain foods. Tannins have also been reported to exert other physiological effects, such as to accelerate blood clotting, reduce blood pressure, decrease the serum lipid levels (Chun *et al*., 2002).

PE: DA (1:2) represents the higher crude fat value of 1.89%. Crude fat serve as energy store in the body. It can be broken down in the body to release glycerol and free fatty acids. The glycerol can be converted to glucose by the liver and used as a source of energy. (Gamman *et al.*,1996). PE: DA (1:2) represents the higher crude protein value of 17.16%.

PE: DA (1:2) was found to have a significant amount of crude fiber with a value of 1.78%. Crude fiber is positively related to different physiological and metabolic effects. It contributes less to calories, and can bind and flush cholesterol, carcinogens and undesirable chemicals from the body. It provides bulk, regulates intestinal motility and thereby helps to prevent the development of diverticulosis and chronic diseases including coronary heart disease, colonal cancer and other disorders of the gastrointestinal lining (Topping, D.L. et al, 2001).

Dioscorea alata have high carbohydrate content. More than 85% of the carbohydrate reserve in Dioscorea alata comprises of starch, generally utilized for its edible and medical values. From the results obtained while comparing all the mixed ratios, PE: DA (1:8) was found to have a highest carbohydrate content of value 74.41

3. 2 Chemical characteristics of various mixed ratios of MC: CE

The results indicate that moisture content of MC: CE (1:2) showed the highest moisture content 5.38% when compared with the other mixed ratios. The ash content of MC: CE (1:8) was found to be 5.37% which is higher than that of the other samples. Ash content is a reflection of mineral status, and presently in both the tubers mixtures reflects high amount of mineral. The amount of ash in a tuber depends on the type of soil from which it was harvested, the moisture content and the maturity of the crop (Lebot *et al.,2005).* The Iron content of MC: CE (1:8*)* was found to be 0.56mg/100g which was found to be the highest among all the mixed ratios. The Recommended Dietary Allowance for iron in adult and children is 10 mg/day, while female adult is 15 mg/day. Iron is required for blood formation and it is important for normal functioning of the central nervous system of carbohydrate, protein and fats. (Adeyeye *et al*., 2005).

The RDA for calcium is about 800-1200 mg for adults. Calcium is vital for the development of healthy bones and normal functions of bones. It helps in muscle contraction and regulation of heartbeat, and it has major function during blood clotting. Shortage of calcium can lead to osteoporosis, that makes bones brittle and break easily (Umar *et al.*,2005). MC: CE (1:2) is found to have a calcium content of 21.1 mg/100g and it was found to be the highest among the various mixed ratios.

The phosphorous content MC: CE (1:8) is found to have significant amount of 51. 3 mg/100g which is found to be highest among the various mixed ratios. In this study MC: CE (1:2) was found to be highest amount of vitamin C in the range of 10.3mg/100g among the various mixed ratios. Starch is known to account for about 80% on a dry weight basis of yam carbohydrate, starch content determines the physicochemical, rheological and textural characteristics of yam food products as reported by Moorthy, S.N. 1994. The starch content of MC: CE (1:8) was found to be 6278mg/100g. The result of the analysis indicates that starch content of the samples were high.

The results showed that MC: CE (1:2) was found to have a tannin content of 0.68mg/100g which was found to be highest among the mixed ratios. The crude fat content of MC*:* CE (1:2) was found to be 1.82% and was highest among the various mixed ratios. Crude fat serve as energy store in the body. It can be broken down in the body to release glycerol and free fatty acids. The glycerol can be converted to glucose by the liver and used as a source of energy. (Gamman *et al.*,1996).

The crude protein content of MC: CE (1:2) was found to be 12.69%. The result of the analysis indicates that crude protein content of the samples were very low. From the results it was observed that MC: CE (1:2) was found have crude fiber content of 2.13% and it was found to be higher when compared with other mixed ratios. Crude fiber is positively related to different physiological and metabolic effects. It contributes less to calories, and can bind and flush cholesterol, carcinogens and undesirable chemicals from the body. It provides bulk, regulates intestinal motility and thereby helps to prevent the development of diverticulosis and chronic diseases including coronary heart disease, colonal cancer and other disorders of the gastrointestinal lining (Topping, D. L, et al,2001). The results obtained showed that MC: CE (1:8) has a carbohydrate content of 87. 21mg/100g and was highest when compared with the various mixed ratios.

Table 1: Chemical characteristics of various mixed ratios of PE: DA

PARAMETERS	PE: DA (1:0)	PE: DA (1:2)	PE: DA (1:5)	PE: DA (1:8)	PE: DA (0:1)
Moisture content (%)	5.59±0.05[a]	5.96±0.03[a]	6.01±0.09[a]	6.18±0.07[a]	6.23±0.02[a]
Ash content (%)	2.96±0.09[a]	3.99±0.12[a]	4.12±0.08[a]	4.38±0.06[a]	4.65±0.11[a]
Iron (mg/100g)	0.32±0.15[a]	0.39±0.18[a]	0.48±0.11[a]	0.51±0.14[a]	0.56±0.12[a]
Calcium (mg/100g)	27.6±0.03[a]	20.18±0.05[a]	19.52±0.08[a]	18.89±0.02[a]	19.3±0.04[a]
Phosphorous (mg/100g)	0.12±0.14[a]	37.12±0.16[a]	43.29±0.13[a]	59.94±0.17[a]	57±0.15[a]
Vitamin C (mg/100g)	88.32±0.02[a]	38.9±0.05[a]	27.3±0.07[a]	21.98±0.04[a]	15±0.03[a]
Starch (mg/100g)	2565±0.15[a]	5042±0.23[a]	5673±0.20[a]	5928.6±0.28[a]	6429±0.24[a]
Tannin (mg/100g)	0.85±0.04[a]	0.45±0.12[a]	0.40±0.08[a]	0.35±0.07[a]	0.32±0.14[a]
Crude fat (%)	2.56±0.02[a]	1.89±0.01[a]	1.67±0.04[a]	1.54±0.03[a]	1.38±0.02[a]
Crude protein (%)	35.7±0.18[a]	17.16±0.12[a]	14.12±0.22[a]	11.9±0.29[a]	7.52±0.26[a]
Crude fiber (%)	1.98±0.20[a]	1.78±0.28[a]	1.62±0.25[a]	1.59±0.18[a]	1.52±0.23[a]
Carbohydrate (mg/100g)	51.21	69.22	72.46	74.41	78.7

3. 3 IN-VITRO ANTIOXIDANT ASSAY

3. 3. 1 DPPH radical scavenging activity of different ratios of PE: DA

The DPPH radical scavenging activities of different ratios of PE: DA are shown in Figure 2 and 3. DPPH is a stable free radical which is commonly used for assessing antioxidant activity. Usually, the results of DPPH assay were expressed in IC_{50} values. Concentration of the sample necessary to decrease initial concentration of DPPH• by 50% (IC_{50}) under the experimental condition was determined. Therefore, the lower value of IC_{50} indicates a higher antioxidant activity. All the extracts of various ratios showed excellent DPPH$^{\cdot}$ radical scavenging activity. The best free radical scavenging activity is exhibited by PE: DA (1:0) which is comparable to the referred standard BHT. Among the ratios PE: DA (1:2) is found to have a lower IC50 value of 21. 82µg/ml followed by PE: DA (1:5) having a value of 22. 87µg/ml.

An inhibition rate of 78. 2% was found in PE: DA (1:0) and among the various ratios a good inhibition rate is given by PE: DA (1:2) which is also having a lower IC50 value and this indicates its good antioxidant capacity. Therefore, among the various ratios PE: DA (1:2) is found to have a good antioxidant capacity.

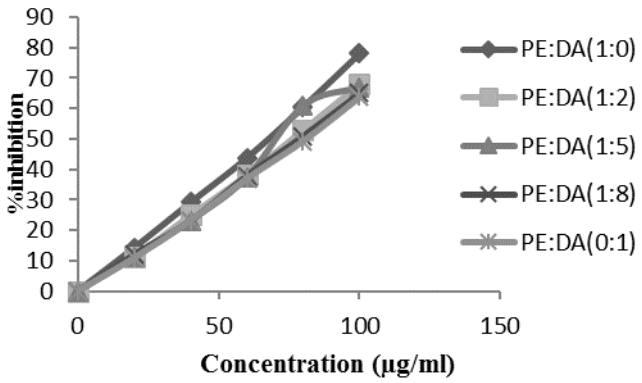

Figure 2: DPPH radical scavenging activity of various mixed ratios of PE: DA

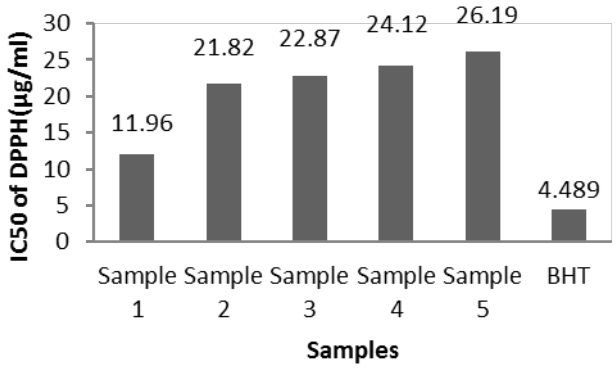

Figure 3: DPPH radical scavenging activity of different ratios of PE: DA

3. 3. 2 DPPH radical scavenging activity of various mixed ratios of MC: CE

The DPPH radical scavenging activities of different ratios of MC: CE are shown in Figure 4 and 5. The best free radical scavenging activity is exhibited by MC: CE (1:0) which is comparable to the referred standard BHT. Among the ratios MC: CE (1:2) is found to have a lower IC50 value of 22.39 µg/ml followed by MC: CE (1:5) having a value of 24.82µg/ml.

Lower IC50 value and a higher inhibition rate indicate a higher antioxidant activity. An inhibition rate of 79.2% was found in MC: CE (1:0) and among the various ratios a good inhibition rate is given by MC: CE (1:2) which is also having a lower IC_{50} value and this indicates its good antioxidant capacity. Therefore, among the various ratios MC: CE is found to have a good antioxidant capacity.

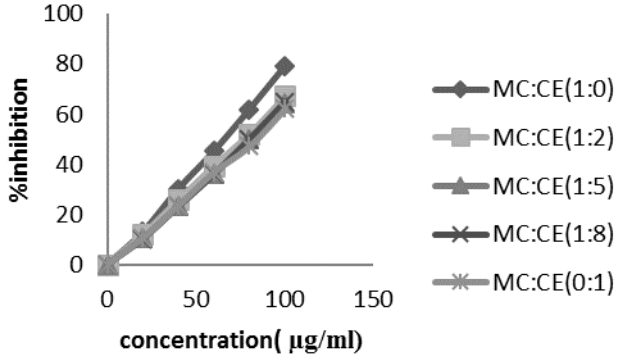

Figure 4: DPPH radical scavenging activity of various mixed ratios of MC: CE

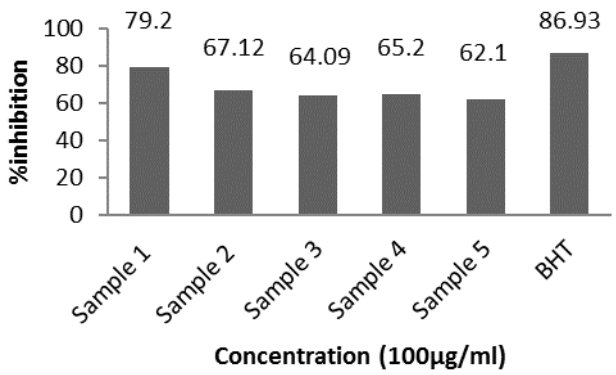

Figure 5: DPPH radical scavenging activity of different ratios of MC: CE

3. 3. 3 Metal chelating activity of various mixed ratios of PE: DA

The metal chelating activities of different ratios of PE: DA are shown in Figure 6. Metal chelating capacity was significant as they reduced the concentration of the catalyzing transition metal in lipid peroxidation (Duh *et al*., 1999). It was already reported that chelating agents which form σ- bonds with a metal, are effective as secondary antioxidants because they reduce the redox potential, thereby stabilizing the oxidized form of the metal ion (Gordon, 1990). Antioxidants inhibit interaction between metal and lipid through formation of insoluble metal complexes with ferrous ion. Hence the data obtained reveals that s all the extracts of various samples demonstrate an effective capacity for iron binding, suggesting that its action as antioxidant may be related to its iron binding capacity. All the sample extracts exhibited the ability to chelate metal ions. Among the different sample extracts, PE: DA (1: 0) shows an activity of (75. 9 %). Further, the activity decreased in methanol extract of various samples and among the various mixtures PE: DA (1: 2) exhibits an activity of (64. 26 %)

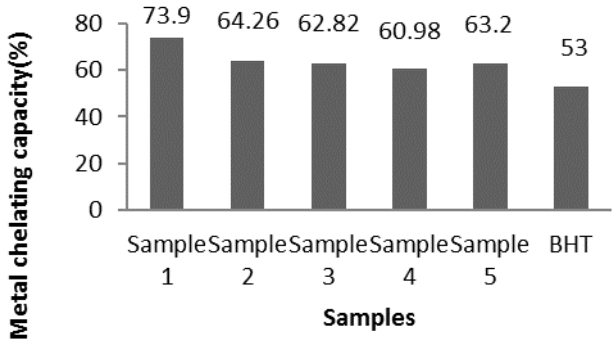

Figure 6: Metal chelating activity of various ratios of PE: DA

3. 3. 4 Metal chelating activity of various mixed ratios of MC: CE

The metal chelating activities of different ratios of MC: CE are shown in Figure 7. Iron is essential for life because it is required for oxygen transport, respiration, and activity of many enzymes. In complex systems, such as food and food preparations, various different mechanisms may contribute to oxidative processes, such as Fenton reaction, where transition metal ions play a vital role. Different reactive oxygen species might be generated and various target structures such as lipids, proteins, and carbohydrates, can be affected. Therefore, it is important to characterize the extracts by a variety of antioxidant assays (Halliwell B et al., 1997). The chelating effect on the ferrous ions by the various samples are shown in figure5. All the sample extracts exhibited the ability to chelate metal ions. Among the different sample extracts, MC: CE (1:0) shows an activity of (75. 9%). Further, the activity decreased in methanol extract of various samples and among the various mixtures MC: CE (1:2) exhibits an activity of (65. 21%). Chelating agents

are effective as secondary antioxidants because they reduce the redox potential thereby stabilizing the oxidized form of the metal ion (Gulcin I et al., 2007). The high contents of polyphenolic compounds present in the extracts should be able to chelate transition metals because of the high charge density of the phenoxide group generated on deprotonation (Hyder RC et al., 2001). The findings of the study established that the extracts could chelate irons and the values are substantial.

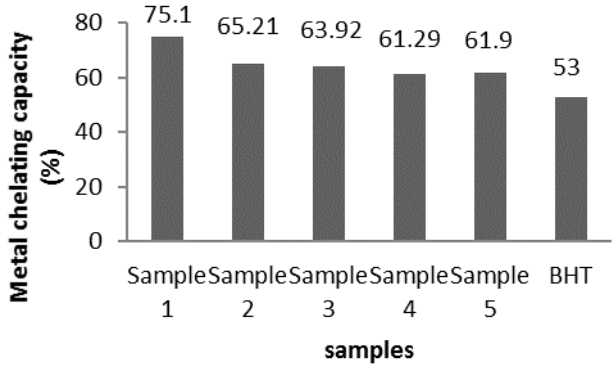

Figure 7: Metal chelating activity of various ratios of MC: CE

3. 3. 5 Phosphomolybdenum assay of different ratios of PE: DA

The phosphomolybenum assay of different ratios of PE: DA are shown in Figure 8**.** The phosphomolybdenum method is based on the reduction of Mo (VI) to Mo (V) by the antioxidant compounds and the formation of green phosphate/Mo(V) complex with the maximal absorption at 695 nm. Among the various extracts evaluated, the PE: DA (0:1) extract of Dioscorea alata alone had the strongest phosphomolybdenum reduction (298. 32). Among the various mixed ratios PE: DA (1: 8) shows the highest phosphomolybdenum reduction of (291. 36) followed by PE: DA (1:5), (288.79). Hydrogen/electron transfer from antioxidants to DPPH radical and Mo(VI) complex occur in the DPPH radical and phosphomolybdenum assays, respectively (Halliwell B, 2008).

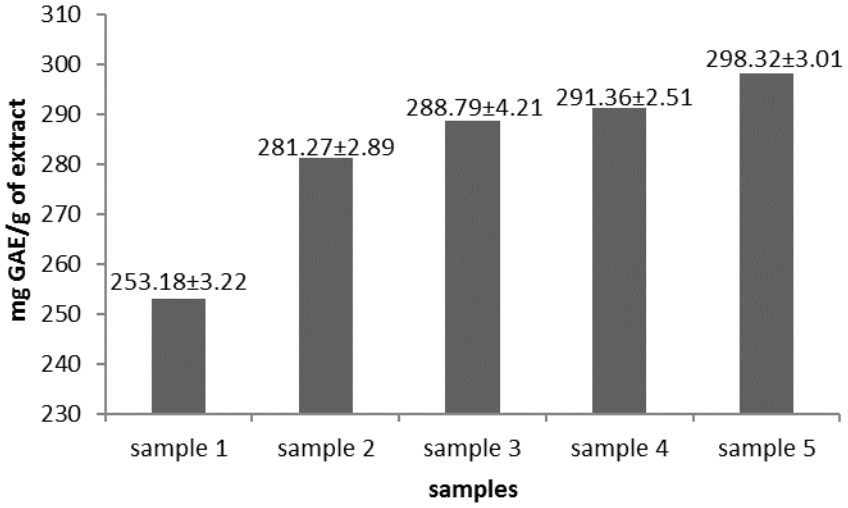

Figure 8: Phosphomolybdenum activity of various mixed ratios of PE: DA

3. 3. 6 Phosphomolybdenum assay of different ratios of MC: CE

Among the various extracts evaluated, the MC: CE (0:1) extract of had the strongest phosphomolybdenum reduction (292.93). Among the various mixed ratios shows the highest phosphomolybdenum reduction (284.8) followed by MC: CE (1:5) (281.8).

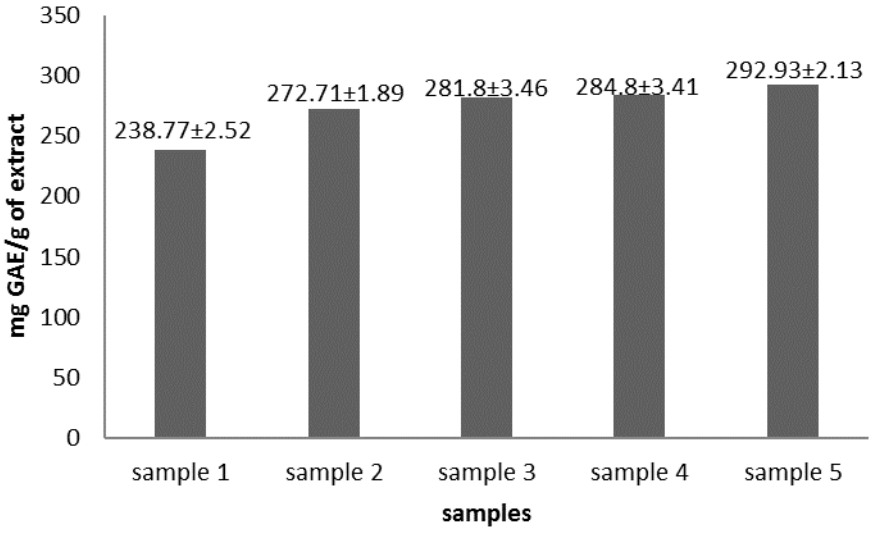

Figure 9: Phosphomolybdenum activity of various mixed ratios of ME: CE

3. 3. 7 Sample analysis of extruded product sample of PE: DA

The mass flow rate was found to be minimum in the range of 3.30g/s for the sample which was extruded at a temperature of 100˚C and 13% moisture. The bulk density of the MC: CE (1:8) (110˚C,13%) was found to be highest in the range of 0.8 g/100ml when compared to the other samples. Swelling power of MC: CE (1:8) (110˚C, 13%) was found to be highest and percent solubility was found to be highest in MC: CE (1:8) (100˚C, 13%)

3. 3. 8 Sample analysis of extruded product sample of MC: CE

The mass flow rate was found to be minimum in the range of 3.12g/s for the sample which was extruded at a temperature of 100˚C and 13% moisture. The minimum mass flow rate indicates faster extrusion. The variations in the mass flow rate of extrudate samples were very less, due to constant maintenance of barrel temperature as well as moisture content in the feed mixtures. The bulk density of the MC: CE (1:8) (110˚C,13%) was found to be highest in the range of 0.7 g/100ml when compared to the other samples. Swelling power of MC: CE (1:8) (100˚C,13%) was found to be highest

3. 4 Comparison of PE: DA and MC: CE

The results indicate that moisture content of PE: DA (1:8) showed a highest moisture content of 6.18% when compared to the other mixed ratios of PE: DA and moisture content of MC: CE (1:2) showed the highest moisture content of 5.38% when compared with the other mixed ratios of MC: CE and when comparing PE: DA (1:8) and MC: CE (1:8) the moisture content is less in MC: CE (1:8) and lesser moisture increases the shelf life of the mixture. PE: DA (1:8) was found to have an ash content of 4.38% which was higher when compared with other ratios of PE: DA. The ash content of MC: CE (1:8) was found to be 5.37% which is higher than that of the other samples of MC: CE and the ash content was high in MC: CE (1:8) when compared to PE: DA (1:8) and the ash content indicates the presence of minerals. Iron content of PE: DA (1:8) powder is reported to have highest iron content of value 0.51mg/100g than other samples of PE: DA (1:8) and iron content of MC: CE (1:8) was found to be 0.56mg/100g which was found to be the highest among all the mixed ratios of MC: CE (1:8) and the iron content of MC: CE (1:8) is higher than PE: DA (1:8). PE: DA (1:2) is found to have a highest calcium content of 20.18mg/100g. MC: CE (1:2) is found to have a calcium content of 21.1mg/100g and it was found to be the highest among the various mixed ratios of MC: CE (1:2) and MC: CE (1:2) has higher calcium content than PE: DA (1:2). Phosphorous content of PE: DA (1:8) was found to be 59.94mg/100mg which was higher when compared to the other samples of PE: DA. Phosphorous content MC: CE (1:8) is found to have significant amount of 51.3mg/100g which is found to be highest among the various mixed ratios of MC: CE. Phosphorous content of PE: DA (1:8) is higher than MC: CE (1:8).

From the results it was found that PE: DA (1:8) had the highest starch content of 5928.6mg/100g among the various mixed ratios of PE: DA and among the samples of MC: CE it was observed that MC: CE (1:8) had a starch content of 6278mg/100g. When the starch content of MC: CE and PE: DA where compared it was found that MC: CE (1:8) had a higher starch compared to PE: DA (1:8). The tannin content was highest in PE: DA (1:2) in the range of 0.45mg/100g among the mixed ratios of PE: DA and among the mixed

ratios of MC: CE, MC: CE (1:2) was found to have the highest tannin content of 0.68mg/100g. When the tannin content of PE: DA and MC: CE where compared it as found that MC: CE (1:2) has a higher tannin content when compared to PE: DA (1:2). The crude fat content was highest in PE: DA (1:2) in the range of 1.89% among the mixed ratios of PE: DA and among the mixed ratios of MC: CE, MC: CE (1:2) was found to have the highest crude fat content of 1.82%. When the crude fat content of PE: DA and MC: CE where compared it as found that MC: CE (1:2) has a lesser crude fiber content when compared to PE: DA (1:2). The crude protein content was highest in PE: DA (1:2) in the range of 17.16% among the mixed ratios of PE: DA and among the mixed ratios of MC: CE, MC: CE (1:2) was found to have the highest crude protein content of 12.69%. When the crude protein content of PE: DA and MC: CE where compared it as found that MC: CE (1:2) has a higher crude protein content when compared to PE: DA (1:2). The crude fiber content was highest in PE: DA (1:2) in the range of 1.78% among the mixed ratios of PE: DA and among the mixed ratios of MC: CE, MC: CE (1:2) was found to have the highest crude fiber content of 2.13%. When the crude fiber content of PE: DA and MC: CE where compared it as found that MC: CE (1:2) has a higher crude protein content when compared to PE: DA (1:2). The carbohydrate content was highest in PE: DA (1:8) in the range of 74.41 mg/100g among the mixed ratios of PE: DA and among the mixed ratios of MC: CE, MC: CE (1:8) was found to have the highest carbohydrate content of 87.21 mg/100g. When the carbohydrate content of PE: DA and MC: CE where compared it as found that MC: CE (1:8) has a higher carbohydrate content when compared to PE: DA (1:8).

In DPPH antioxidant assay among the ratios PE: DA (1:2) is found to have a lower IC_{50} value of 21.82µg/ml followed by PE: DA (1:5) having a value of 22.87µg/ml. A good inhibition rate is given by PE: DA (1:2) which is also having a lower IC50 value. Among the ratios MC: CE (1:2) is found to have a lower IC50 value of 22.39µg/ml followed by MC: CE (1:5) having a value of 24.82µg/ml. Among the various ratios a good inhibition rate is given by MC: CE (1:2) which is also having a lower IC50 value. PE: DA (1:2) is having a lower IC_{50} than MC: CE (1:2). In metal chelating assay among the different sample extracts, PE: DA (1:2) exhibits an activity of (64.26 %) which is lesser which compared with MC: CE (1:2) which exhibits an activity of (65.21 %). PE: DA (1:8) shows the highest phosphomolybdenum reduction of (291.36) when compared with MC: CE (284.8).

The mass flow rate of PE: DA was highest in PE: DA (1:8) (110˚C,12 %) in the range of 3.42g/s among the various mixed ratios of PE: DA and among the mixed ratios of MC: CE (1:8) (110˚C,12 %) was found to have the highest mass flow rate of 3.37g/s. When ME: CE and PE: DA where compared it was found that PE: DA (1:8) (110˚C,12 %) was the highest. It was observed that PE: DA (1:8) (110˚C,13 %) had the highest bulk density of 0.8g/100ml among the various mixed ratios of PE: DA and among the mixed ratios of MC: CE, MC: CE (1:8) (110˚C,12 %) was found to have the highest bulk density of 0.7g/100ml. When both MC: CE and PE: DA are compared it was observed PE: DA (110˚C,13 %) had a higher bulk density. The swelling power of PE: DA (1:8) (110˚C,13 %) was found to be 5.86 g/g and that of MC: CE (1:8) (110˚C,13 %) is 5.87g/g which were the highest among the various mixed ratios of PE: DA and MC: C. When PE: DA and MC: CE are compared it was observed that both the samples had equal swelling power. The percentage solubility of PE: DA (1:8) (100˚C,13 %) was found to be 0.03% and that of MC: CE (1:8) (110˚C,12 %) is 0.035% which were the highest among the various mixed ratios of PE: DA and MC: CE. When PE: DA and MC: CE are compared it was observed that both the samples had equal swelling power.

4. CONCLUSION

From the results obtained from this analysis of various mixtures of PE: DA and MC: CE PE: DA (1:8) and MC: CE (1:8) was found to have a significant amount of moisture content, ash content, iron, phosphorous, starch and crude protein, crude fat, carbohydrate, DPPH antioxidant activity, metal chelating and Phosphomolybdenum assay when compared with other mixed ratios of PE: DA and MC: CE and that was used for the development of extruded product and the developed product using PE: DA (1:8) and MC: CE (1:8) can be employed as a good nutritional and antioxidant extruded product among all the other ratios.

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Health Inequality in Forest and Non-Forest Areas: A Comparative Study in Kokrajhar District of Assamin terms of Disease Incidences and Health Facilities

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Abstract: As the Health for All programming goal of the World Health Organization is gaining popularity around the world, the health inequality has risen up as a burning topic of research in the field of health studies. Since the goal cannot be achieved without eradicating the health disparities among different sections of the people, researchers are trying to find out the ways and means for the purpose. The plainly observed health disparity between the populations of forward area and remote area has been identified as one of the obstacle in meeting the goal.

An attempt has been made through this study to study the health inequality in forest and non-forest areas of Kokrajhar district of Assam in India in terms of disease incidence and distribution of health facilities there, through analysis of secondary data obtained from relevant sources. In this connection, the analysis conducted on incidences of prevalent diseases in the forest area and non-forest area of the districtduring the period 2010-2016 did not find significant differences in their occurrences in the two areas. On the other hand, analysis of seventeen years' data on malaria incidences over the period from 2000 to 2016 revealed statistically significant differences in API and SPR of malaria in forest area and non-forest area of the district (at 5% significance level). However, both forest and non-forest malaria, currently, are found to have declining trends.Another analysis on spatial distribution of health care institutions in forest and non-forest areas of the district and available manpower therein, revealed notable disparities in both the matters.Both in quantity and standards, forest area health institutions were found to be poorer than that of the non-forest area. Although health institutions in non-forest area are also not of desired and requisite standard, these are in much better condition than that of the forest area, while the later are deplorably functioning. Despite of continued national health programme, under the name and style of National Rural Health Mission (currently National Health Mission), 80% health institutions of the district (75% in forest and 83% in non-forest area) are functioning in substandard mode when referred to the standard prescribed by the national health authority.

Key words- Forest area, health inequality, health services, non-forest area, primary health centre, rural health care

1. Introduction

Eradication of inequality in health among different sections of the people has become key agenda of the world society nowadays. It has been well perceived that establishing equality in health is possible only through removal of root drivers of health inequality.WHO identifies following features as the drivers of health inequity in international context.

1) Unequal distribution of the benefits of the economic growth
2) A net financial outflow from poorer to richer countries that has been resulted due to inadequate international flows of aid to the poor countries.
3) A declining share in national consumption.
4) Gender biases in power, resources, entitlements, norms and values.
5) Lack of empowerment of individuals to challenge and change the unfair and steeply graded distribution of social resources to which everyone has equal claims and rights.

However, in regional context, the drivers of health inequality are seemed to vary region by region. The regional diversity in terms of social and economic status contributes towards surfacing of health inequality among the people of the society.

1.1 Social determinants of health and health inequality between societies

The circumstances, in which people are born, grow up, live, work and age, and the systems put in place to deal with illness are termed as social determinants of health. The social determinants of health are shaped by economics, social policies, cultural and environmental conditions, and politics prevailing in the society; and

therefore, the risk of illness of people and the preventive measures in regard to illness or treating an illness is seen to vary along with social and economic conditions of the respective people [1]. This variation causes differences in health status or in the distribution of health resources between different population groups. An association between health and social class has been observed around the globe since early times. Over the years there has been notable improvement in health in all sections of societies; measures have been undertaken to eradicate health inequalities; but this discrepancy is still prevalent in the societies.

India, the mini world, being a multi-cultural, multi-ethnic, multi-lingual society with pluralistic health system, is susceptible to health inequality [2]. India, ranked 131 on Human Development Index in 2015 ranking, had to forfeit 27 % of its score due to regional disparities in education, health parameters and living standards within the country [3]. The inequality in health status and inequity in accessing health resources are predominant features of various societies in India. The high rate of maternal mortality and low rate of institutional delivery are indicators of inaccessibility of healthcare facility in India. Due to its inaccessibility, the modern medicines are sometimes found as an unfeasible option for a large section of the population living in remote areas [4]. Socio-economic determinants, such as poverty, social exclusion and gender discrimination are playing the role of retarding forces in adopting health policies.

The uneven distribution of health facilities is sponsoring health inequality in India. The existence of a huge workforce shortage in health sector has added more strain in this regard. The health workers are more inclined towards the urban area than rural area in extending their services. This is the outcome of the circumstance that major portion of the incoming doctors hail from towns and cities and belong to upper and middle castes; considerable size of them being from very rich family[5].

Despite of worth mentioning effort of the Government to diminish the disparity in the distribution of health facilities through various health programs, establishing health equality in the country still remains as a distant dream for India. The current health program National Health Mission, although penetrating the remote area for enhancement of health facilities in rural areas, it has not been able to achieve even 50% of its target[6]. Due to shortage of ambulances, carrying the patients of rural areas on bullock or horse cart for their treatment to the hospitals, still remains as a regular phenomenon in India. Some analyst even sees its trend to decline towards the failure zone [7].

A study by Krycia Cowling et. al [8] identified some social determinants of health and suggested for new or improved national policies along with evaluation of existing national policies in these areas. Sarkar, in his editorial note of 2016 International Journal of Medicine and Public Health, opined that India has not been able to reduce the wide disparities in health between different sections of the population and between different regions of the country[9].

1.2National Health care system in India

In order to deliver health care services to the people, in India, public health care hasbeen organized at following three levels-

1. Central level
2. Intermediate level, and
3. Primary level

The central level institutions for delivery of health care are mainly comprised of regional hospitals, medical college hospitals and specialized hospitals, which are usually located in the urban areas.

In the second level there exists sub divisional and district hospitals, which provides support to the primary health care institutions. In this level of health institutions, a morecomplex problems compared to the primary level are dealt with.

The third level, that is the primary level, is most concerned withthe rural areas. It is the main organ that deals with delivery of health care in the rural areas. Health institutions of this level are the points of contact between individualsand the health system. Taking the purpose and service of the primary level of the health care system into account, it is alsocalled as rural health care system[10].

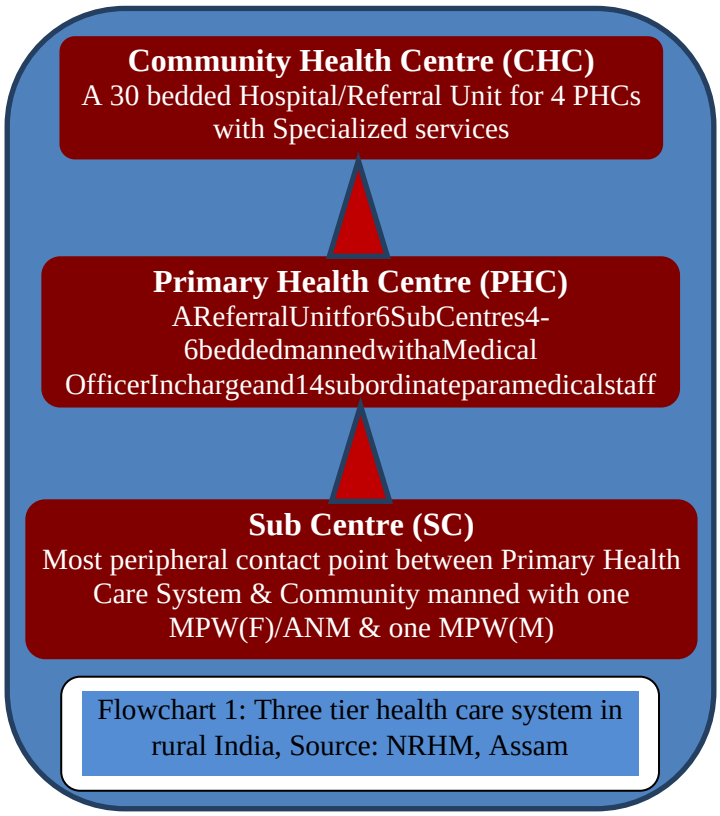
1.3 Rural health care system in India and structure of public health care system

The rural health care delivery system of India comprises three major types of health care- the public health system, theprivate health system, and the traditional health care system. Private health system is mainly a phenomenon in urban area, which provides health care to the people in a more convenient way, but at higher cost. On the other hand, traditional system of health care is inevitable in the areas where there are scarce of preceding

two health care systems or non-existent of them. However,nowadays, the public health care system constitutes the prime source of healthdelivery system in India.

The health care infrastructure in rural areas of India has been developed as a three tier system, as shown in Flowchart-1, viz.,

1. Sub Centre
2. Primary Health Centre, and
3. Community Health Centre



Flowchart 1: Three tier health care system in rural India, Source: NRHM, Assam

The Sub-Centre (SC) is the first contact point between the primary healthcare system and the community. They are assigned tasks relating to interpersonal communication in order to bring aboutbehavioural change. Further, they are entrusted with the responsibility of providing services in relation to maternal and child health, family welfare,nutrition, immunization, diarrhoea control and control of communicable diseases programmes. Equipped with basic drugsneeded for taking care ofessential health needs of men, women and children, these can provide treatment to minor ailments.

On the other hand, Primary Health Centre (PHC) stands as the first contact point between village community and the Medical Officer. Theseare envisaged to provide an integrated curative and preventive health care to the ruralpopulation, laying emphasis on preventive and promotive aspects of health care [11].

The third tier of the network of rural health care institutions, the Community Health Centres (CHC),are designed toprovide referral as well as specialist health care to therural population from the neighbouring PHCs, usually four (4) in number, for the patients requiring specialised health care services. There is two-fold objective of having a referral centre for the primary health care institutions- first, to make modern health care servicesaccessible to the rural people, and second, to ease the overcrowding in the district hospitals.

The health institutions, Sub Centre, Primary Health Centre and Community Health Centre, are established by the State Governments following some population and staffing norms framed at national level by the Directorate General of Health Services with objectives to provide basic primary health careservices to the community and achieve and maintain anacceptable standard of quality of care. These prescribed norms are known as Indian Public Health Standards (IPHS), which are expected to help monitor and improve functioning of the health institutions at different level.

1.4 Population norms for health centres

Following are the population norms to be followed in establishing different types of health centres.

Table 1: Population norms for health centres

HealthCentre	Population Norms	
	Plain Area	Hilly/Tribal/Difficult Area
Sub-Centre	5000	3000
Primary Health Centre	30,000	20,000
Community Health Centre	1,20,000	80,000

Since the rural area of the district is dominated by Schedule Tribe population, the IPHS norms for Tribal area are applicable for all health institutions of the district.

1.5 Staffing norms for health centres

As per IPHS, minimum norm of staffing pattern of health centres at different level are to as below[12a, 12b,12c].

Table 2: IPHS for staffing pattern of health centres at different levels

A. STAFF FOR SUB – CENTRE / Number of Posts 1. Health Worker (Female)/ANM / 1 2. Additional Second ANM (on contract) / 1 3. Health Worker (Male) / 1 4. Voluntary Worker /1 Total (excluding contractual staff): 3	C. STAFF FOR COMMUNITY HEALTH CENTRE: 1. Medical Officer #/ 4 2. Nurse Mid– Wife(staff Nurse) / 7 3. Dresser / 1 4. Pharmacist/Compounder / 1 5. Laboratory Technician / 1 6. Radiographer / 1 7. Ward Boys / 2 8. Dhobi / 1 9. Sweepers / 3 10. Mali / 1 11. Chowkidar / 1 12. Aya / 1 13. Peon / 1 Total: 25 #:Either qualified or specially trained to work as Surgeon, Obstetrician, Physician and Paediatrician. One of the existing Medical Officers similarly should be either qualified or specially trained in Public Health).
B. STAFF FOR NEW PRIMARY HEALTH CENTRE 1. Medical Officer / 1 2. Pharmacist / 1 3. (i) Nurse Mid-wife (Staff Nurse) / 1 (ii) Additional Staff Nurses on contract / 2 4. Health Worker (Female)/ANM / 1 5. Health Educator / 1 6 Health Assistant (Male) / 1 7. Health Assistant (Female)/LHV / 1 8. Upper Division Clerk / 1 9. Lower Division Clerk / 1 10. Laboratory Technician / 1 11. Driver (Subject to availability of Vehicle) / 1 12. Class IV / 4 Total (excluding contractual staff): 15	

1.6 Three tier structure of health care system in Assam

Following the national policy of providing health services to the community through three tier system Assam has also adopted and implemented the same system for health services in the state. Under each district of the state there is one sub divisionalhealth centre or one civil hospital as referral units. For rural healthserviceseach district has been divided into some blocks as per specified population norms, which are called Block Primary HealthCentre (BPHC). Under each blockprimary health centre, there are Community Health Centres as per the existing population norms. In the second line there are some PHCs under each CHC. Besides PHCs, there are some other health institutionsunder CHC such as subsidiary health centre (SHC), char primaryhealth centre (Char PHC), state dispensary (SD), mini primary healthcentre (MPHC); all of which are at par with a PHC. These health institutions with different names exist because during the time of adoption of the national health service policy some of these health institutions were already in existence. Perhaps, in due course of time these health institutions have been upgraded with better facilities to make them equivalent to a new PHC. BPHCs are the administrative headquartersfor all CHCs, PHCs and sub centres.

1.7 Study area

Kokrajhar is one of the twenty-seven districts of Assam state of Indian union.The Report of the Task Force on "Identification of Districts for Wage and Self-employment programmes", Planning Commission, 2003 enlisted it as a backward district placing it in 59th rank among the backward districts in India.Major portion of this socially and demographically backward district is covered by the notified forest area, which has acquired an atypical distribution of the villages within it.The villages which were established by Forest Department or recognized by it are known as Forest Villages. Besides forest villages there exists other settlement areas too. The villages are scattered and communication is very much deplorable.Majority of the people residing in the forest area are from Scheduled Tribe community.As per the Economic census, 2001-02, as much as 75% of the families residing within the forest area are leading their life below poverty line.Their financially backwardness keeps them busy in arranging two square meals for the day, as a consequence of which they remain disconnected from the outside world. They are hesitant to approach concerned authorities for their health and other problems as they are illiterates and consider themselves inferior to other advanced people.

There exists a contiguous forest area along the northern tract of the district.This contiguous forest area is distributed over two forest divisions, namely Haltugaon Forest Division and Kachugaon Forest Division.For the present study, this contiguous forest area has been defined as the forest area, leading to term the area outside it to be non-forest area.

1.8 Medical Blocks of the district

Kokrajhar district comprises four medical blocks, namely Balajan Block, Dotma Block, Kachugaon Block and Gossaigaon. Block Almost whole part of the Kachugaon Block lies within the notified forest area. Within the contiguous forest area along northern track of the district some more health institutions of the middle level, such as PHC, MPHC, SHC, SDare available. Accordingly, the forest area contains good numbersSub Health Centres, the most peripheral to the community, of the district.

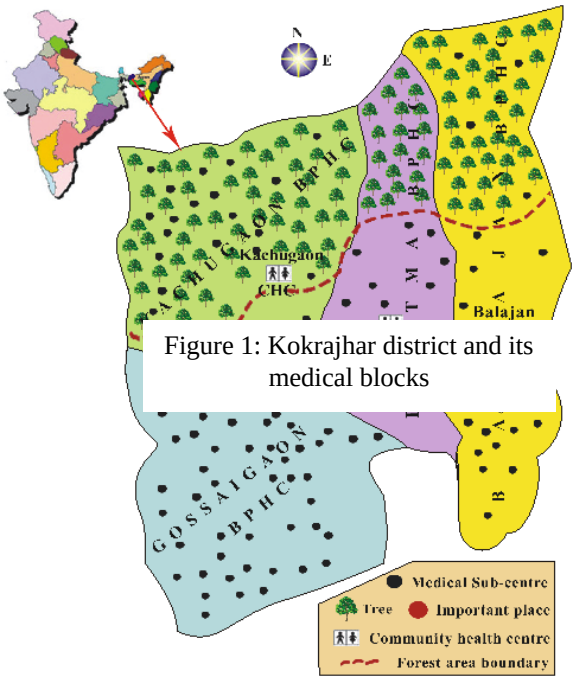


Figure 1: Kokrajhar district and its medical blocks

2. Aims and objectives

The study aims at investigating the occurrence of different diseases in the forest and non-forest areas of the district.The cases of different diseasesoccurred during the period of last one decade in the forest area and the non-forest area of the district would be estimated and then finally effort will be made to compare the maladies in the two areas.Further, it is also intended to survey the health facility distribution in the forest and non-forest areas and then to examine if there exists disproportionality in the distribution of health facilities in the two areas.

In order tomaterialize the above mentioned aims it is intended to use the district level Integrated Disease Surveillance Reports of Integrated Disease Surveillance Programme under Ministry of Health & Family Welfare, Govt. of India. In addition to this, the monthly reports of National Vector Borne Disease Control Programme on malaria incidences has also been considered for the purpose.

3. Materials and methods

Monthly district level Integrated Disease Surveillance Reports of the last ten years were collected from the Kokrajhar Unit of Integrated Disease Surveillance Programme. The reports were not available for some months. Data were entered into SPSS 24 worksheet and then unavailable values were estimated by interpolating the missing values of the entered data. Then year wise cases of different diseases were estimated block wise. The disease situation in Kachugaon Block Primary Health Centre has been considered to be the disease situation of the forest area of the district. The district has been divided into three areas, viz. Forest village area, Forest area and Non-forest area vide following definitions-

Forest village area: - area constituted by forest villages
Forest area : - area constituted by notified forest area and its fringe area
Non-forest area : - area outside forest area
Evidently, forest area includes forest village area.

For the situation analysis of malaria, the data on epidemiologicalsituation reports supplied by National Vector BorneDisease Control Programme (NVBDCP), Kokrajhar district,for the period 2000–2017, has been considered and malariaindicators for different years have been calculated for all thefour medical blocks.

For analysis on health facility distribution the district report on Rural Health Statistics (RHS), 2016 has been considered. Distribution of health facilities in forest villages, forest area and non-forest area were extracted from the data, and then analysis were carried out.

4. Results and Discussion

4.1Prevalent diseases of the district and their block wise incidence

From the IDSP monthly surveillance report following diseases are found to be prevalent in the district-

1. Acute Diarrhoeal Disease
2. Bacillary Dysentery
3. Enteric Fever
4. Acute Respiratory Infection, and
5. Pneumonia

Following Charts 1, 2, 3, 4 and 5 show the block wise incidences of above five diseases during the last seven years from 2010 to 2016.

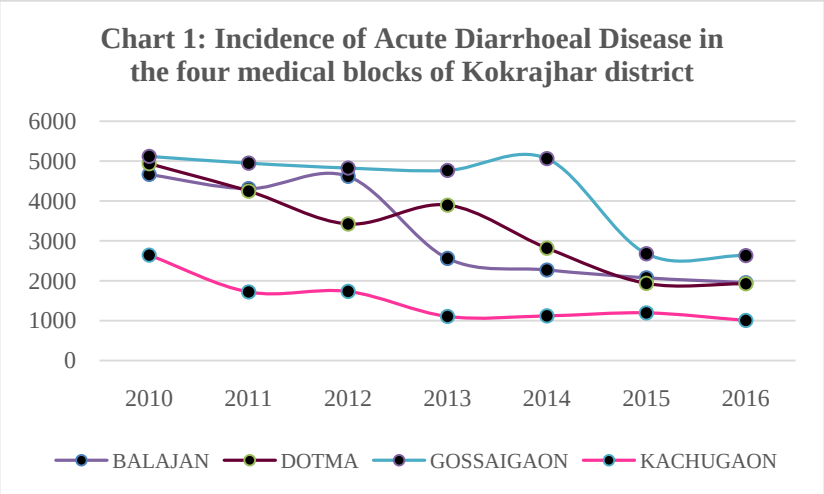


Chart 1: Incidence of Acute Diarrhoeal Disease in the four medical blocks of Kokrajhar district
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON

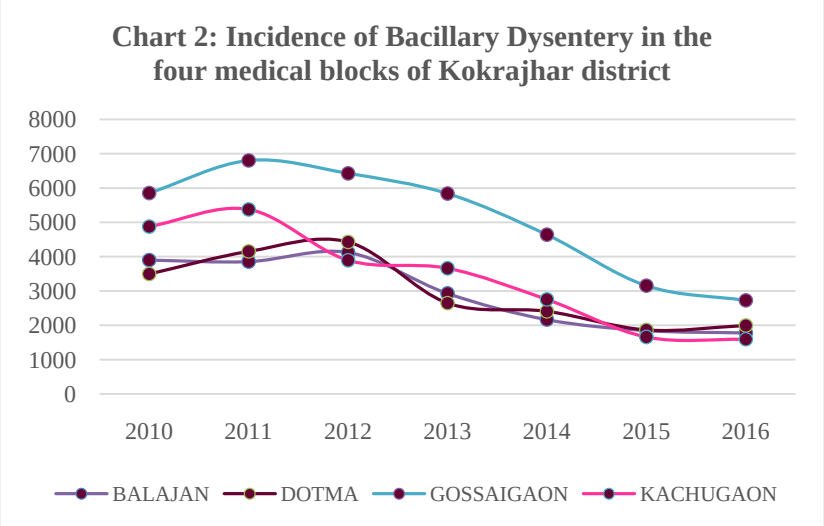


Chart 2: Incidence of Bacillary Dysentery in the four medical blocks of Kokrajhar district
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON

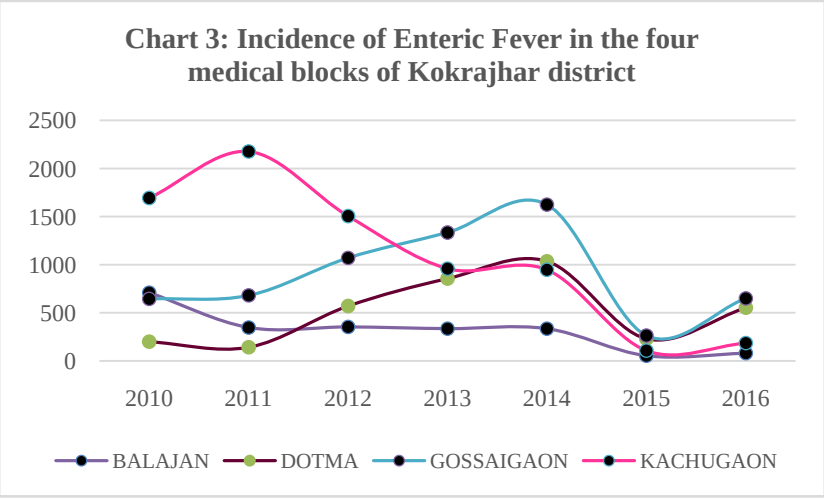
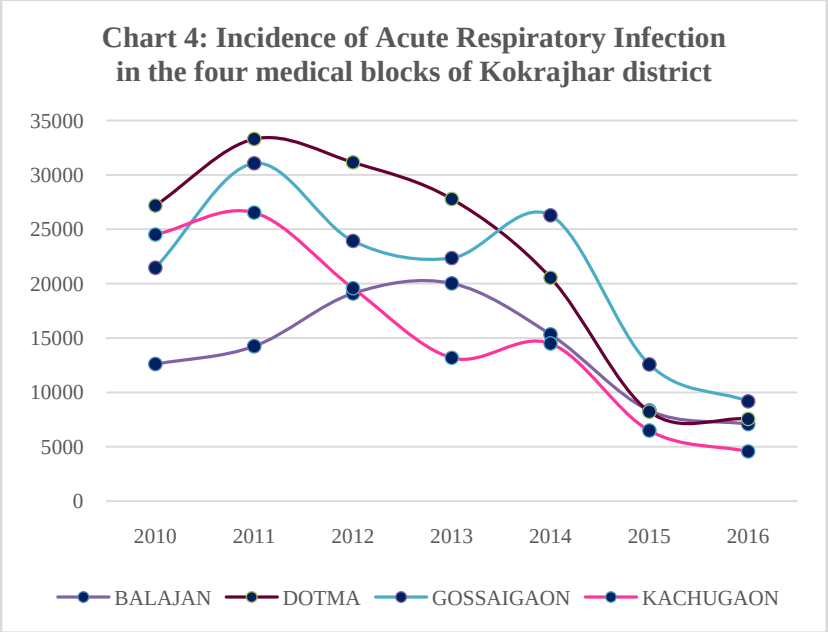
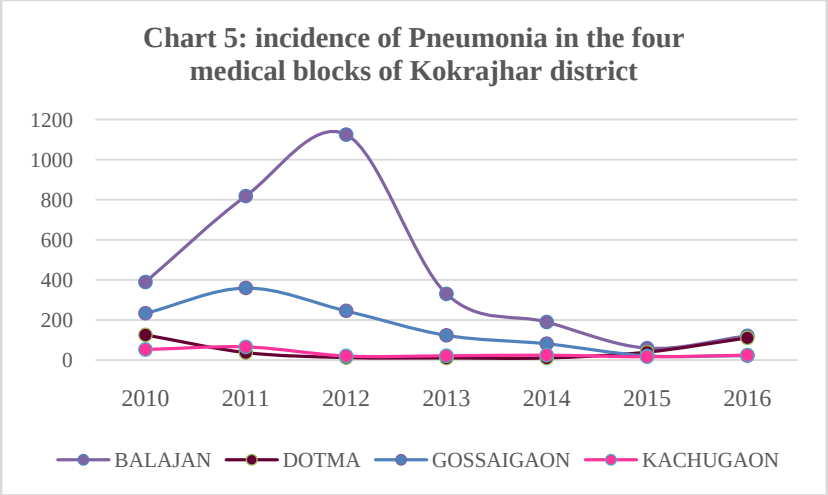


Chart 3: Incidence of Enteric Fever in the four medical blocks of Kokrajhar district
2500
2000
1500
1000
500
0
2010
2011
2012
2013
2014
2015
2016
BALAJAN
DOTMA
GOSSAIGAON
KACHUGAON





Throughout the period 2010-2016, the Kachugaon block received fewer cases of Acute Diarrhoeal Disease(including acute gastroenteritis) than other three blocks. The incidences of diseases have got a declining trend in all the four medical blocks.

During the period the Kachugaon block followed the Gossaigaon block in respect of Bacillary Dysentery incidence. There can be seen an almost proportionate decline in the incidence of this disease in all four medical blocks.

In the beginning of the period, the Kachugaon block witnessed higher incidence of Enteric Fever than all other three blocks, but towards the end it received lower cases than others. In all the four blocks, incidences of the fever have got overall declining trends.

In the beginning of the period the Kachugaon block received high incidences of Acute Respiratory Infection, next to Dotma, but towards the end the incidence of the disease has notably reduced so as to occupy the bottom position among the four blocks. Incidences of this disease in all the four medical blocks have declining trends.

During the period occurrence of Pneumonia in the Kachugaon block remained below the incidences of other four blocks. Although the incidences are low, the fever is seen to maintain steadiness in all the four blocks, except a sharp declination in Dotma block.

From this study on incidences of different prevalent diseases in forest and non-forest areas of the district it may be observed that the forest is not contributing towards occurrence of these diseases, there prevails the same situation in both forest and non-forest areas in regard to occurrence of these diseases.

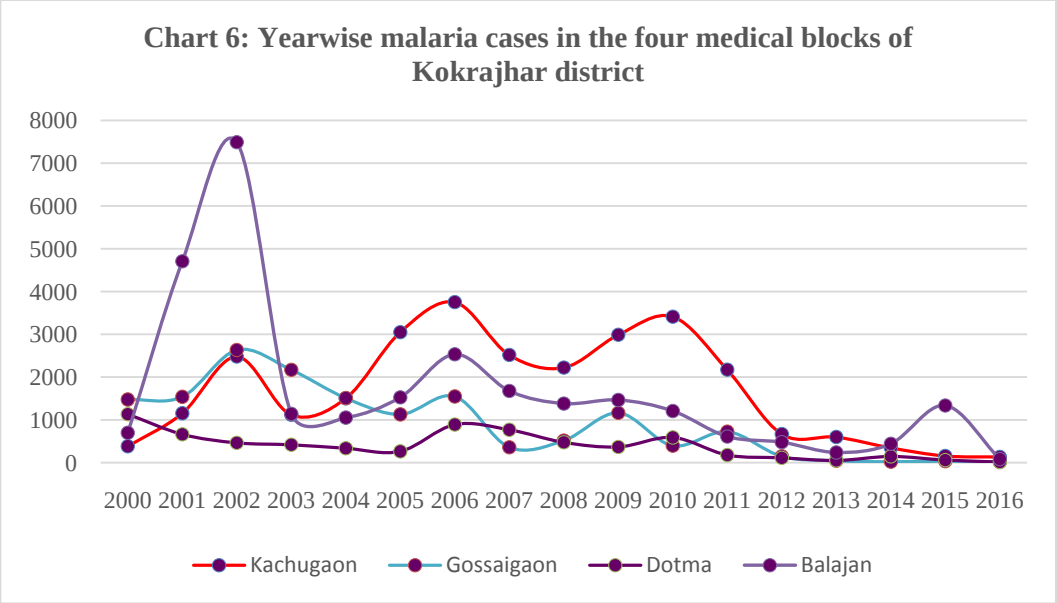
4.2 Malaria disease in Kokrajhar district

There was prevalence of different endemic diseases in the district in the past for a long time [13]. Kala-azar, usedto sweep through the district killing thousands of peoplein the twenties of the 20th Century [13]; but it exists no longer in the district. Other vector-borne diseases are also very rare in the district. Butmalaria still remains to be endemic in the district and createshavoc among the masses[14].

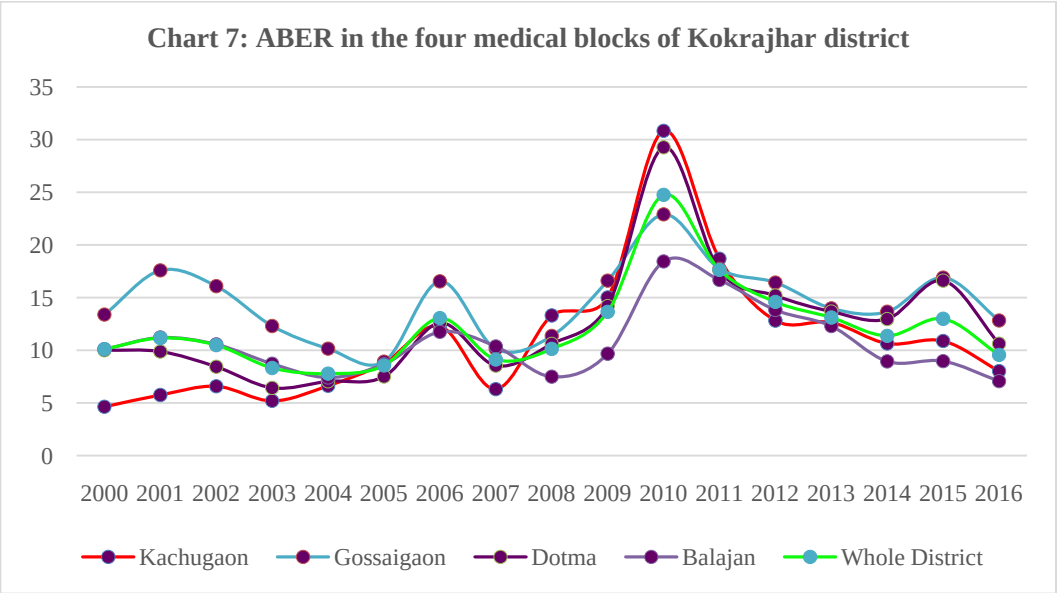
The district has a moderate variation of temperatureranging 22◦C to 32◦ C, January and August being the coldestand the hottest months, respectively. Thedistrict has got a high annual rainfall of 18626mm and ahigh humidity of 73.5 on average [14]. These together give rise a favourable condition for transmission of malaria thatsubsists in the district throughout the year. Thus,malaria disease occurs in the district throughout the year,the monsoon season, fromMay to September, being the pickperiod of the disease [15].

Analysis of the malaria incidence data supplied by National Vector Borne Disease Control Programme for the last seventeen years from 2000 to 2016 shows that the Kachugaon medical block, which lies within forest area almost completely, is more vulnerable to malaria than other three blocks of the district.All the malaria indicators indicate the deplorable situation in Kachugaon block in respect to occurrence of malaria.

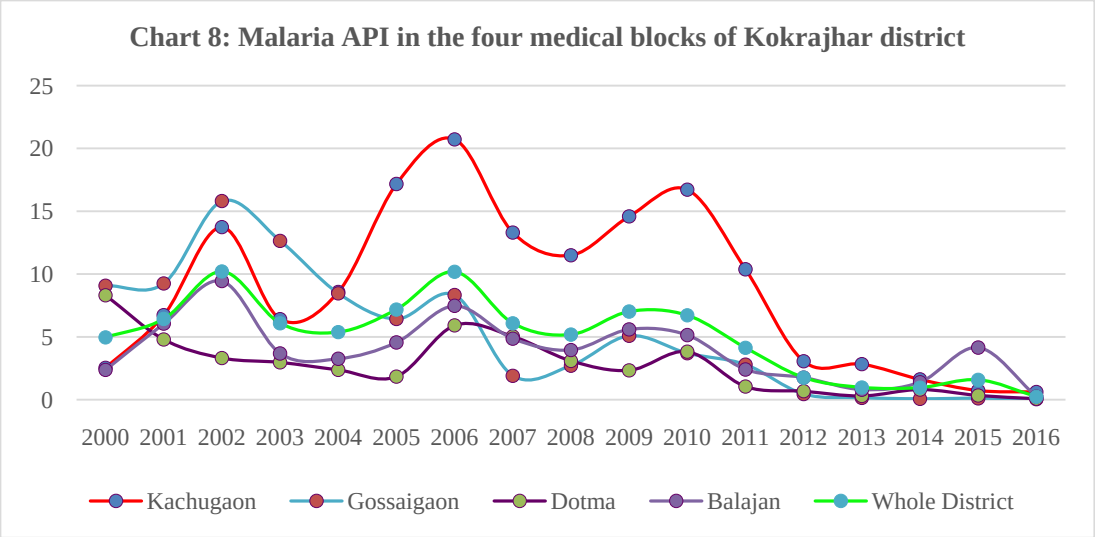
Charts 6, 7, 8, 9, 10 show the Malaria incidences in the four blocks, the Annual Blood Examination Rate (ABER), the Annual Parasite incidence (API), the Slide Positivity Rate (SPR) of the four medical blocks during the period 2000-2016.

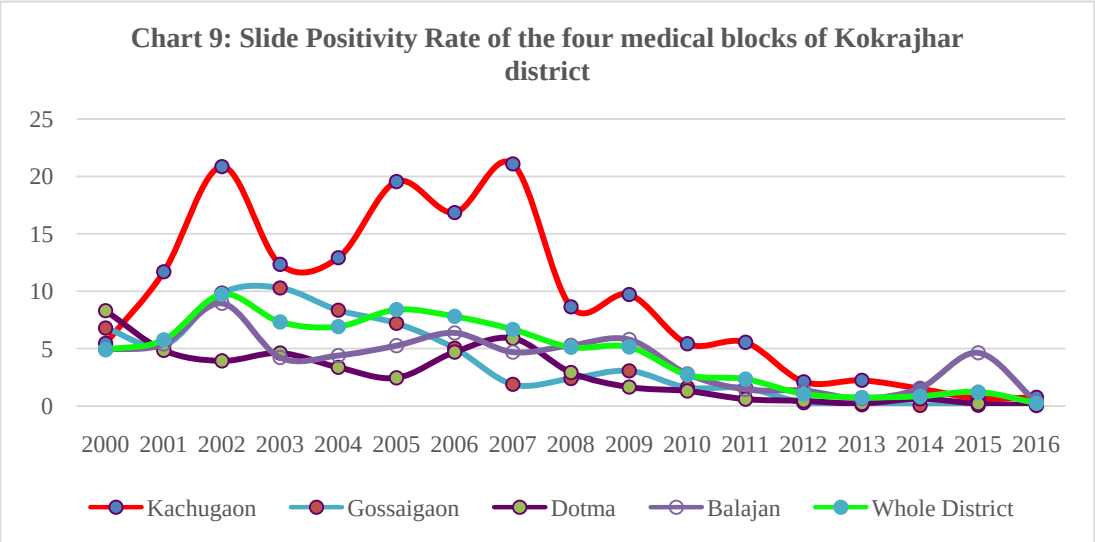


There was a malaria endemic in 2001 and 2002 in Balagaon block, during which two years the annual malaria incidence of the block rose higher than that of the Kachugaon block. For other years, the malaria cases in the Kachugaon block remained higher than that of other blocks. Towards the end of the period the malaria incidence in Kachugao block is found to decline faster than other blocks. In the year 2016, the malaria incidence in all blocks significantly declined, when incidence in all blocks remained below 100 cases.



In most of the years of the period from 2000 to 2016, the Annual Blood Examination Rate (ABER) of Kachugaon Block remained below that of the district. It ranged from 4.64 to 30.82. The blockachieved the highest ABER in 2010 when it rose up above the district ABER (24.75).Medians of Kachugaon, Gossaigaon, Dotma, Balajan blocks ABER and that of the whole district stood at 10.64, 13.98, 10.63, 10.10, 11.16 respectively.





Except for the years 2000 and 2015, the API of the Kachugaon block remained higher than the district API. In most of the years the Kachugaon API exceeded API of the other three blocks. Medians of APIs of Kachugaon, Gossaigaon, Dotma, Balajan blocks and that of the whole district stood at 8.57, 3.70, 2.37, 3.95, 5.38. Towards the end of the period, there was sharp decline in the API of Kachugaon block. APIs of all blocks have declining trend.

ABER indicates the population coverage for blood examination for malaria. Higher the ABER, higher the coverage. On the other hand, API indicates the positivity rate of the examined cases. Therefore, for a better malaria situation it is expected to have high ABER followed by low API. But in Kachugaon medical block there can be seen higher API for lower ABER, apprehending even higher API in the block had there been higher ABER.

Mann Whitney U test indicated that API of Kachugaon block was significantly different from the APIs of Dotma (p= 0.004 at 5% significance level) and Balajan (p= 0.038 at 5% significance level) blocks, however, the same was significant from the API of Gossaigaon block at 10% significance level (p= 0.057) only.

On the other hand, SPR indicates the prevalence of the malaria disease. The mean SPRs of Kachugaon, Gossaigaon, Dotma, Balajan blocks and that of the whole district come out as 9.25%, 3.75%, 2.71%, 4.00% and 4.52% respectively, showing awful malaria situation in Kachugaon block in comparison to other blocks of the district.

Mann Whitney U test indicated that the SPR of Kachugaon was significantly different from SPRs of all other three blocks(for Gossaigaon, p= 0.013, for Dotma, p= 0.002 and for Balajan, p= 0.020, all at 5% significance level).

However, the SPRs of all blocks are declining at fast rate, and for the last three consecutive years, no medical block had attained SPR greater than 5% continuously. Hence, all medical blocks of the district are outside malaria high-risk area as per the criteria ofMalaria Action Programme of the country [16, 17],

4.3Health facilities of Kokrajhar district

The block wise distribution of different types of health institutions of the district is as below.

Table 3: Block wise distribution of health institutions in Kokrajhar district

Name of health block	No of CHC	No of PHC/MPHC/SHC/SD	No of SC	Population covered
Balajan	1	12	34	178116
Dotma	1	14	30	95760
Gossaigaom	1	11	59	222036
Kachugaon	1	08	38	175507

4.4 Area wise distribution of health facilities

Following is the area wise, viz. Forest villages, Forest area and Non-forest area distribution of health facilities in Kokrajhar district.

Table 4: Distribution of health facilities in forest villages, forest area and non-forest area

Name of area	No. of BPHC	No of CHC	No of PHC/MPHC /SHC/SD	No of SC	Population covered
Forest villages	0	0	4	29	134855
Forest area	1	1	12	64	281939
Non-forest	3	3	33	59	389480

4.5 Distribution of Sub Centres

Distribution of SCs in the forest villages, forest area and non-forest area of the district are as below.

Table 5: Distribution of Population, SC and ASHA in forest villages, forest area and non-forest areas

Area	No. of SCs	No. of villages	Average no. of villages per SC	Population covered	No. of ASHA	Population per ASHA
Forest villages	29	214	8	134855	220	613
Forest area	64	443	7	416794	419	995
Non-forest area	97	567	6	389480	528	738

Out of 140 forest villages available in the district, there are 29 SCs, each of which covers eight villages in average. When entire forest area is considered, the average number of villages covered by an SC diminishes by one; for non-forest area this number again reduces by a village. In regard to appointment of ASHA, the guideline tells to lay emphasize on spatial distribution of habitations, not on population (which is one ASHA for 1000 population for tribal area) (NRHM guidelines), which seems to be followed in case of forest villages (220 ASHAs for 214 villages). But when entire forest area is considered it is seen to deviate from this guideline; non-forest area has been provided better coverage in regard to ASHA than forest area.

Table 6: Manpower available in the SCs of forest villages, forest area and non-forest area

Area	RHP[a]		ANM[b]			MPW[c](M)		
	Sanctioned	In position	Sanctioned	In position	Population per ANM	Sanctioned	In position	Population per MPW
Forest villages	3	7	16	41	3290	8	13	10373
Forest area	5	11	28	91	4581	14	33	12630
Non-forest area	28	12	100	130	2996	50	64	6086

a- Rural Health Practitioner, b-Auxiliary Nurse Midwife, c-Multi Purpose worker

All the SCs in the district, irrespective of forest area and non-forest area, have got very poor manpower. Even the small number of scanty sanctioned posts of RHP are not filled up.Since, as per the population norm,there should be at least one ANM for 3000 populations in tribal area, there is inadequate number of ANM in the forest area. In regard to availability of MPW, the condition is appalling one as as many as 64 SCs, 31 in the forest area and 33 in the non-forest area, are functioning without an MPW(M), who are supposed to provide preliminary treatment to the people including malaria, which is prevalent in the district.

4.6 Distribution of PHC rank health institutions

Following table gives the distribution of PHC, MPHC, SHC and SD, which are of equivalent rank in Assam, in the district.

Table 7: Distribution of PHC rank health institutions in forest villages, forest area and non-forest area

Area	Total no. of PHC/MPHC/SD/SHC	Population covered	Average population covered by a HI	No. HI fulfilling IPHS norms	No. of HI functioning as FRU	No. of HI functioning as 24×7SDC*
Forest villages	4	99510	24878	0	0	3
Forest area	12	186212	15518	3	0	4
Non-forest area	33	260408	7891	6	0	14

*Services Delivery Centre

There can be seen much better provision of health services delivery centres in the non-forest area than in forest area. Although the population norm form for PHC in tribal area (one PHC for 20000 population) has been fulfilled in forest area, the same has not been done in forest villages. No health institution in forest villages is functioning fulfilling the IPHS norms; out of twelve health institutions of forest area, only three are running as per IPHS norms. In this regard, health institutions in non-forest area are also not in a better position, as only 18% of the health institutions, available in the it, are functioning as per IPHS norms. Regrettably no health institution of the PHC rank is functioning as First Referral Unit, although, as per IPHS norms, these are expected to act as FRU for 6 Sub-Centres andrefer out cases to CHC (30 bedded hospital) and higherorder public hospitals located at sub-district and district level. Although these institutions are required to be 24×7 Services Delivery Centre majority of them have failed to do so.

4.6.1 Availability of beds in different wards in the health centres

Availability of beds in different wards in different health institutions of the forest area and non-forest area of the district is as shown in Table 8.

Table 8: Available beds in the PHC rank health institutions in forest villages, forest area and non-forest area

Area	Antenatal ward		Post Natal ward		Eclampsia Ward		Paed. Ward	Med. ward	Surg. ward	Eye ward	ENT ward	Isol. Ward	Other ward		Total bed	Avg. no. of bed per HI
	Nhiwa	NoB	Nhiwa	NoB	Nhiwa	NoB							Nhiwa	NoB		
Forest villages	1	1	4	13	3	18	NA	NA	NA	NA	NA	0	0	0	32	>6
Forest area	7	12	6	18	4	24	NA	NA	NA	NA	NA	0	2	2	56	<6
Non-forest area	21	30	16	28	3	18	NA	NA	NA	NA	NA	1	11	32	120	<6

Nhiwa- No. of health institutions where available, NoB- No. of Beds, Paed.- Paediatric, Surg.- Surgical, NA-Not available, Isol.- Isolation, Avg.- Average

Only one health centre in the forest villages has Antenatal ward, which is vital for maternal care. Similarly, major number of health centres in both forest and non-forest areas are functioning without antenatal ward. None of the health centres in the rank of PHC possesses some vital wards viz. Paediatric Ward, Medicine ward, Surgical ward, Eye ward andENT ward. The numbers of health institutions in forest villages, forest area and non-forest area that possess less than six (6) bed, the number prescribed by IPHS for a health institution of PHC rank, are respectively 1, 7 and 23.

4.6.2 Status of essential services in PHCs

Table 9 shows the status of essential services to be available in the PHC ranked health centres.

Table 9: Status of essential services in forest villages, forest area and non-forest area

Area	Laboratory		Operation Theatre		Labor Room		New Born CC		Doctor Quarter		Ref. Transport	
	Avail.	Funct.	Avail.	Funct.	Avail.	Funct.	Avail.	Funct.	Avail.	Living	Avail.	NA
Forest villages	4	4	0	0	4	3	4	4	4	3	3	1
Forest area	11	11	0	0	12	11	12	7	12	7	6	6
Non-forest area	21	20	1	0	29	29	23	19	28	13	12	21

Avail.- Available, Funct.- Functional, CC- Care Corner, Ref.- Referral

Out of forty-five PHC ranked health centres in the district, there exists only one health centre which has an operation theatre, which lies in non-forest area, but that is also non-functional. Thus there does not exist a PHC ranked health centre in the entire forest area having an operation theatre, functional or non-functional. Although majority of the PHCs have functional Laboratory, considerable number of health centres, both in forest and non-forest areas, are functioning without any laboratory. Same is the case with Labour Room and New Born Care Corner also. Although almost all health institutions are having Doctor's Quarter, doctors are living in 50% of them only.

4.6.3 Staff positions in health centres

Staff positions of different health centres of the district are as in Table 10A and 10B.

Table 10A: Area wise manpower of the health centres

Area	Allopathic Doctor		Medical Officer (Ayur)		Medical Officer (Homeo)		Female Doctor		Block Extension Educator		Statistical Assistant for MIS	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Forest villages	1	0	1	4	0	1	0	0	0	1	0	0
Forest area	6	4	4	6	2	1	2	0	0	1	0	0
Non-forest area	35	12	23	13	11	2	10	2	1	2	2	3

Table 10B: Area wise manpower of the health centres

Pharmacist		Lab Technician		Health Educator		Health Assistant (M)		Health Assistant (F) / LHV		Health Worker (F) / ANM		Nurse Midwife / Staff Nurse	
Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
1	3	1	3	1	1	1	0	1	0	2	4	3	10
4	10	4	10	4	1	4	3	3	0	8	8	12	15
26	42	25	23	25	10	25	12	20	4	52	50	59	35

In the four PHC ranked health centres, only one centre has got a sanctioned post of allopathic doctor, and currently there is no doctor against this post. Out of twelve health centres lying within forest area, there are no sanctioned post of allopathic doctor in as many as eight centres, and eight centres are running without any allopathic doctor. As per non-forest area is concerned, out of thirty-five health centres of PHC rank, seven centres have no sanctioned post of allopathic doctor and currently twenty-three centres are running without an allopathic doctor.

In the PHC ranked health centres, ayush doctors are more available than allopathic doctors in forest area. In the forest villages, all centres are being run by ayush doctors, while in the entire forest area, 60% of available doctors are from ayush. In non-forest area the situation is improved a little where allopathic doctors constitute 52.27% of the available doctors.

In forest area, four centres (33.33%) are running without any doctor, allopathic or ayush, while in non-forest areaas many as thirteen health centres (33.39%) are running without a doctor.

While as per IPHS norms there should be minimum ten (10) staff members of rank higher than IV, in forest area eleven centres (91.67%) have got staff strength (higher than Grade-IV) less than it and there is not a single sanctioned post of such rank in as many as eight health centres (66.66%). As per non-forest area is concerned, there are no sanctioned post of such rank in eleven centres (33.33%) and in twenty-eight centres (84.85%) the staff strength of such rank is less than ten (10).

4.7Distribution of CHCsin the district

There at four Community Health Centres in Kokrajhar district, namely, Balajan, Dotma, Bashbari and Kachugaon.Three out of these four CHCs, namely Balajan, Dotma and Kachugaon are situated at BPHC headquarters. The Kachugaon CHC lies within the forest area.The Balajan and Bashbari CHCs are attached to Balajan BPHC and Bashbari SD respectively, and currently both are non-functional.

The Kachugaon centre covers a population of 158834, which is approximately as twice as the population prescribed by IPHS for tribal area, the populations covered by other three centres, namely Balajan, Dotma and Bashbari, are respectively 21887, 78445 and 67385, all of which are within the prescribed population limit.

Although both the functional CHCs are functioning as 24×7 Service Delivery Centre, neither both of them has meet the IPHS norms nor function as FRU. Blood Storage Facility is not available in all the four CHCs. Only the Kachugaon centre has the facility of emergency obstetric services.

Kachugaon centre, the only CHC within the forest area, has only three wards, namely Antenatal, Post Natal and Paediatric Wards with 15 beds in total. Great inconveniences are there in the centre due to non-availability of any medicine ward, male or female and Eclampsia Ward.On the other hand, all other three CHCs, which are in non-forest area, have both male and female medicine wards, with 30 beds each; but none of them possesses paediatric ward. None of the health centre of the district possesses Surgical, Eye, ENT and TB Wards.

Only Kachugaon and Dotma centres have got Operation Theatre; meanwhile all centres have got functional Laboratory, Labor Room, New Born care corner and referral transports. Although three centres in the non-forest area have Stabilization Units for New Born, Kachugaon centre does not possess it. No centre has functional X-Ray machine. Though Kachugaon centre has Quarter for Specialist Doctors, doctors are not staying there.

4.7.1 Staff position in CHCs

Following Table 11A gives the numbers of sanctioned posts in different branches / sections in four CHCs of the district.

Table 11A: Specialist and Nursing Staff position in CHCs

CHC	Surgeons		Obstetricians/ Gynecologist		Physicians		Paediatricians		Public Health Nurse / ANM		Staff Nurse / Nurse Midwife	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	0	0	1	0	0	0	0	0	1	0	7
Dotma	1	0	1	0	1	0	1	0	4	5	4	9
Balajan	0	0	0	0	0	0	0	0	0	0	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

The Kachugaon CHC is lack of sanctioned posts of essential specialists require in order to provide quality health services to the community. For most specialised sections of the centre such as Surgeons, Obstetricians, Gynaecology, Paediatric, General Medicine, Public Health Nurse, Staff Nurse it has not been accorded any sanctioned post. In comparison to the situation of Kachugaon CHC, situation in Dotma CHC is much improved. It has acquired some essential sanctioned posts in specialised sections. Both in terms of sanctioned posts and in position of specialised staff, Dotma is much developed one.

Table 11B: Subsidiary manpower in CHCs(I)

CHC	Anaesthetist		Eye Surgeon		Public Health Programme Manager		General Duty MO Allopathic		General Duty MO (Ayur)		General Duty MO (Homeo)	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	0	0	0	0	0	0	0	0	2	0	1
Dotma	1	0	1	0	1	1	2	3	1	1	0	0
Balajan	0	0	0	0	0	0	1	0	1	1	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

Table 11C: Subsidiary manpower in CHCs(II)

CHC	Pharmacist / Compounder		Lab Technician		Radiographer		Computor		Statistical Assistant for MIS		Accountant	
	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position	Sanctioned	In position
Kachugaon	0	2	0	1	0	0	0	0	0	0	0	1
Dotma	2	2	2	2	1	1	1	1	1	0	1	1
Balajan	1	1	1	1	0	0	1	1	0	0	0	0
Bashbari	0	0	0	0	0	0	0	0	0	0	0	0

In case of subsidiary staff strength alsoDotma CHC is in an advanced position than Kachugaon CHC. Almost in every section Dotma has acquired sanctioned post and in position staff, including attached regular or contractual staff, whereas in Kachugaon centre, no post has been sanctioned in all sections, available staff are either attached to the centre or engaged as contractual. Although both centres have failed to meet the IPHS norms, Dotma centre is in better position with 26 staff members than Kachugaon that has 16 staff members. On the other hand, the Balajan CHC, one of the two non-functioning CHCs, has a staff strength of 4, while the Bashbari CHC, the other non-functioning CHC, has no staff at all.

5. Conclusion

An attempt has been made to analyse the health inequality in forest and non-forest areas of Kokrajhar district of Assam in India in terms of disease incidences and spatial distribution of health facility. Although health status cannot be well explained only by these two components of health status, these can give insights to the health situations of the areas or communities in concern.

Even though there is no difference in the situations of forest and non-forest areas in regard to the occurrence of prevalent diseases, still there exists a significant difference between the malaria situation in the two areas, situation in forest area being more serious than that in non-forest area. Although the malaria has a decreasing trend in both forest and non-forest areas of the district, there may be sudden rise in the malaria incidences as previous studies on malaria of the district found that malaria incidences in the district has a fluctuating character [14]. Forest area should be the main focus of malaria eradication program in the district.

The uneven distribution of health facilities in the forest and non-forest areas of the district is a matter of serious concern. Beginning right from the health sub centre up to community health centre, forest area people have been discriminated. Policy and implementation of health schemes are running in opposite directions in the district; because health policies aim at providing special care to the backward people, whereas the implementation part provides better facilities to the advanced people.

It is a matter of serious concern that only below 20% of the PHC ranked health centres in the district are functioning as per IPHS norms, which has been more aggravated by non-availability of any CHC in the district functioning with same norm. Non-availability of many vital wards viz. Medicine, Surgical, Eye,ENT and TB wards in the PHCs and CHCs has made the presence of the health centres insignificant. Due to absence of these services the implementation of some important health schemes, such as National Programme for Control of Blindness (NPCB) (which aims at providing Diagnosis and treatment of common eye diseases, Refraction Services, detection of cataract cases and referral for cataract surgery) and Revised National Tuberculosis Control Programme (RNTCP) (which aims at making all PHCs to function as DOTS Centres), has become quite unviable. Behaviour Change Communication has become an integral part of health delivery services in order to cover all aspects of pro preventive care in health care. Though it has been made a requisite of primary health centres, it is nowhere in the health centres of the district as there are no health educators in the existing health centres.

The common phenomenon in the field of health that remote population are also in possession of poorer health facility than the easily accessible population is found to be reflected in this study. Time has come to lay more emphasize on implementation of existing health policies in order to take the health facilities to the doorsteps of the common people.In this regard, the Hospital Management Society, available in the primary health centres, have to play active and important roles. The root causes of deplorable condition of health institutions are to be identified and functioning of the health institutions are to be closely monitoredby them, and corrective/necessary measures are to be suggested to the appropriate authority. Measures should be taken by the health authorities to strengthen such societies.

6. Abbreviations, Acronyms and Definitions in relation to malaria

PV: Plasmodium vivax
PF: Plasmodium falciparum
BSE: Blood slides examined (number of blood slides examined tested for presence of malaria parasite)
POS: Positive (number of confirmed malaria positive cases)
SFR: Slide falciparum rate = (PF/BSE) ×100
SPR: Slide positivity rate = (POS/BSE) × 100
ABER: Annual blood examination rate = (BSE/Population) × 100
API: Annual parasite incidence =(POS/Population) × 1000.

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The Humanitarian Crisis in Iraq is The Cost of Corruption

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Abstract- The cost of corruption on societies is heavier than estimated before. It does not only threaten economic, development, rule of law and the values of our democracy. Corruption could affect the prosperity of individuals and cause catastrophic humanitarian damages to countries. The Iraqi humanitarian crisis demonstrates a good example on the harmful effects of corruption on the safety and well-being of its citizens. This study sheds new light on two main issues; firstly, corruption is the inducer of instability and conflicts, and secondly the hitchs imposed by corruption during the delivery of humanitarian aids.

Index Terms- humanitarian disaster in Iraq, manmade crisis, the impact of corruption, cost of corruption, armed conflicts.

I. INTRODUCTION

Horrific violence dominates Iraq. It is estimated that one third of the Iraqi population is in constant need of humanitarian relief. The country has a long record of crises brought on by various issues starting with human right violations to corruption, armed conflicts, poverty and most recently, the arrival of Internally Displaced Persons (IDPs). Iraq, nowadays, faces severe challenges and destruction, especially after the emergence of terrorist groups and organisations, such as the Islamic State in Iraq and Syria (ISIS). Following the invasion of the city of Mosul, ISIS's insurgency have contributed to worsen the humanitarian situation in the country and rapidly increase the level of crime.

Perhaps, analysts and writers think that the Iraqi humanitarian crisis, in particular, is the result of many facts and or justifying practices; those concerned with religious disputes, political disagreements or any other type of ethical and sectarianism discrimination. This research paper, however, displays some profound arguments on how corruption in Iraq has generated the reality of today in terms of the weakness of government, hostilities and, above all, the humanitarian crisis resulting from human actions, such as armed conflicts and terrorist activities.

It suggests that the corruption and the abuse of power by different actors inside a country has created the current unrest in two different aspects. Firstly, corruption is the creator of the manmade crises, when the national defence is destroyed by a corrupt leader, making the state vulnerable in the face of armed conflicts and terrorist attacks. Secondly, corruption prevents the process of resolving these crises and provokes the continuation of this disturbance. For example, bribery or other form of misconduct by the staff of NGOs, governments and third parties create difficulties ineffectively delivering humanitarian aids to beneficiaries and respond to the situation timely.

The aim of this research paper is to expose another unfavourable side of corruption. Very few writers have ever outlined the correlation between both corruption and humanitarian crisis, in which this phenomenon is well perceived by Iraqis, for instant. This paper provides a unique study to discover the relationship between that two factors, in a place that is ranked amongst one of the most corrupt countries worldwide. According to an index by Transparency International (TI), corruption is pervasive at all levels of Iraqi government and is fuelling political violence and hampering effective state building.

To sum up with the hypothesis and all the queries in this research, these beginning sections outline the terms in general, and how this study defines corruption and humanitarian? The remaining sections provide in depth analysis on how corruption could affect us and how this could be linked with manmade humanitarian disasters, specifically, in Iraq.

II. METHODOLOGY

This is a qualitative research which uses the Grounded Theory method to provide an explanation or theory behind some events in Iraq. The research, basically, examines how corruption stimulates humanitarian crisis in general, and then uses Iraq as a solid base for the purpose of the study, with giving several examples on how corruption attacks solidities.

The sources of the data discussed in this paper are numerous, including international conventions, UN documents and reports, documents of other international organizations. Documents and publications of TI were significantly relied on as primary sources for this research. The secondary sources consulted for this dissertation are books, journal articles, online articles, blogs and reliable websites such as United Nations (UN) websites and TI's website, for extending the arguments in the research.

III. Literature Review

The United Nations High Commissioner for Human Rights, NaviPillay, says;

''Let us be clear. Corruption kills. The money stolen through corruption every year is enough to feed the world's hungry 80 times over. Nearly 870 million people go to bed hungry every night, many of them children; corruption denies them their right to food, and, in some cases, their right to life" [1].

Corruption has serious consequences. It is the disease that weakens the structure of state and prevents the development by stealing from state resources. It is a dominant factor in driving fragile countries to state failure via eroding the country's infrastructure. This disease could be seen as the source of the manmade crises and conflicts, plus the paralysis of different actors within the aid response operations.

There is also a parallel relation between corruption and conflicts. TI declares that fragile and unstable countries are, simultaneously, the home of the most corrupt countries in the world. The countries scarred by war and ongoing conflict, meantime, they received the lowest score and ranked at the bottom of the *Corruption Perception Index (CPI)*[1][2]. For example, within the latest CPI of 2016 countries like Somalia, with a score of 10, Afghanistan at 15, Myanmar at 28, Sudan at 14 and Iraq at 17. These results demonstrate that countries which are perceived as the most corrupt are also those plagued by long-standing conflicts.

The corrupt officials always adopt ways to charge money from people, giving rise to violent protest calling and grievances against the central government by various social group. Examples are the Liberian second civil war in 2003 and the Syrian civil war in 2015, between the presidents of the two countries andvarious forces opposing the government [3], [4]. Massive corruption was undermining state legitimacy and citizens' hopes for the future. The Liberian president Charles Taylor had been elected by a majority of people, but he failed to democratically reunite Liberia in the aftermath of the first Liberian civil war [3]. Instead, he focused efforts on retaining power, repressing others in the process [3].

In addition, corruption could also inspire stumbling blocks within the delivery of humanitarian relief by states and NGOs. It could cause a threat over the lives and well-being of persons of concern. In like manner, TI defines the corruption in humanitarian response as a matter of life and death, in which the affected people are on the lifeline for food, shelter and other basic means for living, whether caused by conflict, famine or natural disaster [5].

Corruption stands against the face of the humanitarian NGOs totake over their role. TI in July 2008 published a report, laying out the impact of corruption in the process of giving humanitarian support. It suggests, humanitarian assistance can be abused in numerous ways and it can pervade almost any part of the standard program cycle, including the projects, administration and financial practices [6, pp. 8]. One of the examples showed by the report on the unfavourable turn of corruption in providing assistance; in one community, a powerful man with connections demanded that the INGO's partner direct house construction assistance to a particular person in the community, yet the partner refused, resulting in the powerful person threatening them and preventing them from conducting their activity in that place [6, pp. 13]. Next, the partner informed the INGO and they attempted to resolve the issue through explanation of their mandate and targeting approach to the person, the INGO and the partner decided they could not work in the community [6, pp. 13].

Other serious challenges in delivering humanitarian assistance is *sextortion*,[2] in which sometimes called as *sexual exploitation or harassment*,[3] especially in the West African countries. "Your name isn't on the list... The computer swallowed your card'' this is a very common response which addressed to female refugees by the staff of humanitarian agencies [6, pp. 4]. One of female refugees quoted, ''I sleep mostly with NGOs' workers: I have to eat and feed my child" [6, pp. 4]. From here to there the power is abused for sexual purposes. Instead of humanitarian support, such demands result in the extension of crises by creating unfortunate consequences like unwanted pregnancy; abortion; single (often teenage) parenthood; abandoned children; HIV and sexually transmitted diseases; lost education and employment opportunities and not to mention the psychological trauma.

The Somalia aid is one of the most significant examples in this context. During 1970s and 1980s, Somalia received enormous supports for humanitarian aid operations from both west bloc and east. The misuse by government and the manipulation of the humanitarian relief were routinely tolerated by donors; foreign aid workers who dared complain about the diversion and misuse of aid were thrown out of the country [7]. SiadBarre, the president of Somalia, converted the aid to enrich itself and advance its own narrow interests; aid intended for refugees was diverted and refugee camps were used as sites to recruit, train and encamp security forces [7].

[1] CPI is the statistics which is every year launched by TI. It includes more than 170 countries and was first started in 1995. In the CPI survey the more higher the ranking number of a country, the more corrupt the country. For example, A-country ranked 20th out of 170, and B-country ranked 25th out of 170. This means B-country is more corrupt than A-country. As well as, if the country scored lower, it is perceived to be more corrupt. The CPI also scores the countries from scale 0 (perceived to be highly corrupt) to 10 (perceived to have low levels of corruption).

[2] Corruption can take any form. For example, the latest news from Transparency International reveals some recent attempts towards defining ''Sextortion", as a form of corruption. Sextortion refers to the abuse of power to obtain a sexual benefit or faviour, which is sex, can be dealt with as a form of currency, rather than money, for bribe. *See also,*Transparency International. ''Sextortion: undermining gender equality.''Internet: https://www.transparency.org/, Mar. 7, 2016 [July. 15, 2017].

[3] Sexual exploitation refers to a person when attempts to misuse that position, power or trust for sexual purposes. Meanwhile, Sexual harassment is when someone behaves in a sexual manner makes the victims feels distress, offended or intimidated.

Finally, the recent Somalia's ongoing conflict and complex emergency have displaced millions from their homes. The country remains weakened by years of consecutive crises: famine, poor rains and harvests, drought and other natural disasters. Likewise, corruption exposes a great risk and confronts the entire humanitarian programme cycle. TI launches a report in 2016, showing that corruption exists in both international and national agency staff, and in the awarding of contracts to private contractors and humanitarian agencies [8, pp. 28]. It says that corruption takes place at many levels, such as by favouring geographic areas, favouring family and friends, creating so-called ghost beneficiaries and taxing beneficiaries [8, pp. 20].

IV. Findings

1.1 What is humanitarian?

Humanitarian in its broadest sense is a moral issue that links the human instincts of sympathy and kindness. It is the principle of improving people's lives and promoting human welfare [9]. The legal concept of humanitarianism was originated from the International Humanitarian Law, which is a legal framework attempting to aid those who are no longer participating in hostilities, as well as the treatment of victims of war [10]. The modern concept of humanitarianism, however, has a wider meanings and it covers several actions which includes emergency relief delivered to people struck by natural or manmade disasters [11].

In contrast, the humanitarian disaster or the humanitarian crisis is a single or series of actions that threaten health, safety or well-being of a community or large group of people [12]. It occurs when there is a generalised threat to human life, health or subsistence, such as poverty, inequality, lack of access to basic services, exacerbated by a natural disaster or armed conflict [12]. The humanitarian crisis basically divides into two categories, according to the International Federation of Red Cross and Red Crescent Societies (IFRC); firstly, man-made hazards or crises, belonging to those events that are caused by humans like armed conflicts, pollution, famine, industrial accidents and transport accidents, and secondly, Natural hazards or disasters which naturally occur, just as earthquakes, landslides, tsunamis, famine caused by nature and drought, volcanic activity and drought [13].

To combat and curb these crises, a humanitarian action or operation is needed to save lives, reduce suffering and respect to human dignity. The global community and states have established several international NGOs, governmental institutions and diversity of projects to deliver humanitarian aid in humanitarian operations. The aid is rooted in four fundamental principles that guide the humanitarian actors and NGOs during the process of provide assistance to affected people, whether in a natural disaster or a complex emergency [14]. These basic principles are widely recognised as: humanity, neutrality, impartiality and independence [14, pp. 7].

Humanitarian operations, in general, refer to the actions of providing material assistance to people in need and have existed throughout human history, often in the form of food or material aid provided during famine, drought or natural disaster [15]. This action is sometimes called ''humanitarian aid'' or ''humanitarian relief'' to which the terms of "assistance," "rehabilitation," and "protection and prevention" are related as well [16]. The humanitarian relief starts as an immediate assistance to peoples' needs in a territory or a state that cannot uphold the human rights of its citizens and provide them with the basic conditions of life. For this purpose, a significant number of agencies have been set up to provide aid to affected people.

In a nutshell, the history of humanitarian relief can be traced back to the second half of the 19th century. The Red Cross Committee is the very first example of humanitarian organisation which emerged in 1863 [16]. It is one of the true international aid organisation, which has also received a formal mandate at the first Geneva Convention in 1864 to provide neutral and impartial assistance to civilian and military victims of conflict under the organization of national Red Cross Committees [17]. Following, the Shandong Famine Relief Committee established in response to the Northern Chinese Famine of 1876–1879 and the Great Famine of 1876-1878 in India, brought about by a drought that began in northern China in 1875 and lead to crop failures in the following years [18]. As many as 10 million people may have died in the famine [18].

The Hague law in 1899 and the Geneva law 1949 are the most significant international conventions in respect to humanitarian issues. Like any international law they do not impose obligation upon humanitarian agencies and NGOs, instead the provisions in Geneva Convention are interpreted in a way that state parties should allow relief to their territory [14, pp. 5].

1.2 What is corruption?

The term ''corruption'' does not always refer to money. Corruption can take any form that results in misuse of power or abuse of that power. For instance, when a president of a country uses his position to employ his relatives in high governmental positions or when an employee deceives his supervisor and claims to be sick, in order to go on holiday with his friends and family. Corruption in some such way is complex to describe, but not difficult to grasp. It may point to any behaviour by human being which leads to receiving something or achieving a goal through unfair competition or abusing the other.

There is neither an absolute nor an agreed definition on corruption. The ways that corruption occurs and the factors that contribute to the growth of corruption are varied and could take any form. It remains a challenge for academics to draw the lines for corruption, due to the complexity of corruption and scientist do not want to restrict this phenomenon in one aspect of life or attach it to one criminal definition.

Although, states nowadays have reorganized and defined some common acts of corruption, such as bribery, embezzlement, illicit enrichment, fraud and abuse of power or function. These forms of corruption have been criminalized almost in every state and every jurisdiction, as well as, they are part of international law which are embedded within the United Nations Convention Against Corruption (UNCAC) [19].

In addition, there are some well-organised definitions of corruption. It is defined by The World Bank as the ''the abuse of public office for private gain'' [20]. The most common and widely definition, however, is ''the abuse of entrusted power for private gain'', which is compromised by TI [21]. Based on the TI's definition, the perpetrators of corruption could be any person who has the following common features. Firstly, the person should be assigned the responsibility for doing something (entrusted power). Secondly, the entrusted power is to be used for a corrupt/fraudulent/illegal purpose (abuse of entrusted

power). Thirdly, the abuse should be for the interest of the person itself or a concerned person or a belonging group (private gain).

There are also a number of idiomatic definitions on corruption. The UNCAC defines corruption in two ways. It describes corruption as an insidious plague and an evil phenomenon that has a corrosive effect to our societies in many aspects, such as violating human rights, undermining democracy and the rule of law [19]. Furthermore, some scholars define it as a disease that attacks the hopes of the poor for a better future for themselves and their children which drains revenues that might otherwise go to projects that would bring education to poor children or offer civil services and health care programs [22].

Similar to The Hague and Geneva conventions for humanitarian, the international communities have also adopted the first international anti-corruption treaty [23]. The UNCAC is a unique international legal instrument against corruption. It is a legally binding, universal anti-corruption instrument that requires each State Party to take the necessary legislative and administrative measures, in accordance with fundamental principles of its domestic law, to implement its obligations under the Convention [19, art. 55]. States Parties to the UNCAC must undertake appropriate actions aimed at enhancing criminal justice responses to corruption [24].

1.3 The impacts of corruption

Corruption could affect democracy, rule of law, poverty, human rights violation even killings and terrorist act. The Secretary-General of the UN, Ban Ki-moon, states that corruption erodes democracy and the rule of law, and also that corruption can violate human rights and even sometimes kill, when corrupt officials allow medicines to be tampered with or they accept bribes that enable terrorist acts [1].

Highly corrupt countries became the home of the most dangerous terrorist organisations. For instance, Al Qaeda by Osama Bin Laden in Afghanistan, Boko Haram in Nigeria and ISIS in Iraq and Syria. In corrupt countries the terrorist groups face no difficulties to perpetrate their activities and find resources to their funding. Katherine Dixon, from TI, says:

"The link between corruption and development is simple: corrupt leaders that siphon state funds and resources away from vulnerable populations bring about weak states and public unrest, creating fertile ground for terrorists and organised crime."

The OECD in 2016 published a paper to identify the connection between corruption and terrorist activities. The organisation explains that corruption and poor government undermines the fight against corruption by weakening the army, because the money cannot be delivered to the solders or they might be poorly equipped [25]. Further, corruption may facilitate terrorist financing and helps terrorist funding. The OECD suggests that ISIS in Iraq and Syria uses oil as a main source for its finance [25]. The terrorist organisation with help from corrupt officials has adopted several ways to smuggle the oil out of these two countries [25].

Another additional side effect of corruption is the human rights violations. Corruption infringes the right to obtain food, water, education, health and fair trials. For instance, corruption violates the right to not have undue delay in court proceedings when a corrupt judicial body receives a bribe to protect the interests of one party in a trial [26]. Further, hospitals do not provide sufficient services when their staff gives better treatment to those who pay bribes, families suffer from poverty and hunger when social security programmes are corrupt, and schools cannot provide the necessary support to their students when government officials divert public money for corrupt reasons [27].

Apparently corruption stands to dictate many aspects in our life. UN's Human Rights alleges that corruption affects the enjoyment of both civil and political rights [1]. When corruption is prevalent, those in public positions fail to take decisions with the interests of society in mind [1]. As a result, corruption damages the legitimacy of a democratic regime in the eyes of the public and leads to a loss of public support for democratic institutions, makingthe masses become discouraged from exercising their civil and political rights when those rights are not respected [1].

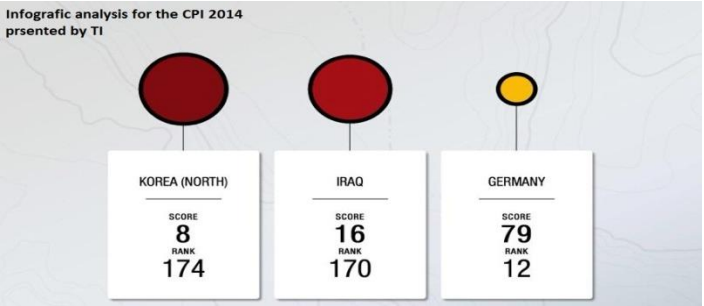
Above all, corruption may also in twofold manners affect humanitarian crises. Firstly, when corruption and humanitarian crises creating indirect relation. The former can lead to a sustained violent conflict which is one of the main grounds of the crises. Conflict is the manmade disaster that is, eventually, threatening the basic principles of living, health, safety or well-being of a community or large group of people. It weakens government and generates social unrest; suppresses economic development, and hinders or prevents the establishment of a good defence and the security needed for stability and growth.

Secondly, corruption may help the humanitarian disasters continue by creating weak administration that cannot respond to emergency situations. Severe and massive corruption during national emergency, which is also described as a "crisis corruption" that could be especially violent [28]. For instance, after several years of suppression under the Somoza regime in Nicaragua, it was massive corruption in his handling of emergency relief for earthquake victims that finally began to seriously erode his national and international support [28]. It is also, eventually, led to the collapse of the regime [28].

1.4 The nature of disaster in Iraq

Iraq has a long history with diversity of crises and human rights violations. It started, specifically, after the invasion of Kuwait in 1991. Following that year, the country infrastructure collapsed and the national economy was destroyed, in spite of the UN sanction imposed on Iraq for two decades [29]. Iraq has been suffering from all kinds of crises, just as insecurity, economy instability, underdevelopment, corruption, food shortages, poverty, water, electricity, creating shortage of the fundamental means for living.

In terms of corruption, CPI highlights Iraq among one of the most corrupt countries worldwide. CPI for 2015 ranked Iraq 161 out of 168 countries. The Index has consistently ranked Iraq as one of the countries with the highest level of corruption. For example, in 2012 Iraq was ranked 169th out of 174 countries; in 2013 Iraq was ranked 171st out of 175 countries and in 2014, the country was ranked 170 out of 175 countries. It shows that only Iraq, Libya and Sudan are ranked at the bottom 10 countries from the Middle East and North Africa region, far beyond countries that ranked at the lowest, just as Germany and Norway, in which they are considered to have the lowest level of corruption. The 2014 CPI also scored Iraq just 16 on a scale where 0 indicates that a country is perceived to be highly corrupt and 100 is where a country is perceived to be very clean. Only Afghanistan, North Korea, South Sudan, Somalia and Sudan scored worse.



Further, the poor condition of humanitarian crisis in Iraqexceeds the expectations. The conflict between the Jihadist organisation of ISIS and the security governmental forces led to a catastrophic human situation in Iraq. In June 2014, ISIS's fighters swept across Iraqi border from Syria and took control of approximately one third of the country, including Mosul, the second largest city in Iraq [30]. This invasion result in forcing the Iraqi army to abandon the cities in Nineveh governorate and fleeing of around 600,000 residents in this area [30]. From that moment, the number of displaced people accelerated when the proceeding fights started between the Jihadist groups and the Iraqi army to recapture the cities like Tikrit, Mosul, Shingal, Hawiga.

ISIS used civilians as human shields, fired indiscriminate weapons into civilian areas, carried out car bombings, other suicide attacks, and planted landmines, killing and injuring civilians. Government forces engaged in destruction of homes, looting, and abuses against civilians including torture, enforced disappearances and executions [31]. A report in 2016, by both UNAMI and Office of the United Nations High Commissioner for Human Rights (UNHCR), reveals that ISIS kidnapped between 800 and 900 children in Mosul for religious and military training [32]. Further evidence shows that ISIS committed 4 million human rights violations during their take over in Iraq in 2014; this includes child recruitment, violation of freedom, destructions of historical sites, beheading prisoners, mass killing against minorities and more [33].

The UN described Iraqi humanitarian crisis as "one of the world's worst", saying that more than 10 million Iraqis, making up almost a third of the population, are in need of immediate humanitarian aid [34]. Media may not expose the real scenario inside Iraq, but Iraq now has one of the highest populations of Internally Displaced People (IDPs) in the world.The violence between armed groups and government forces has resulted in over 3 million IDPs across Iraq and left more than 11 million in need of humanitarian assistance [35]. Iraq is also hosting a quarter of a million Syrian refugees [36].

1.5 Corruption provokes conflicts in Iraq

The situation in Iraq is quite complex. The state is divided according several ethical, religious and other ideological beliefs that many think to be the fuel of conflict and instability in Iraq. In this context, however, one fundamental element has scarcely been taken into consideration which is corruption. The latter is the driven source for the weakness of the country's institutions, grievances of its people and government of incompetent.

Iraq offers a concrete example. The recruitment of high-ranking positions in the public sector is predominantly based on political affiliation, rather than merit selection or a technocratic approach to government. The political power is not used for the protection of the rule of law or civil rights, instead every high-ranking officials works only for the interest of its political party or a group, even when this interest contradicts with the benefit of public [37]. In 2006, Nouri al-Maliki, who is from Shia party of the Islamic Dawa, was asked to form the government and he was signed as Prime minister for Iraq [38, pp. 2]. However, during his time in office, he has been accused of being corrupt and only uses his power in favour of his Shia party, creating authoritarianism and sectarianism [39, pp.12]. He has played a major role in provoking internal conflicts by fuelling anger over injustice and enabling powerful and predatory leaders to buy their way out of accountability for crimes they have committed. Many also believe that his action was the ground of emerging ISIS in Iraq, via accelerating the disloyalty of citizens and extending he distance between Shia's and Sunni's of Iraq [39, pp. 24].

Deep fissures remain in public administration that is caused by corruption. Among all the sectors of government, the ministry of defence and the ministry of interior have been consistently reported to be the most influenced by corruption through the contracts and the procurements made for defence [40]. For instance, the Board of Supreme Audit estimates that US$1.4 billion was wasted in fraud and corruption in the Ministry of Defence in 2005 alone [41]. In 2008, former Integrity Commissioner judge Al-Radhi declared that corruption cases worth US$4 billion had been detected in the ministry of Defence, and $US 2 billion in the ministry of the Interior [41].

The *R -v- James McCormick* case of fake bomb detector illustrate a triggering example to which corruption can be dangerous in Iraq [42]. a British businessman and director of ATSC Ltd, who was found guilty of fraud and sentenced to ten years in prison for selling millions of useless devices to the Iraqi government[42]. The devices being fake, the ADE caused actual death and losses of limbs, because the Iraqi soldiers believed the devices worked and they used it at checkpoints to detect bombs [42]. That McCormick illicitly sold over 6,000 of the ADE devices by paying several millions of pounds to bribe at least 15 senior Iraqi officials, in order to sell the product to the Iraqi government [43]. In addition, a BBC news article says that the senior Iraqi officials who received the bribes were aware that the devices did not work; nonetheless, they purchased the devices [44]. The article also states that General Jihad al-Jabiri, who ran the Baghdad bomb squad, is in jail on corruption charges relating to the fake contracts [44].

Iraq has an ineffective army for providing both security and stability for its people. When ISIS invaded Mosul in the summer of 2014, the Iraqi army had around 30,000 soldiers and several hundred Federal Police stationed in the city, facing against only 800 members of the attacking force [45]. Katherine Dixon from Transparency International suggests that corruption helped ISIS to take over Mosul, that the terrorist group exploited corrupt states likeSyria,Libya and Iraq to facilitate their operations through smuggling and abusing the corruption of officials [46]. She alleges, many Iraqi senior officers, appointed due to their factional and sectarian loyalty rather than professional record that their attempts focused around getting personal fortunes, embezzling public resources [46]. By the moment the ISIS reached Mosul, Iraq's army existed only on paper (ghost solders) [46]. One of the 2,500-troop solders turned out to only be 500 men, many of them underfed and with salaries skimmed off by

their commanders, allowing commanders to pocket their pay [46].

U4 Anti-corruption Resource Centre releases a report in 2015, ‘’*U4 Expert answer’’*[4], addressing the issue of corruption in Iraq. The report alleges, misuse of power in Iraq benefited ISIS to invade some major cities in Iraq including Mosul [38, pp. 5]. In three ways it explains how corruption disseminated in Iraqi army First, nepotism allowed inexperienced generals to be given prominent roles, secondly corrupt procurement processes resulted in poor quality or non-existent equipment, thirdly the employment of ghost soldiers and payroll corruption and finally army generals sold military supplies on the black market which were then bought by militant groups such as ISIS [38, pp. 5].

1.6 Corruption prevails in the crisis in Iraq

Corruption in Iraq has not only contributed to the creation of humanitarian crisis, but it also aids the continuation of the crisis and imposes obstacles during the process of delivering the relief to vulnerable and affected people. When power is abused, the quality and effectiveness of humanitarian operations are reduced.

The corruption in the Iraqi Oil For food Programme (OFFP) is one of the leading case in this context.[5] It is the most highly prominent and embarrassing scandal, especially for the UN when its staff have gained corruptly from humanitarian response that were provided for poor Iraqi citizens [47, pp. 113]. The case starts in 2004, when the UN Secretary General, Kofi Anan, announced the formation of the Independent Inquiry Committee (IIC) in response to allegations by US, UN and Iraqi officials of illicit methods being used in the Oil-for-Food [48]. The IIC was established in order to investigate the corruption cases within the OFFP. The Committee was headed by Paul Volcker, and the Committee has issued two interim reports regarding the OFFP, focused specifically on allegations of mismanagement of the program by UN officials [48, pp. 14].

The IIC concluded that Kojo Annan, the son of Kofi Annan, intentionally abused the position of his father regarding his relationship with Cotecna, one of the contractors of the OFFP [48, pp. 14]. As well as the former Executive Director of the UN Office of the Iraqi Programme, BenonSevan, who corruptly benefited from his role in the OFFP [49]. The 2005 IIC report states that Sevan had solicited and received on behalf of African Middle East Petroleum Co. Ltd several million barrels of oil through the OFFP from 1990 to 2001 [48, pp. 28]. UN Secretary-General Kofi Annan has expressed shock at the IIC’s findings and has pledged to take disciplinary action against Sevan [48, pp. 24]. On the other hand, SadamHussain made an estimated $14 billion in illicit gain by selling oil and another $4.4 billion through kickbacks on humanitarian goods [47, pp. 116].

The armed conflict is could be the greatest humanitarian threat facing Iraqis. Since ISIS stepped in Iraq, nearly a third of Iraq's population is in need of emergency aid, meanwhile the Iraqi government is failing to provide basic essentials such as water, food, sanitation and shelter for up to eight million people, a report by Oxfam and NCCI says [50]. The reports added, 60 per cent from the four million Iraqi displaced people who cannot regularly buy enough to eat, currently have access to the Public Distribution System (PDS), and run by government. It also alleges that administrative corruption has weakened the efficiency of the distribution system that PDS only reaches a limited amount of the affected people[6] [50, pp. 9].

According to an article published on IRIN webpage, corruption is rooted within the Ministry of Displacement and Migration (MODM) have been forcing displaced families to pay bribes in order to receive government cash support [51]. The article suggests officials in Iraq are delaying payments earmarked for displaced families and attempting to take advantage of their positions by forcing IDPs to pay bribes [51]. Ahmed Al-Salamani, a Sunni lawmaker representing Anbar Province, and a member of the MODM said ‘MODM staff have been stealing the money and then telling the people that their names were not on the lists, or that they had already received the payment when they haven't [51]."

Regardless of kickbacks and bribery, corruption in Iraq could have a hand in the extension of humanitarian disaster in different pattern. Sometimes the fraudulent act refers to the NGOs or both the NGOs and political leaders in the country. In Kurdistan region of Iraq (KRI) for example, the National Democratic Institute (NDI) reported, in 2011, 57 percent of NGOs it interviewed in the KRI maintained partnerships with political parties [52]. As well, it was announced, that there are dozens of organisations and agencies focusing on "early marriage for girls" and most of these are implementing their own projects while the KRG simultaneously implements its own and the country is facing extraordinary of humanitarian crises at the same time [52].

V. CONCLUSION

Corruption is an authentic threat to the well-being of people. It does not only affect rule of law, democracy, development, good governance or minimizing the quality of life. Corruption alone is not a direct reason why refugees flee their countries, but it is one of the major causes of misery for individuals, including the humanitarian crises. It could damage the segments of countries

[4] U4 Expert answer is a study launches by U4 Anti-corruption Recourse Centre which is ‘a web-based resource centre for development practitioners who wish to effectively address corruption challenges in their work. U4 also runs in-country workshops and online courses on anti-corruption measures and strategies for our partner agencies and their counterparts. Finally, a Helpdesk service providing expert answers to the most pressing questions faced by development practitioners in the field is also available through *its+ website: About U4’ (U4 Anti-Corruption Resource Centre) <http://www.u4.no/info/about-u4/, [Aug, 14, 2017].

[5] After the invasion of Kuwait on 2 August 1990 by Iraqi army, the UN Security Council adopted the Resolution 687 in 1991, which provided for an international embargo on Iraq. Following, the entire country suffered from lack of food and medicine and the basic means for life. In 1995, the UN proposed the Oil-for-Food progamme OFFP to cope with this situation caused by the declining living standards in Iraq. The former Iraqi regime accepted the proposal, and the United Nations signed a memorandum of understanding on the programme on 20 May 1996.

[6] An interviewee by the International Organisation for Migration (IOM) between April and December 2006 demonstrates, 32 per cent reported that they had no access to PDS rations, 51 per cent reported receiving food rations only sometimes, while just 17 per cent reported that they always received them. In addition, many of those who received rations found that they were incomplete.

from being stable and secure, as well as limiting the response to save lives and alleviate the suffering of people in times of crisis.

Corruption and the abuse by the corrupt autocratic governments are the reason behind many conflicts, including the one in Iraq, where a tremendous number of the IDPs are present. In this frame, Iraq presents a clear-cut lesson. At the beginning, corruption attacked the top officials of the armed forces and the defence establishment in the country. Back in 2014, when ISIS invaded Mosul, Iraq had supposed to have thousands of soldiers on the ground, but none of them existed in reality. Due to corruption and favouritism the leaders were not successful in rebuilding Iraqi army in this area and were easily defeated by only a few hundreds fighters in Mosul during June 2014.

In addition, corruption also in Iraq has undermined the efforts by different actors and the international community to respond to the humanitarian crisis effectively. The capacities of Iraqi government and agencies are often stretched during emergency relief. Aid, frequently, has to be delivered partially in the absence of the rule of law, endemic corruption and immense needs. The OFFP case is absolutely is one of the good example, where different actors from UN, government and corporations bypassed the standard of aid measures.

The humanitarian situation in Iraq continues to deteriorate; in spite of, adopting various attempts by significant numbers of humanitarian NGOs to harmonize efforts against the crises. Instead, priority should be given to fight against corruption. Corruption, indeed, is the major source behind the suffering of Iraqi people. To ensure that such crises in Iraq will not take place again, global community and governments ought to promote transparency and address integrity and accountability in public admiration.

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Effects of Absenteeism on Students Performance

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Abstract- The research is all about the "EFFECTS OF ABSENTEEISM ON STUDENTS PERFORMANCE". Author was collected data from the department of Lahore school of Nursing "The University of Lahore" the total population of the department is N#170. 119 survey questionnaires were distributed to the students of the LSN department. Answers were collected on 5-Likert scale which was based on options; 1 for strongly agree and 5 for strongly disagree All female and male, below 20 years to above 30 years were included .They filled the questionnaire after consents. The results of findings show that there are three main factors or indicators which are badly affecting by absenteeism i.e. class participation .coordination of students with teachers and peers and the third is the Grades of students. Out of 119, 82 females and 37 male participant's opinions were recorded and it is concluded that 84.5% agree for the effects of class participation, 68.67% agree for the effects on student's coordination. 69.40%.agree for poor GPA. As shown in table (4.1, 4.2, 4.3) respectively. It is recommended that University should take effective measures in order to control the absenteeism. Attendance teams should recognize barriers of absenteeism and deal with them through interventions, such as work in partnership and find needs students. Attendance policy makers should provide incentives or rewards to motivate the students for the good percentage of attendance hence the academic outcomes of the students and the organization can become outstanding.

I. Introduction

Absenteeism a tendency to be away from work or school without a good reason: the perform or habit of being absent from work or school. (Merrimum.dictionary)

The students who are not come in schools, colleges and universities regularly and not attend the classes are called absent. Some students come in universities but not attend the classes also called absent. This habitual act of students is called absenteeism.

"Performance means the act of the point or the state of being performed." (The American Heritage® Dictionary).

According to my point of view performance is an action by which an individual fulfill the task which assign ourselves or assigned by others is called performance.

Although there are many factors which effect on students performance either related to personal life or educational setting but the effects of absenteeism on students performance is more prone to discuss. Indicator is defined as "A thing that indicates the position or level of something.''(Oxford dictionary). Indicators of poor performance low GPA, poor class participation, poor coordination among students. Regular attendance fulfills several important goals of higher education. It encourages the students to organize their thinking by comparing new ideas. It plays an important role in enhancing student performance because it helps the student to submit assignment on time, enhance collaboration among student, increase the test score of the student, improve the student GPA, increase the student confidence , increase their understanding of basic concepts, easily understand every point, student achieve greater understanding and improve coordination with teachers and peers. These problems can be overcome by improving the attendance and reducing the absenteeism.

Class participation includes **keenly participating in class** including being sufficiently prepared, discussion with class mate and teachers.

Student's class participation becomes affected due to absenteeism. The effects of absenteeism in class participation, miss the chance to become a part in class participate, can't raise questions about any confusion regarding topics. Can't clear the concepts, Poor participation in tutorial discussion; miss the chance of small group discussion within the class. They neglect much value able information which students can gain in class.

It leads to poor coordination with teachers, poor coordination with their class mates in their group studies. Also affect the performance of students especially when they are in a teamwork or group assignments and projects. Unable to update for their assignments, unable to take the guideline about preparing the assignments, Absenteeism leads the students to drop out graded activities. Poor performances in class quiz which lead to poor GPA. Unable to prepare and the assignments on due dates which badly effect the GPA of students. Poor performance during exams leads to poor GPA that's why they have to repeat the session or drop out from the university. This means that students

that miss their class will not have the opportunity to foster their learning and often compensated with poor grades.

Kamla Raj quoted in his article, Bowen (2005) have established that students who attend classes more regularly seem to be more successful in their studies than those who regularly absent.

In addition, students that attend class regularly are more likely to remember well the information and apply the knowledge effectively throughout their life (Crede, Roch&Kieszczynka, 2010).

Significance of research:

Research is conducted in the LSN department of the Lahore university and it was beneficial for the students who were habitual absent maker or late comers to assure them how the absenteeism badly affect their performance and future carrier .so that they became agree to improve their attendance and reduce absent rate hence they can able to get good grades andimprove learning abilities and their performance in study by attending the lectures regularly. It was beneficial for the students to make them punctual not only for lectures but also for their personal life and assure them to show outstanding performance in exams hence the outcomes of the organization became excellent.

Problem statement:

What are the effects of absenteeism on the students of LSN of The University of Lahore? This problem statement created various objectives of study which helped the author to accomplish the complete research.

Purpose of study:

The purpose of study is:

- To investigate the effects of absenteeism among students of LSN "The Lahore University
- To find the basic literature review regarding absenteeism among students
- To recommend the various possible solutions after the analysis

II. Literature Review

Kamla-Raj quoted in his article in 2011.Absenteeism is the most important factors which impact on the assembly line function in the development of administration of University. These absenteeism levels decrease the level of production because of work specialization. One analysis given that, absenteeism brings out hundreds of cases of negative impact on the building of future of students. Empirical evidences confirm that absenteeism produce the high level of problems and failure. There is decline in value of specialization among the students and significant decrease the achievements of students (Steyn& Van, 2002).

Kamla-Raj quoted in his article in 2011, Physical presence of student on discussion in class and learning performance of students' relationship is close relative. The only way of measuring the learning ability of students is class participation. In the units of learning of student, student and teacher relationship is one of fundamental unit in the class(Moore, Armstrong et al. 2008).

Due to absenteeism teacher have to reteach lesion take instructional time away from students those who attend regular classes. They spend extra time over absentee extra homework and class assignments. It is beyond the planning period of lecturers and time needed to provide individual assistance to students (Weller, 1996). Student miss valuable information when they are absent from classes. They also missed the interaction lecturer and benefits of specific examples which are used to clarify the difficult concepts. They valuable information cannot be repeated when teacher re-teach lecture to absent students (Williams, 2000).

Kamla-Raj quoted in his article in 2011, Absenteeism affects the abilities of students which can be reason of decreasing the grades and in the result of this the students may get failed and they have to repeat same year level. Performance of students becomes prominent and effective when they attend the classes on regular basis and it positive impacts on the performance. Student who are attending the classes on regular basis, they get higher grades and marks in the examination than those students who got absent from classes. Absenteeism leads the difficult effect on the performance. Once the student is absent from class, he or she will miss the opportunity to learn new techniques. If he missed the class there is chance of missing study material and misses the opportunity in the examination to get high grade. Students who attend the regular classes get high marks as compare to absent students (Sharma, 2005). There is a strong positive correlation between attendance and grades. (Moor, 2003)

Absenteeism at higher education level affects the learning process of the students as well. As the final result at the end of academic session. Lecture and tutorials provide a policy where students interact with the teachers, observe them and differentiate them as role models. Low attendance hence may affect this process and obstruct their professional growth. On the other hand the role of teachers in improving student's attendance in lectures cannot be denied. Good attendance is maybe the most important and direct sign of the student's perception of the effectiveness and usefulness of the lectures delivered. Teachers with good teaching skills deliver lectures which are organized and structured; have good communication skills which attract students and shows higher attendance rates .(hafeez 2014, Indiana: and Achievement 2014)

Kamla-Raj quoted in his article in 2011,the continue absenteeism or poor academic achievement among the students leads to drop out from the University. It is indicating by one author that absenteeism is act as crime which is more commonly among the student who got low grades, have spotted attendance and they dropped from class (Robbins and Coulter 2007)

It is also given by one author, students who missed the class on specific date, they are more likely to respond wrongly to question related to material covered in that day than those student who were present. It is given in the hypothesis that there is correlation between the students learning which had inquired empirically in educational literature. It is most surprisingly, there are inverse relation between the course performance and absenteeism in most of the studies (Marburger 2001).

Student miss valuable information when they are absent from classes. They also missed the interaction lecturer and benefits of specific examples which are used to clarify the difficult concepts.

They valuable information cannot be repeated when teacher re-teach lecture to absent students (Williams, 2000).
According to PNC rule learners are likely to maintain 100% attendance in all theory classes. However in cases of emergency/sickness learners may miss up to 15% (collective) of classes. If learners miss more than 15% (collective) per semester/term he/she may be asked to repeat the semester/term/year or be withdrawn/expelled from the programmed if theproblem persists. It is the responsibility of the learners to catch up for the missed inside of the class if absence is due to reasonable reason. (Curriculum PNC, 2006)

III. METHODOLOGY

Data Gathering:
Target population is all the students of LSN department of the Lahore University which are N#170 in numbers. The quantitative research methods using Likert scale was used in order to rate the effects of absenteeism on students performance. All the questions are closes ended which are 15 in numbers. Time limit for filling the questionnaire is 10-15 minutes. Further, author was collected the secondary data from journal articles, books, authentic websites, magazines, and archives. Co-relational study design is used and data is gathered by "random sampling".**Inclusion:** Both male and female students of LSN of age 18 or above will be selected to fill the questionnaire **Exclusion:** The students of other departments of UOL are excluded. **Variables:** There are two variables Absenteeism is an independent variable Student's performance is a dependent variable.

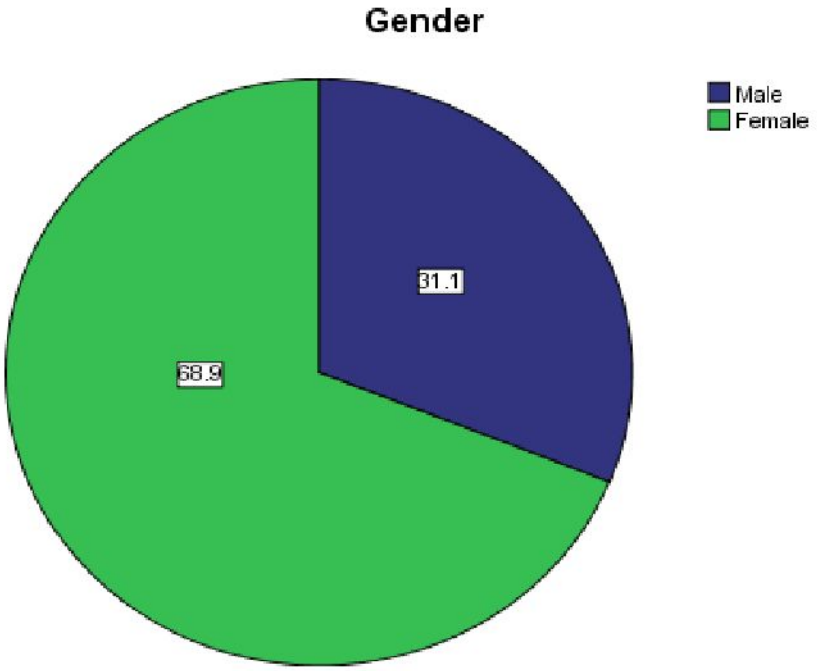
Data analysis:
The results of this study were based on literature review and the response collected from students and teachers through questionnaires. The response rate was appropriate in order to analyze the data. Data was analyzed in percentage response of respondents and using factor analysis.

Sample:
The sample size is n# 119.out of total population which was 170. The sample was calculated on 5% margin of error.

Research Ethics:
In this research author was maintained the high level ethical standards of research. Data was collected through the prior permission of respondents and the purpose of study was not kept hide from respondents. Further, it was ensured to respondents that the data will not use for any unfair means.

IV. ANALYSIS AND FINDINGS

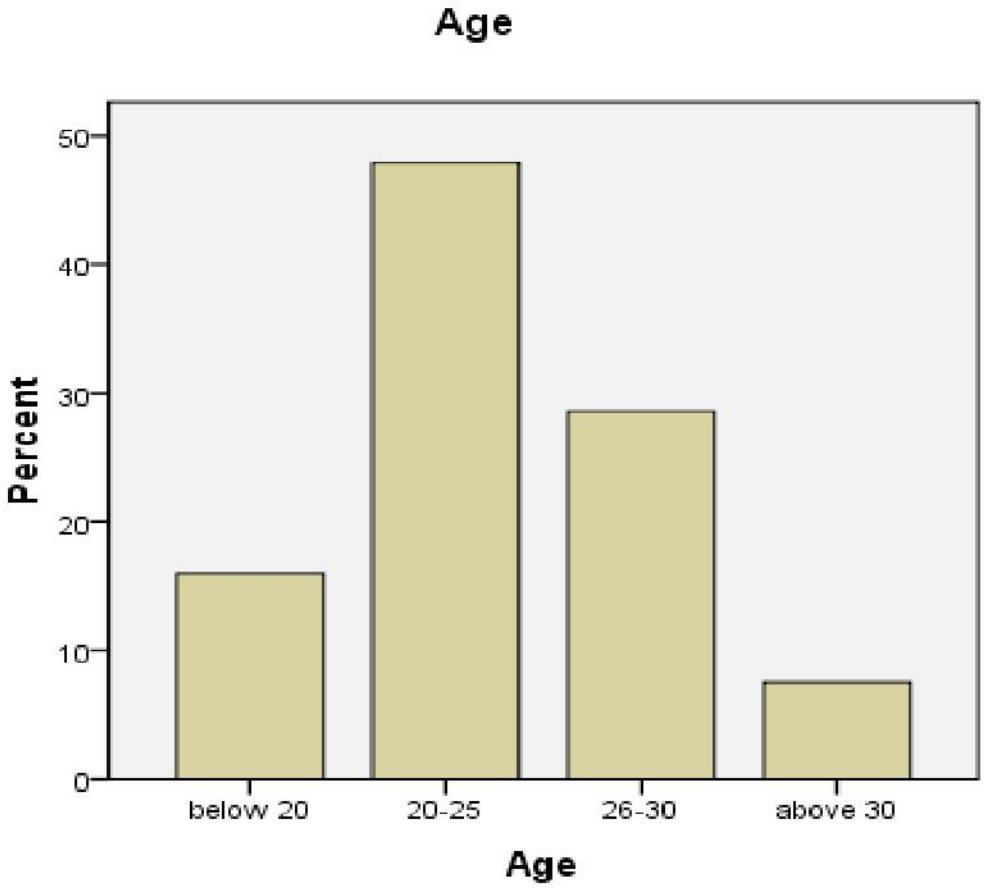
Analysis of demographic data
Gender:
The research which is conducted in LSN department 119 participants was included in The University of Lahore. Among them, male and female were 37 and 82. Male made up 31.1% of respondents and female 68.9%.Female respondent are more than male respondent. The gender analysis of respondents is depicted below. (Table: 4.1).



Age:

[1] **f i g 4**

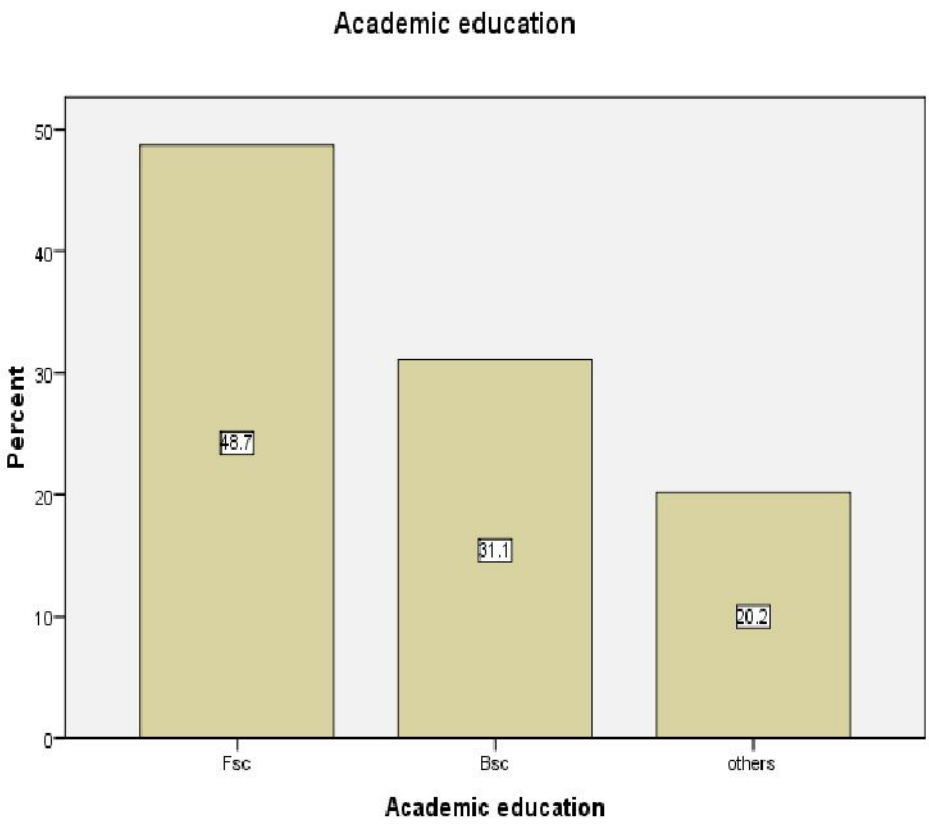
The range of students' age is between below20 to above 30 years. According to data received from students (Figure: 4.2) below analysis is found that the mostly selected sample was based on 21-25 years of age which are 57 in numbers (47.9%), then the second peak value is the range of age between 26-30 years which are 34 (28.6%), 19 participants (16%) are below the age of 20, and least value of correspondents are above the age of 30 (7.9%).



[2] F i g 4

Academic qualification:

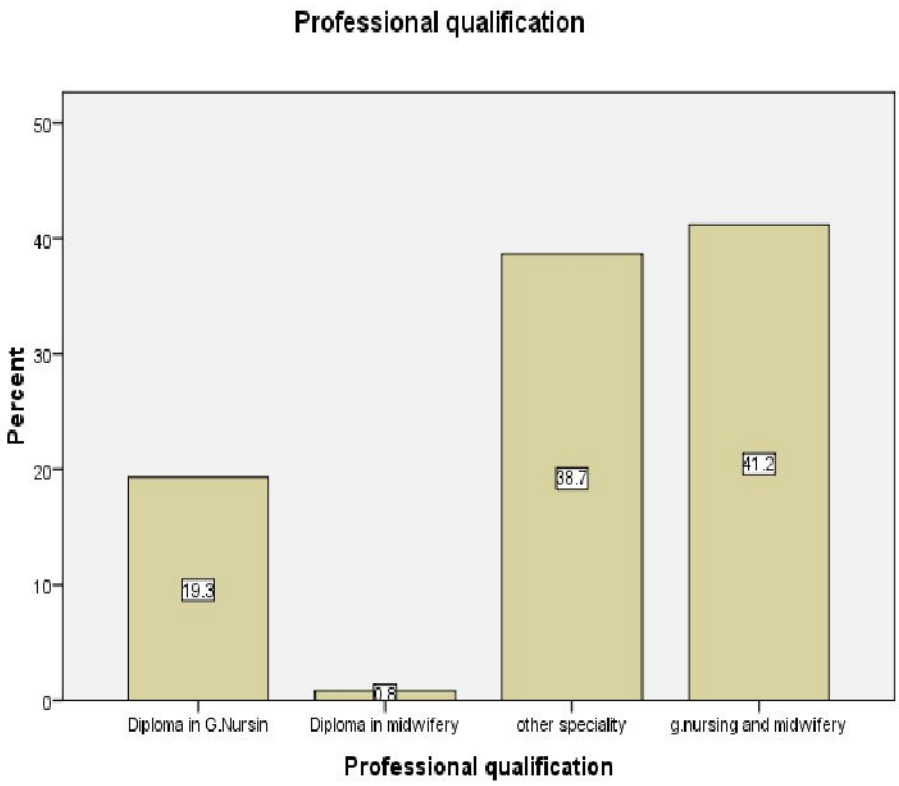
The participants of this research are 58(48.7%) having Fsc degree, 37 (31.1%) participants of BSc and 24(20.2%) are those who have other than Fsc and Bsc degree .as shown in table (4.1) (fig.4.3)



[3] Fig 4

Professional qualification:

The professional qualification of the participants are also differ as shown in below given chart and 5.1 table that 23(19.3%) participants are diploma holder , 1(0.8%) participant is having midwifery diploma,46 (38.7%) were having other specialty but 49(41.2%) participants were having both diplomas of G.Nursing and Midwifery.



[4] **Fig 4.4**

Table 4.1

S.NO		Frequency	Percentage
1	**Gender**		
	Male	37	31.1
	Female	82	68.9
	Total	119	100%
2	**Age**		
	Below 20	19	16
	21-25	57	47.9
	26-30	34	28.6
	Above 30	9	7.6
	Total	119	100%
3	**Academic qualification**		
	FSc	58	48.7
	BSc	37	31.1
	Others	24	20.2
	Total	119	100%

4	**Professional qualification**		
	G.Nursing	23	19.3
	Midwifery	1	0.8
	Other specialty	46	38.7
	G.Nursing and midwifery	49	41.2

Analysis on the effects of absenteeism on student's class participation
Frequencies as shown in table 4.2

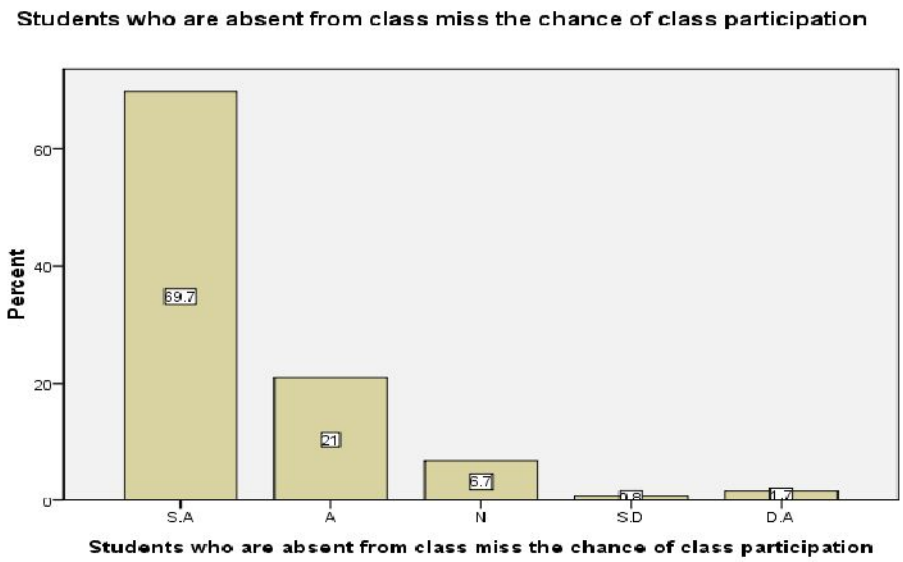


fig4.5

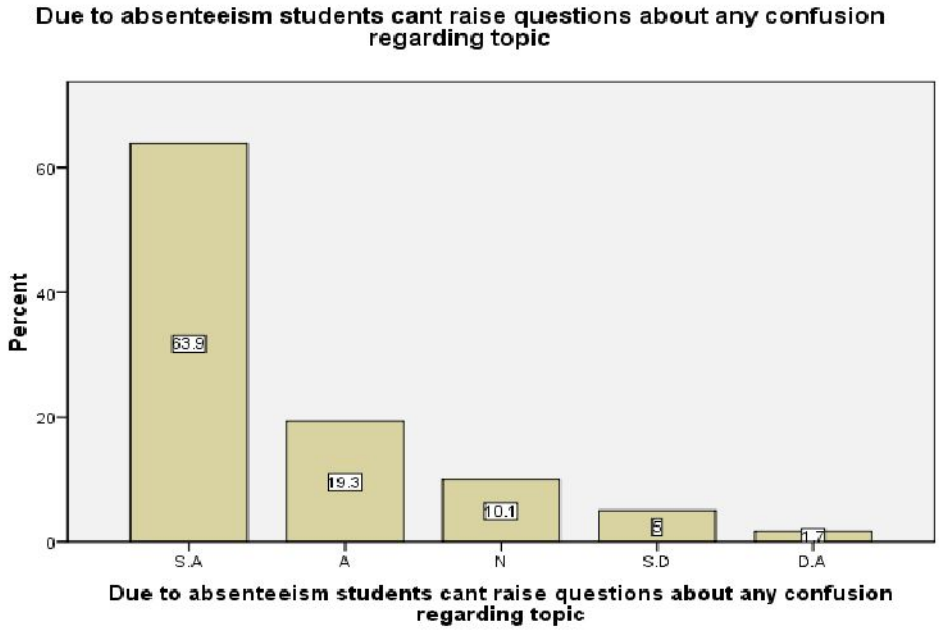


Fig 4.6

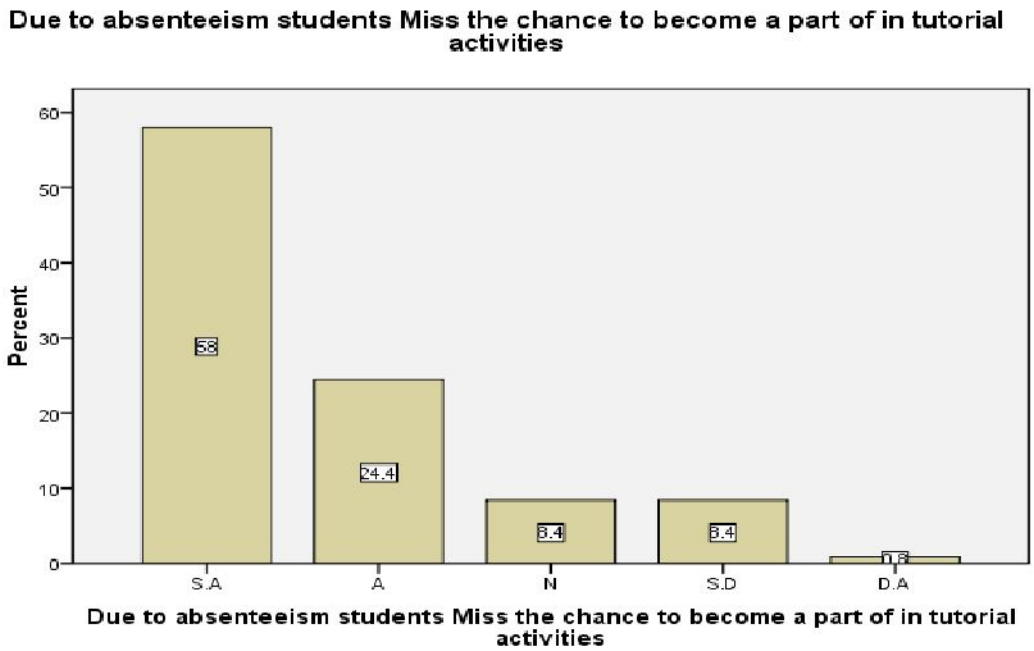

Due to absenteeism students Miss the chance to become a part of in tutorial activities
Percent
60
50
40
30
20
10
0
58
24.4
8.4
8.4
S.A
A
N
S.D
D.A
Due to absenteeism students Miss the chance to become a part of in tutorial activities

Fig 4.7

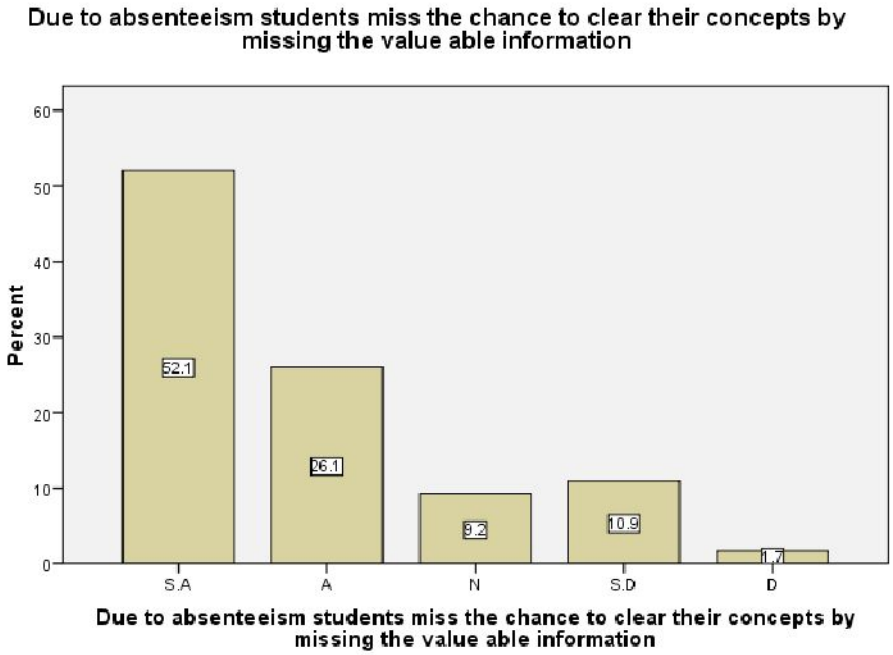

Due to absenteeism students miss the chance to clear their concepts by missing the value able information
Percent
60
50
40
30
20
10
0
52.1
26.1
9.2
10.9
1.7
S.A
A
N
S.D
D
Due to absenteeism students miss the chance to clear their concepts by missing the value able information

Fig 4.8

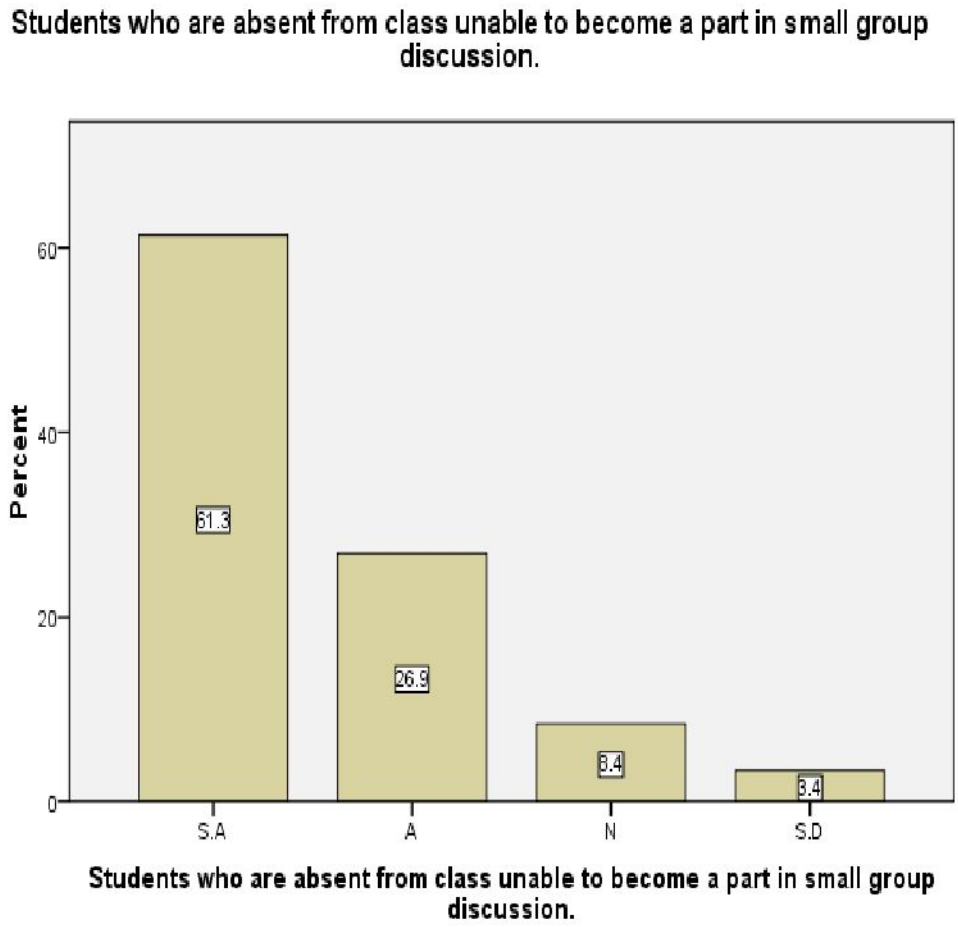


Fig 4.9

Further, Author was also received the various responses against questions which are depicted in table below:

Analysis of the effects of absenteeism on student's class participation

Table 4.2

Q.No	Questions	Response					Total
		S.A	A	N	S.D	D.A	
	Class participation						
1	Students who are absent from class miss the chance of class participation	83	25	8	1	2	119
2	Due to absenteeism students can't raise questions about any confusion regarding topic	76	23	12	6	2	119
3	Due to absenteeism students miss the chance to clear their concepts by missing the value able information	62	31	11	13	2	119
4	Due to absenteeism students Miss the chance to become a part of in tutorial activities	69	29	10	10	1	119

5	Students who are absent from class unable to become a part in small group discussion.	73	32	10	4	0	119
	Total frequencies	363	140	151	34	7	595
	Total percentages	61%	23.50%	25.30%	5.71%	1.17%	100%

Findings: After analysis it is found that the 61% are strongly agree that absenteeism has a significant effect on students class participation,23.5% are agree,25.3% have no idea of agree or disagree ,5.71% re strongly disagree and only 1.17% are disagree.

Analysis of the effects of absenteeism on student's coordination with teachers
Frequencies as shown in table 4.3

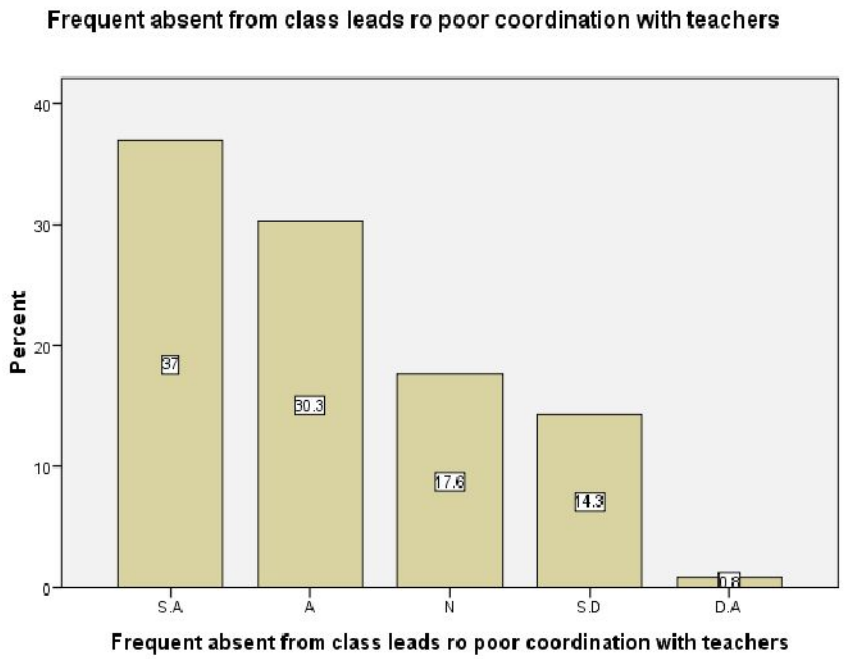


Fig 4.10

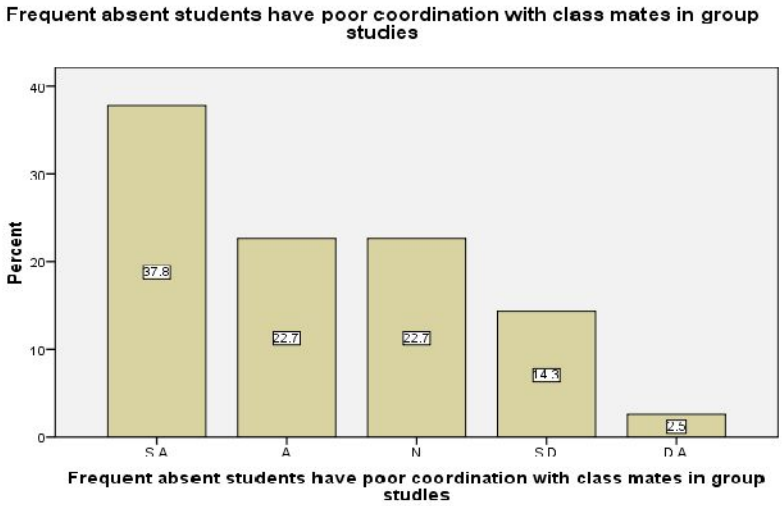


Fig 4.11

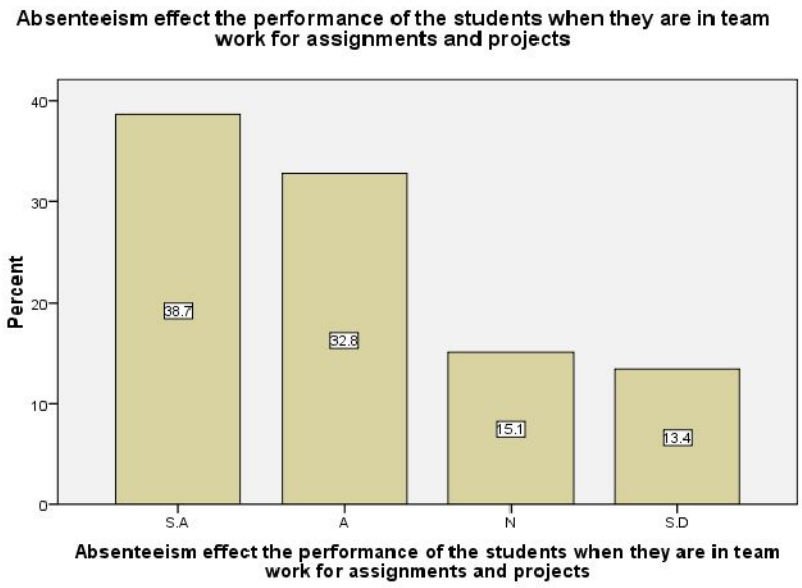


Fig 4.11

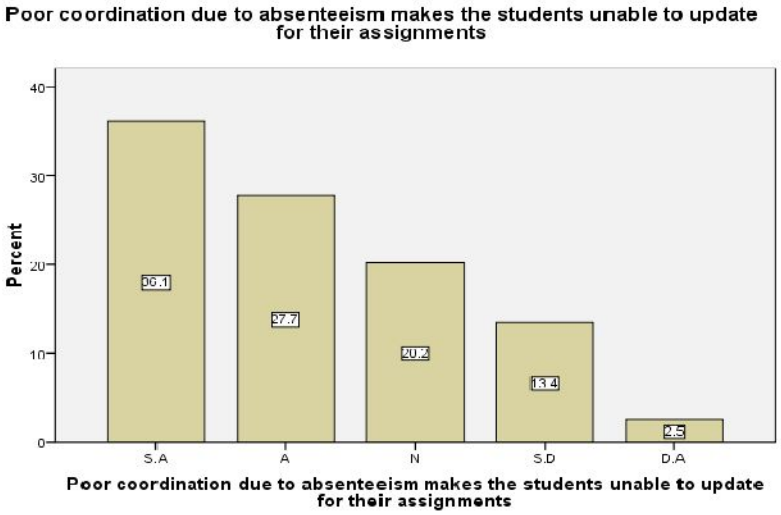


Fig 4.12

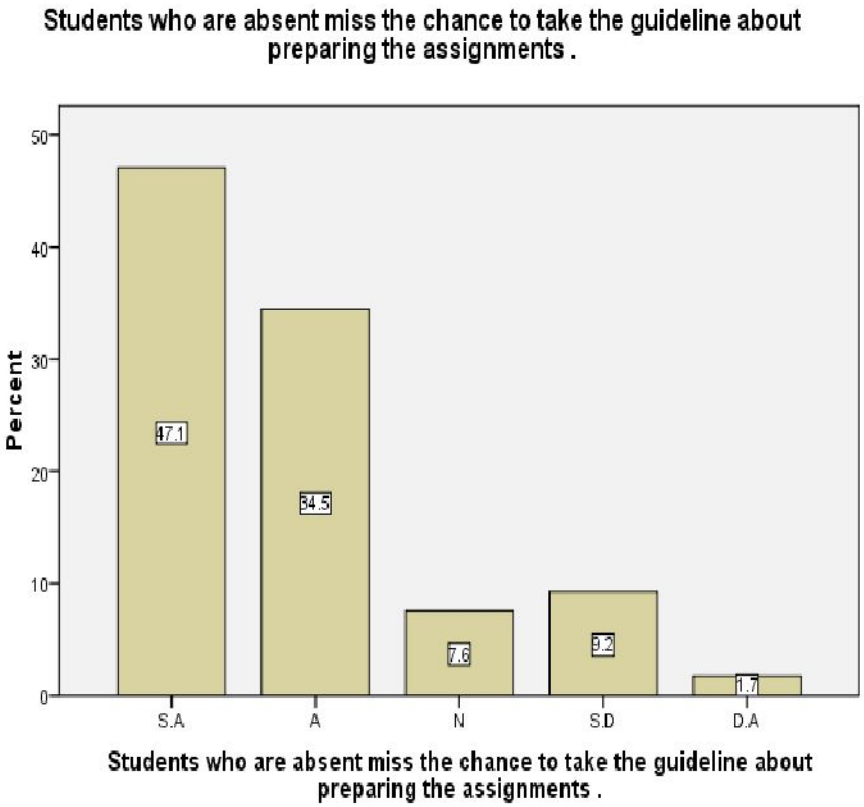


Fig 4.13

Analysis of the effects of absenteeism on student's coordination with teachers and peers
Table 4.3

	Coordination with teachers and peers						
6	Frequent absent from class leads or poor coordination with teachers	44	36	21	17	1	119
7	Frequent absent students have poor coordination with class mates in group studies	45	27	27	17	3	119
8	Absenteeism effect the performance of the students when they are in team work for assignments and projects	46	39	18	16	0	119
9	Poor coordination due to absenteeism makes the students unable to update for their assignments	43	33	24	16	3	119
10	Students who are absent miss the chance to take the guideline about preparing the assignments.	56	41	9	11	2	119
	Total frequencies	234	176	99	77	9	595
	Total percentages	39.3%	29.6%	16.6%	12.9%	1.5%	100%

Findings: Analysis showed that 39.3% participants are strongly agree and 29.57% are agree about the coordination of students with teacher and peers are affected by absenteeism .16.6% give neutral opinion that absenteeism may or may effect on coordination12.9% are strongly disagree and 1.5% are disagree that absenteeism do not affect the coordination of students with teachers and peers.

Analysis of the effects of absenteeism on student's GPA
Frequencies as shown in table 4.4

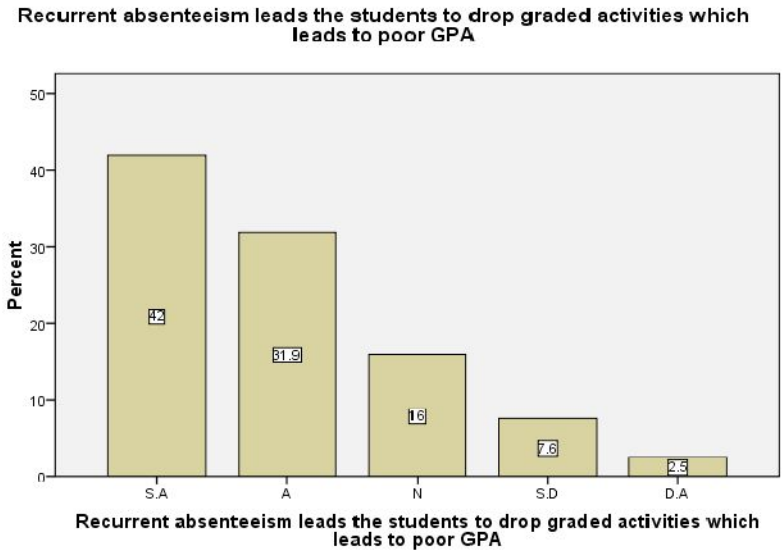


Fig 4.14

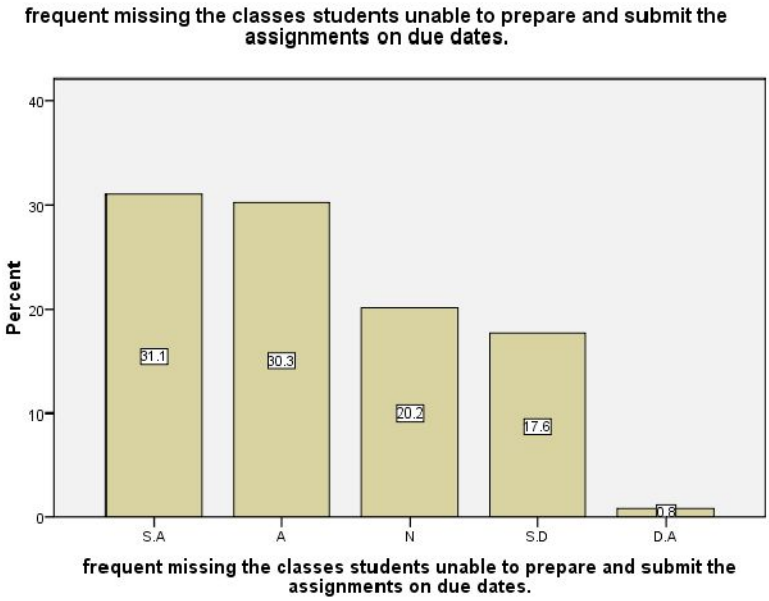


fig 4.15

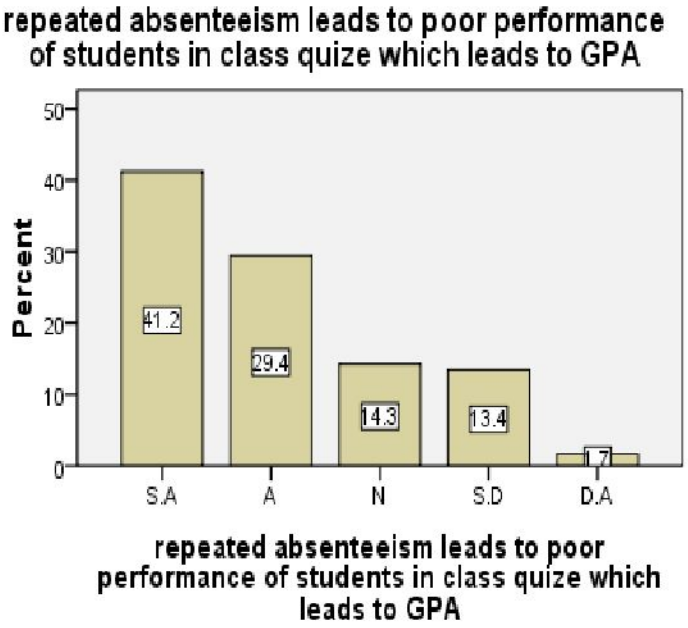


Fig 4.16

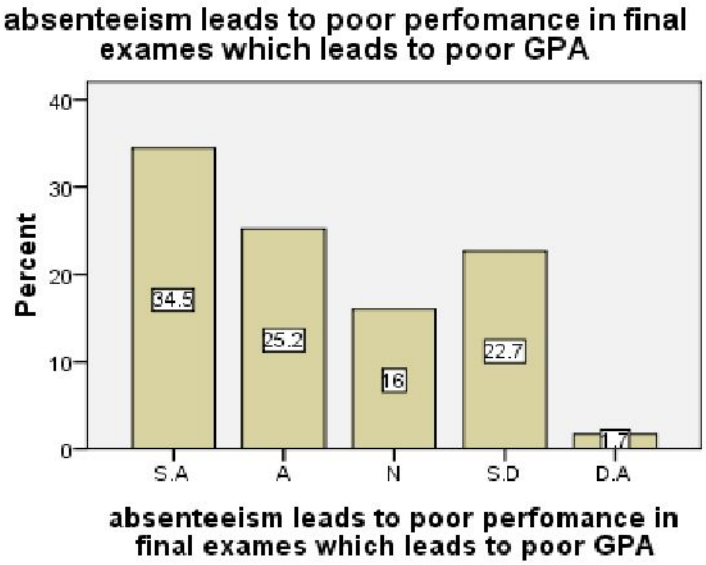


Fig 4.17

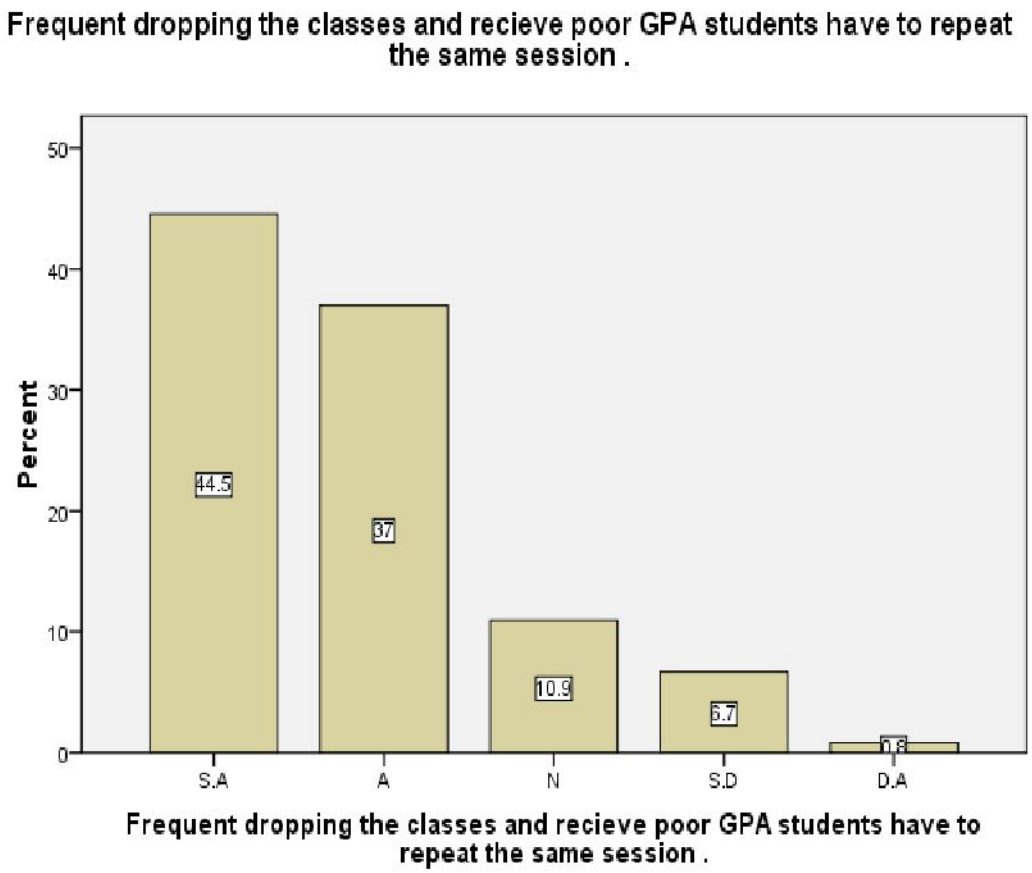


Fig 4.18

Analysis of the effects of absenteeism on student's GPA
Table 4.4

	GPA						
11	Recurrent absenteeism leads the students to drop graded activities which leads to poor GPA	50	38	19	9	3	119
12	Repeated absenteeism leads to poor performance of students in class quiz which leads to GPA	49	35	17	16	2	119
13	Frequent missing the classes students unable to prepare and submit the assignments on due dates.	37	36	24	21	1	119
14	Absenteeism leads to poor performance in final exams which leads to poor GPA	41	30	19	27	2	119
15	Frequent dropping the classes and receive poor GPA students have to repeat the same session.	53	44	13	8	1	119
	Total frequencies	230	183	92	81	9	595

	Total percentages	38.65%	30.75%	15.46%	13.63%	1.51%	100%

Findings:
After analysis it is found that 38.65% and 30.75% are respectively strongly agree and agree that absenteeism effect the students grades .15.46% replied that it may or may not affect the grades and 13.63% and 1.5% are respectively strongly agree and disagree about these effects.

V. CONCLUSION AND RECOMMENDATIONS/IMPLEMENTATION

From response of questions and findings, It is concluded that absenteeism effect on student performance. Student who became absent have poor class participation, poor coordination with teachers and peers and poor GPA. Student's class participation becomes affected due to absenteeism. The effects of absenteeism in class participation, miss the chance to become a part in class participate, can't raise questions about any confusion regarding topics. Can't clear the concepts. 84.5% participants are strongly agree that the absenteeism has effects on students class participation as shown in (table 4.2).
Also affect the coordination of student's and peers performance of students especially when they are in teamwork or group assignments and projects. Unable to update for their assignments, unable to take the guideline about preparing the assignmentsm. The ratio of respondents who are agree with this indicator is 68, 67% as shown in table 4.3.
Absenteeism leads the students to drop out graded activities. Poor performances in class quiz which lead to poor GPA. Unable to prepare and the assignments on due dates which badly effect the GPA of students. The percentage of agree and strongly agree response collectively is 69.40%. Therefore, author is concluded independent variable Absenteeism is strongly impacted on dependent variable on Student Performance.
Attendance matters for all students and this report has quantified the degree to which good attendance contributes to student success. (Spradlin, T.2012)
Late or absent trainee automatically mark as absent. Further, Lahore University also collects fine from absent students while this practice may make the students punctual. Student population agreed that students perform fairly in class room if they go through consistent truancy further; they agreed that absenteeism contribute to low level of achievement. It has also been found from literature that absenteeism effect student's ability to learn, achieve, and perform in the examination (Sharma, 2005).
University has a need to apply the strict measures for attendance control and further, make the attendance system online through re-structuring the old attendance system. The implementation of online attendance measures. The expert career counselors can better guide and understand the absenteeism related problems of students and performance. However, in this stage class teachers and Head of the Department should cooperate with each other in order to cope with absenteeism. Universities should also change the methods to improve the quality of course and strength of interpersonal relation between the students and teachers(Fayombo, Ogunkola et al. 2012).
Attendance teams should identify barriers to attendance and address them through interventions, such as partnering (collaborating) with community organizations to address needs of families and students.
Administrators should work closely with classroom teachers to identify students with a pattern of absence and collaborate wTeachers should strive to create a rich, engaging, and safe classroom environment for students, so they are excited about attending school. with one another to identify barriers to attendance and provide early intervention.Spradlin, T., Cierniak, K., Shi, D., & Chen, M. (2012).
Attendance policy makers should provide incentives or rewards, such as recognition certificates, and prizes or gifts cards donated by the community, to students with good attendance.Spradlin,T.,Cierniak, K., Shi, D., & Chen, M. (2012).

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AUTHORS

First Author – Naila Khalid

"Effects of Absenteeism on the Students Performance"

Consent form

I am Naila Khalid student of BSN Post RN is going to conduct the research on the effects of absenteeism on students performance in University of Lahore LSN Department. Questionnaire consists of 15 close ended questions. Your answers will be written and then used for analysis. All information you provide will be handled as Confidential and your individual answers will not be known, excepting the interviewer and the coordinator of this study.

It will take 10 to 15 minutes

Will you participate in this study?

a. Yes b. No

Signature of participant: ----------

Demographic data:-

Sex: **1)** Male **2)** Female

Age (in years): **1**) Below20 **2)** 20-25 **3)** 26-30 **4)** Above 30

Academic education: 1) Fsc 2) BSc 3) others

Professional qualification:

1) Diploma in General Nursing 2) Diploma in Midwifery 3) Other specialty 4) both 1, 2

Measuring Scale:

1= strongly Agree (SA), 2= Agree (A), 3= Neutral (N), 4= strongly disagree (SD), 5= Disagree (DA)

Questionnaire for Students

The questionnaire is a part of the study at "the University of Lahore" LSN students. Please fill and return it.

ü Please tick inside the box.

Sr. #	**Descriptions**	1	2	3	4	5
		Strongly Agree	**Agree**	**Neutral**	**Strongly disagree**	**Disagree**
	Class participation					
1	Students who are absent from class, miss the chance of class participation.					
2	Due to absenteeism students can't raise questions about any confusion regarding topics					
3	Due to absenteeism students miss the chance to clear their concepts by missing the value able information.					

4	Students who are frequently absent not able to become a part in class activities like tutorials.					
5	Student who are persistent absent from class miss the chance of small group discussion within the class					
	Coordination among peers and teachers:					
6	Recurrent absent from class leads to poor coordination with teachers.					
7	Frequent physically absent students have poor coordination with their class mates in their group studies					
8	Frequent absent from class effect the performance of students especially when they are in a teamwork or group for their assignments and projects					
9	Due to poor coordination student are unable to update for their assignment					
10	Due to absenteeism and poor coordination lead to miss the chance to take the guide line about preparing the assignments according to guideline.					
	GPA					
11	Recurrent absenteeism leads the students to drop out graded activities.					
12	Repeated dropping the classes lead to poor performance in class quiz which lead to poor GPA					
13	Frequent dropping the class students unable to prepare and the assignments on due dates which badly effect on the GPA of students					
14	Absenteeism leads to poor performance during exams which lead to poor GPA.					
15	Frequently dropping the classes and receiving poor GPA students have to repeat the same session.					

A Study of Selected Kenyan Anthill Clays for Production of Refractory Materials

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[2]*Department of Chemical & Processing Engineering, Moi University*
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Abstract: Refractories are essential for all industrial processes using elevated temperatures. They play a triple role of providing mechanical strength, protection against corrosion and thermal insulation. The essential goal in the development of refractories is to obtain a useful lining life that will provide maximum furnace availability for the operators to meet production requirements at the lowest possible cost. High quality refractory at a cheaper cost is the main requirement. The aim of this study was to find out the possibility of using Kenyan anthill, as a major raw material in the production of refractory linings. Anthill clay has not been utilized in Kenya. Anthill clay was collected from Cheptebo, in the rift valley, crushed, sieved and the chemical composition determined. The samples were moulded into rectangular shaped bricks of 40mm height, 40mm width and 80mm length, allowed to dry and later fired up to a temperature of 1000^0c. Refractory properties like Compressive strength, Hardness, Linear shrinkage on firing, Apparent porosity and Density were determined. The result of chemical analysis indicated that the clay was composed of Silica (SiO_2), 52.18%; Alumina (Al_2O_3), 15.79%; Iron Oxide (Fe_2O_3), 9.41%; Calcium Oxide (CaO), 4.30%; Potassium Oxide (K_2O), 2.30%; Sodium Oxide (Na_2O), 2.81%; and other traces. The chemical analysis suggests that the clay deposit is mainly made of kaolinite and free quartz. The physical and mechanical tests show that the bricks had Cold Crushing Strength of 6,019kPa, Hardness of 17.81GPa, Linear shrinkage of 8%, Apparent Porosity of 35.21% and Bulk Density of 2.46g/cm^3. Anthill clay can make better local refractory raw materials.

Keywords: Refractory, Anthill clay, cold crushing strength, hardness, density, porosity

1.0 INTRODUCTION

A refractory material retains its mechanical characteristics and inertness at high temperatures. [1] defined refractories as materials which have the ability to withstand high temperature without breaking or deforming. Any material can be described as a 'refractory', if it can withstand the action of abrasive or corrosive solids, liquids or gases at high temperatures. Refractory materials are used in linings for furnaces, kilns, incinerators and reactors. Depending on the operating environment, they need to be resistant to thermal shock and have specific ranges of thermal conductivity and coefficient of thermal expansion. The ability to withstand exposure to heat above 538 ^oC is the critical distinction separating refractory from other ceramics, fibres and coating applications at only lower temperature [2].

[3], reported in his work on refractory properties of termite hills under varied proportions of additives that over 80% of the total refractory materials are being consumed by the metallurgical industries for the construction and maintenance of furnaces, Kilns, Reactor Vessels and Boilers. The remaining 20% are being used in the non-metallurgical industries as cement, glass and hard ware.

The basic functions of refractory materials according to [4] are;

1. To ensure the physical safety of personnel and installations between the hot material (the processed product) and the outer shell of the processing tool and
2. Reduce heat loss.

The more important characteristics which are required of a refractory are [1]:

a) High melting point or high refractoriness, which is closely related to thermo-chemical stability.
b) Mechanical strength at high temperature in terms of high refractoriness under load, high thermal shock resistance, low thermal shrinkage, low porosity and permeability.
c) Resistance to chemical attack in the particular situation in which it is used, for instance, high resistance to corrosion by slag.

Most refractory materials are made from naturally occurring high melting point oxides. They include silica (SiO_2), Alumina (Al_2O_3), Magnesia (MgO), Chromium oxide (Cr_2O_3), Zirconia (ZrO) and iron oxide (Fe_2O_3). They are either used in natural form without any formal processing or in roasted condition [5].

It is unfortunate that despite vast clay deposits in Kenya, the Country‘s metallurgical industries still depend on imported refractories to meet local consumption and as a result, a lot of hard earned foreign currencies are spent in the process.

Clay is a naturally occurring material composed primarily of fine grained particles of hydrous aluminium silicates and other minerals which show plasticity through a variable range of water content and can be hardened when dried or fired. It is also impermeable when in contact with water [6].

Basically, an anthill is a pile of clay, sand, or earth, or a combination of these materials that are excavated by the ants in the process of digging. The colony is built and maintained by an army of worker ants. These worker ants carry minute bits of earth and deposit them outside of the exit hole so that the particles do not slide back into the nest. Some variety of ants actually design and construct the anthill to specific shapes to create chambers for their various functions and purpose within the anthill. These robust structures have survived heavy rains, cyclones, sun and other adversities of nature for decades and stand tall and brave for our admiration [7].

Figure 1: Anthill

According to [8], an anthill (Figure 2) is a pile of earth, sand, pine needles or clay or a composite of these and other materials that build up at the entrances

of the subterranean dwellings of ant colonies. An ant colony is an underground lair where ants live.

[7] investigated the suitability of ant hill clay as a source of ceramic raw material in Ghana. The results showed that the ant hill clay is suitable as a ceramic raw material.

2.0 RESEARCH OBJECTIVES

General Objective

To investigate the potential of anthill clay for use in the production of refractories.

Specific Objectives

1. To carry out chemical analysis of the clay under study.
2. To prepare brick samples out of the anthill clay.
3. To determine the physical and mechanical properties of the prepared samples.

3.0 MATERIALS AND METHODS

3.1 Raw material and Sample Preparation

The production of refractories begins with processing raw material. Raw material processing involves drying, crushing, grinding and determination of the Chemical Composition.

The raw materials (clays) were initially air dried and then later oven dried at 105^0C to ensure that all the moisture had been removed.

The raw materials were then crushed using a pestle and mortar until a suitable ratio for coarse particles to fine particles was achieved

The chemical composition of the clay sample in percentage weight (wt %) of SiO_2, Al_2O_3, Fe_2O_3 and other oxides was examined using Atomic Absorption Spectrophotometer (AAS), which was carried out at Ministry of Mining Research Laboratories Center, Nairobi, Kenya.

3.2 Development of the refractory from the raw materials

This involved the actual production of refractory from the collected raw materials to the final shaped (formed) product.

1. **Mixing**

The ground particles were thoroughly mixed. This was done for two purposes;

i) For even distribution of the coarse and fine particles

ii) For making moulding easy

2. **Moulding**

The brick samples were formed into the required shape and size with the aid of a wooden box type of mold which could produce three samples at one go. The test pieces of the refractory materials were made into rectangular shapes of dimension 8.0x4.0 x 4.0 cm in a mold and compacted under a hydraulic pressure of 350kN/m^2. 350kN/m^2 was determined as the optimum hydraulic pressure necessary from the work of [9].

3. **Drying**

The molded refractory was dried to remove its moisture. Drying was regulated so that neither voids are left in the refractory nor the refractory is shrunk to produce internal stresses. Drying was carried out very slowly and under particular set of conditions of humidity and temperature.

The sample bricks were air dried until when they were physically seen to be dry. This process undertook two months. From the drying floor the samples were then put in an oven operating at 105°C for twelve hours to remove all the remaining moisture.

4. Firing

The dried refractory was burnt for vitrification and development of stable mineral forms. In this step the already dried bricks were passed through a furnace at a controlled temperature over a certain fixed duration. The samples were fired at a temperature of 1000^{0}C. At this temperature, the soaking time was six hours (6hrs). This is according to [10] work.

3.3 Testing of the brick samples to establish their stability characteristic properties.

3.3.1 Apparent porosity Test

Porosity of a material is defined as the ratio of its pores volume to the bulk volume. Thus porosity is an important property of refractories because it affects several other characteristics like strength, abrasion resistance, thermal conductivity and chemical stability. Porosity decreases the strength, thermal conductivity, resistance to abrasion and resistance to corrosion. On the other hand, it increases the penetration of slags, molten charge and/or gases into the refractory material and resistance to thermal spalling (thermal shock resistance). Therefore, in general, a good refractory should have lower porosity.

The apparent porosity, sometimes referred to as open porosity, is a measure of the open or interconnected pores in a refractory. The apparent porosity is determined by the volume of liquid which was absorbed by the pores when the specimen is boiled in vacuum conditions, and when the material is saturated in water.

According to [11], the porosity of a refractory has an effect upon its ability to resist penetration by metals, slags and fluxes and, in general, the higher the porosity, the greater the insulating effect of the refractory.

[12], also states that porosity and pore size distribution of a refractory will influence its thermal conductivity, in that, more porous refractory translates to a more insulating refractory.

This experiment was performed according to [13], whereby dry specimens were put in an oven maintained at a temperature of 110^{0}C till it attained a substantially constant mass (with an accuracy of 0.01grams). The weight of the specimen (W_1) was recorded after cooling it to room temperature. The dry specimens were then immersed completely in water at atmospheric temperature for 24 hours. The specimens were taken out of water and wiped out with a cloth before being weight. The weight after removal from water was let to be, W_2.

The respective dimensions of the samples were measured using a vernier caliper. The dimensions were then used to calculate the sample volume (V).

The apparent porosity per cent, after 24 hours immersion in cold water is given by the relation;

$$\text{Apparent porosity, } P_A = \frac{W_2 - W_1}{V} \text{ X } 100$$

Where: W_1 and W_2 is the weight of the absolutely dry specimen and the weight of the same specimen saturated in water [g], and V is the volume of the specimen [cm^3] [14].

Volume=length X width X height

3.3.2 Bulk density

The bulk density (BD) is the amount of refractory material within a volume (kg/m^3). An increase in bulk density of a given refractory increases its volume stability, heat capacity and resistance to slag penetration. Bulk density is the ratio weight or mass to volume and it is expressed in pounds per cubic foot or kilograms per cubic meter [15].

[11], also defines bulk density as a measure of the ratio of the weight of a refractory to the volume it occupies.

According to [12] report, the simplest way of measuring Bulk Density for uniform rectangular refractory shapes is by dividing Dry Weight by Bulk Volume which is calculated from measured dimensions. Density, porosity and permeability measurements show whether a body is fully dense, and whether therefore it can be expected to stand up to aggressive slag attack and/or penetration by process gases.

The air dried specimens were further oven dried at 110 ^oC, cooled and weighed to the accuracy of 0.01 in order to determine their dried weight (DW). The respective dimensions of the samples were measured using a vernier caliper. The dimensions were then used to calculate the sample volume (V).

The bulk density was calculated from the equation proposed by [16].

$$\text{Bulk density, BD} = \frac{DW}{V}\ g/cm^3$$

Where, DW = Dried Weight V = Volume

Volume=length X width X height

3.3.2 Cold crushing strength

Cold crushing strength is the resistance of the refractory to compressive loads. As per [17], a cold crushing strength test is used to measure the cold strength of a brick. It is used to show whether or not the brick has been properly fired. This test, generally a quality control check, also indicates whether the brick will damage to corners and edges in transport. Cold crushing strength is the maximum load at failure per unit of cross-sectional area when compressed at ambient temperature.

The dried test bricks produced from the anthill clay, were oven dried at a temperature of 110 ^0C for 12 hours. It was then cooled to room temperature. The specimen was then taken to the compressing test machine where load was applied until cracks were noticed. The load at which the specimen cracked was noted, which represents the load required for determining cold crushing strength of the test specimen.

The test was carried out in accordance with [18]. Cold Crushing Strength was then calculated using Equation;

$$\text{CCS} = \frac{Maximum\ \ load\ \ (kN)}{Cross-sectional\ \ area\ \ (m^2)} = \frac{P}{A}$$

Where, CCS = Cold Crushing Strength P = Applied Load A = Area of Load Applied

A good refractory material must possess high mechanical strength to bear the maximum possible load without breaking.

3.3.2 Linear shrinkage

Linear shrinkage represents the permanent change that the refractory shapes undergo on heating or after reheating under a given set of conditions. The drying of clay is always accompanied by shrinkage. As the film of water between the clay particles is drawn off by evaporation the particles draw closer together to close up the interstices. The effect of this action is the shrinkage of the entire mass of clay.

To determine the fitness of a particular brick for service, it is often tested tor shrinkage under temperature conditions equivalent to those which it would receive in use. This is done by first determining the length or volume of the brick by measurement and then subjecting it to a prolonged heating at the desired temperature. After the brick has cooled, it is again measured and the length, volume and shrinkage determined.

A slanted line of length 6cm was inserted horizontally on each piece and recorded as (L_1). The test pieces were then placed inside the furnace and fired up to 1000°C and the line drawn across the horizontal axis of the pieces was measured to determine its final length (L_2) after firing. The linear shrinkage of the materials was determined with equation;

$$\text{Linear shrinkage (\%)}, = \frac{L_1 - L_2}{L_1} \text{ X } 100$$

The test was carried out in accordance with [19].

3.3.3 Hardness test

Hardness is a characteristic of a material, which can be defined as the resistance to indentation, and it is determined by measuring the permanent depth of the indentation. Measuring the hardness of a ceramic is important and this is usually done using an indentation test. The basic idea is that a permanent surface impression is formed in the material by an indenter. The actual or projected area of the impression is then measured. The hardness is then determined by dividing the applied force, *F*, by this area [20].

In this study, hardness was determined using the Brinell method. The Brinell method applies a predetermined test load (F) to a carbide ball of fixed diameter (D) which is held for a predetermined time period and then removed. The resulting impression is measured across at least two diameters – usually at right angles to each other and these result averaged (d).

In this experiment, the indenter diameter (D) used was 5mm and the test force (F) was 1kN.

Typically, an indentation is made with a Brinell hardness testing machine and then measured for indentation diameter in a second step with a specially designed Brinell microscope or optical system. The resulting measurement is converted to a Brinell value using the Brinell formula or a conversion chart based on the formula.

Equation below illustrates the formula used to obtain the Brinell value.

$$HB = \frac{0.102F}{0.5\pi D(D-\sqrt{(D^2-d^2)})} \text{ N/m}^2$$

Where F = Force, D=Ball Diameter, d = diameter of indentation.

at a constant force of 1kN,and a ball diameter of 5mm

4.0 RESULTS AND DISCUSSION

The results from the experimental work are given in tables 1 and 2. From table 1, it is evident that anthill clay has silica and alumina as the predominant substances and it could be concluded that it is siliceous in nature and is of the Alumino-silicate family.

The sample has high silica content well above the ideal 46.51% for clay which makes it be able to withstand fairly high temperatures [6]. From [21] report, the silica content of anthill satisfies the standards for the manufacture of refractory bricks and high melting clay with values 51.70 and 53-73% respectively; but below the range for the manufacture of ceramics and glass formulation.

The alumina (Al_2O_3) content of the sample is not high and is about 16%. This means that, the value falls below the standards required for the manufacture of ceramics, refractory bricks, paper and paints. However, the anthill clay can still be used to manufacture high melting clay and alumino-silicate fiber glasses since they require 16-29% and 12-17% of Aluminium Oxide respectively as reported by [21].

The sample clay has a fairly high iron content (Fe_20_3) which makes it fire terracotta red (brick red) color on firing [9].

The Loss on Ignition of the anthill clay (LOI) was determined as the percentage of moisture loss to ignition on firing. This represents the amount of moisture the clay material could hold or percentage weight reduction of the soil sample which may probably be a reflection of its grain structure and fineness. Following the report by [21], the loss on ignition of the sample falls within the standard range for the production of ceramics, refractory bricks and high melting clay. [22] suggests that the loss on ignition values, are required to be low in order to reduce on the effect of porosity on the final products.

The physical test results of anthill clay showed an apparent porosity of 35.21% which according to [23], qualify to be used as refractory firebricks.

The bulk density of 2.4 g/cm^3 was obtained which according to [24] makes them qualify to be used as fireclay refractories.

The Cold crushing strength of the anthill bricks obtained was 6018.73 Kpa. This value falls within the standard range for the manufacture of thermal insulators as given by [25]. According to Kumar, the standard range is 981-6867kPa.

Table 1: Chemical composition analyses of Anthill clay compared with standard clay for industrial applications [21].

Composition	Anthill Clay	Ceramics	Refractory Brick	High melting clay	Glass	Paper	Paint
SiO_2	52.19	60.5	51.7	53-73	80-95	45-45.8	45.3-47.9
Al_2O_3	15.79	26.5	25-44	16-29.0	12-17.0	33.5-36.1	37.9-38.4
Fe_2O_3	9.41	0.5-1.2	0.5-2.4	1-9.0	2-3.0	0.3-0.6	13.4-13.7
CaO	4.30	0.8-3.0	0.1-2.0	0.5-2.6	4-5.0	0.03-0.6	0.03-0.6
K_2O	2.30	-	-	-	-	-	-
TiO_2	1.13	-	-	-	-	-	-
CuO	-	-	-	-	-	-	-
V_2O	-	-	-	-	-	-	-
LOI	9.77	8-18.0	8-18.0	5-14.0	-	-	-

According to [22], the total percentage shrinkage for standard fireclay and siliceous refractories are supposed to be ranging between 4-10%. The total percentage shrinkage value obtained from the brick samples was 8% thus falling within the acceptable range.

The hardness value obtained from the fired anthill bricks was 17.81GPa which falls between the highest and least hardness values for ceramics as given by [20]. It is reported that MgO has the least hardness value of 3.63GPa while Diamond is the hardest with a value of 78.48 GPa.

Table 2: Physical and Mechanical test results

Sample description	Tested properties				
	Apparent Porosity (%)	Bulk Density (g/cm3)	Cold Crushing Strength (kPa)	Linear Shrinkage (%)	Hardness (GPa)
Anthill Brick	35.21	2.4	6018.73	8	17.81

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

An experimental study was conducted to investigate the suitability of Anthill clay as industrial raw material for making refractories in view of their chemical, mechanical and physical properties.

The results of the chemical analysis showed that the clay contain aluminum oxide (Al_2O_3) and silica (SiO_2) as major constituents making it suitable as alumino-silicate refractory material.

The batch samples passed through the experimental tests to determine their refractory properties in terms of mechanical and physical behaviors showed that the selected raw material (clay) can substitute for the imported refractories either as thermal insulators or as service refractory linings (bricks). The cost of refractories will also reduce since they can be obtained locally.

The chemical composition results also suggested that the clay is found to be a source of local raw materials for the production of refractory bricks and high melting clays.

The results of the investigation will be very useful and serve as a database for prospective investors and managers of metallurgical industries.

It can therefore be concluded that Anthill clay can substitute for the imported refractory raw materials.

5.2 Recommendation

The clay under study, that is, anthill, has not been identified in Kenya for the production of refractories. Thus if this clay is exploited and harnessed, it will no doubt provide an internal source of raw materials.

There is also the need for geological survey to determine the extent of the deposits.

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Crisis Leadership in Ethiopia: A Comparative Analysis on the 1989 Coup D'état and the Post-2016 Protracted Political Instability

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Abstract- This article provides a comparative analysis on the post-1974 crisis leadership of Ethiopia. For this purpose, the 1989 coup d'état and the post-2015/16 protracted instability were selected. Methodologically, descriptive analysis has been employed based on the data gained from an array of secondary and primary sources of data. The 1989 coup was plotted by the military chiefs of the armed forces against Mengistu Hailemariam`s regime. The regime had considered this crisis as a threat. As a result, the crisis decisions had emphasized on defusing blames, and defending the status quo. Negotiations and power sharing scheme were discredited. The systemic problem had denied both in problem analysis and crisis responses. On the other hand, in post-1991, ethno-nationalism has been recognized to be the vortex of the political norms. The extreme politicization of ethnicity constrained the shared vision of the people. The spaces for democratic struggles have banned which resulted in the formation of nominal opposition groups. Generally, the problems were both systemic and implementation though the government did not recognize the prevalence of a systemic problem. In its decisions, the regime has considered the crisis as a threat—not as an opportunity—though it has certain deviances from the former in its attempt to use legal and political measures. Therefore, it is recommended that the incumbent government need to consider the crises as an opportunity to adopt systemic reforms.

Index Terms- Crisis, leadership, Mengistu, Regime, Ethnicity, Opportunity

I. Introduction

The history of our world is characterized by "the good and the evil." This may be attributed by "conflict and cooperation, peace and war, mutual trust and security dilemma, and economic boom and economic depression. In many instances crisis is the "evil" which is in need for critical leadership. The term crisis is general that encompasses many forms of risks such as economy, politics, military, social and technology. Crisis is a condition in which things are highly unprecedented, and the environments are uncertain. According to Griffiths, et`al (2008), crises are quite sudden transformations of 'normal' relations between states. This definition focuses on the change of status quo from normal to abnormal ones. For others such as Boin, McConnell & T Hart (2010), crisis encompasses the real events and the shared views towards the event. According to these authors, "Crises are the combined product of unusual events and shared perceptions that something is seriously wrong (Ibid: 230); and such broad definition is necessary since the crisis decision is dependent on the state of shared perceptions towards the incident.

The prevention of aggravated danger that resulted from the crises demands appropriate leadership. In other words, the gravity and the intensity of the danger posed by the crises are highly dependent upon the effectiveness of crisis leadership. Crises leadership is concerned with a process of damage limitation both at operational and strategic levels. Sometimes crises may not be accompanied by evil results/consequences. Rather they have the potential to provide leaders with new and unique opportunities to discard old policies and commitments, kick start new ones, reform public organizations, and reshape the political landscapes by forging new coalitions (Ibid). According to this saying, crises are watersheds in giving up the old system and establishing the new one. In doing so, there is a need for effective leadership. Crisis is a litmus test of the quality of leadership. When leaders at national levels are seen to have not succeeded, their political capacity and the legitimacy may shrink swiftly. Thus, depending up on the leadership, crisis may result in either elevating or deteriorating the legitimacy to the ruling bodies. The failure to redress crisis in time may also result in exacerbation of risks, and the malfunction of the state systems.

The prevalence of regional or global crises could have the potential to cause crises at national levels. The historical events such as the rise of oil price and the 1974 political shake in Ethiopia, the 2008 economic crisis driven political turmoil in Greece, the Arab spring driven regime changes in Egypt and Yemen are few examples in substantiating the above claims. The aforesaid crises were accompanied by the destabilization of state systems such as weakening of state machineries, deposing of leaders, and abating of the bargaining power of the states.

Regarding Ethiopia, in post-1974, the country had faced numerous crises of different magnitudes. The 1974 execution of the high officials of the imperial regimes, the "white terror" and "Red Terror" the 1977/78 Ethio-Somalia war, the Military loss of Red Star Campaign, the 1984 Famine, the 1989 military coup, the collapse of the Derg, the resignation of Oromo Liberation Front (OLF) from the Transitional Government, the Ethio-Eritrea war of 1998, the 2005 election crisis, the 2015/16 onward instability were some the crises. The Derg (committee in Geez language) was the ruling group from 1974 to 1991. Later, since 1991, Ethiopian People`s Revolutionary Democratic Front (EPRDF) is the political organization in charge of passing crisis decision. With the full power to do so, both the Derg and the EPRDF had passed their respective crises decisions.

The objective of this study was to conduct comparative analysis on the crisis leaderships of the earlier and the current regimes of Ethiopia. For this purpose, two key crises were selected. These are the 1989 Coup d'état against president Mengistu and the "2015/16 political fiasco." These two events have been chosen because, they were relatively inclusive and tempo changers. They can also represent other cases since they were multi-faced in their nature. What all the review of existing literature revealed, comparative studies have not been conducted so far on the issue under question even though the gravity of the problems demanding adequate and informative academic studies.

Based on the above backdrops, answers will be sought to the following questions: How did the past and the current governments of Ethiopia respond to the crises? What has succeeded and what has failed? Why failure and what could have been done to avert failures? What key lessons can be drawn from both crises and respective crises leadership processes?

II. Methodological issues

The analysis of the crisis leadership in Ethiopian cases includes a range of variables whose effects are difficult to isolate. The study takes into consideration various contextual issues, and thus, the comparative study is the best method to arrive at meaningful conclusions. By choosing such a strategy, the study used sources and benefit from theories to guide the analysis of data. To achieve the general objective of this study, multiple sources of evidence, that are mainly *secondary and primary sources* were used. As secondary sources different qualitative documents were critically analyzed. It includes public reports, reputable news, and academic literatures. The majority of the literature written on the Ethiopian political history is focused on the key constituent events of crisis and the vital decisions during the crisis. Therefore, this study utilizes the recorded facts to analyze the subject of this study through triangulation of data.

Primary sources: *Legal documents*: The legal codes are also examined as primary sources of evidence. The legal documents are among the foundation for the study of the de jure crisis leaderships of Ethiopia and hence some legal documents of the regimes of post-1974 have been assessed. *Observatory participation*: Evaluating of the political directions and crisis responses of the incumbent government through participating in consultative conferences of 2017 and in the "deep reform" scheme as a practitioner was another means of data collection.

III. Theoretical approach of crisis leadership

In this work, established perspectives, and generalizations are used to throw light on the empirical case selected for analysis. Investigation of crisis leadership theories and practices were explored, with the aim of finding perspectives that could provide tools of analyzing the data. Hence, in this study, the theoretical and empirical findings have mutually nourished each other towards a better understanding of the issue. Therefore, in this section the theoretical concepts of crisis and approaches of crisis leadership have been given a major emphasis.

Crisis is a decisive stage that can have significant consequences in the future of a particular system in which the core values could be affected. According to (Rosenthal, et`al, 1989:10), "a crisis occurs when policy makers experience a serious threat to the basic structures or the fundamental values and norms of a system, which under time pressure and highly uncertain circumstances necessitate making vital decision." The definition covers diversified phenomenon of crisis and works to deal on the crisis such as coup d'état, environmental disaster, policy fiasco, terrorist attacks, revolution, and so on.

3.1. Key Characteristics of crisis leaders

Characteristically, crisis leaders have some sort of differences from crisis managers. Although leading and managing are complementary, leaders take a long view, formulate visions, encourage diversity, empower others, initiate changes, explore new territory, whereas manager take short view, make plans, enforce uniformity, control others, stabilize status quo, and maintain existing patterns (Allio, 2003). Accordingly, unlike managers, leaders probably consider crisis as an opportunity and exploits the crisis situation to devise critical system reform. Moreover, seeing things for what they are, strategic and tactical thinking, taking risk, and readiness to admit mistakes are some of the characteristics of crisis leaders. These are detailed as follow:

"Seeing things for what they are*: Crisis leaders live on the front end of reality. They recognize events and their significance and do not shy away from the consequences of what they see.* ***Strategy and detail****: They are in need to see the big picture as well very detailed knowledge of the issues.* ***Take risk****: Crises often bring the leader face-to-face with a set of situations they have not previously seen. They will deliver bad news when they need to and do it in a way that avoids panic and provides a realistic level of hope for the future.* ***Prepare to admit mistakes****: leaders know that making an imperfect and risky decision can often be better than making no decision at all. Hence, in the face of certain failure, big leaders are courageous to admit their mistakes"* (Rowe, 2008). Niche

This articulation shows that leadership demands expertise, and quality of sensing the realities of disastrous situations, interpretation and passing rational decision in time in the face of risks. In addition, there are other characteristics of leaders discussed as follow:

Collaboration: *Leaders understand, however, that a long-term solution requires the input and involvement of many stakeholders. They identify those individuals and work together towards a solution that most support. Gathering contrarian viewpoints from individuals with whom they might not agree, but respect, likely means they may create solutions not previously tried.* ***Listening to unpopular advice:*** *Successful leaders listen not only to those who agree with them. Rather, they include individuals with whom they may not agree and whose advice may be contrary to that of their closest advisers.* ***Multiple options:*** *When they have identified the problems, they are willing to consider multiple approaches to how these may be addressed. Initially, they engage others in brainstorming potential solutions without judgment, even though they may have a preferred solution in mind* (Ibid).

For crisis leaders, having this category of the characteristics is vital to widen the scopes of the vantage points of problem

analysis and to connecting the big picture with the operational issues.

3.2. The nexus between event, Perception, Posture, and decision

Crises are realities of unusual events and the constructed and share perceptions of the danger of the real events. Given this notion, when leaders are confronted with events of crisis they may adopt fundamentally different postures. This may be the result of their idiosyncrasy, and experience and the ability of them to amalgam niche perspectives to understand the situation. Sometimes, perceptions are ordered through pre-set belief systems that are both valuable and potentially dangerous; they can lead to wishful thinking and faulty analysis (Griffiths, et`al, 2008). Generally, decisions are dependent of perception and as a result of perception some use crisis as opportunities for institutional reform others may not (see the figure 1 bellow).

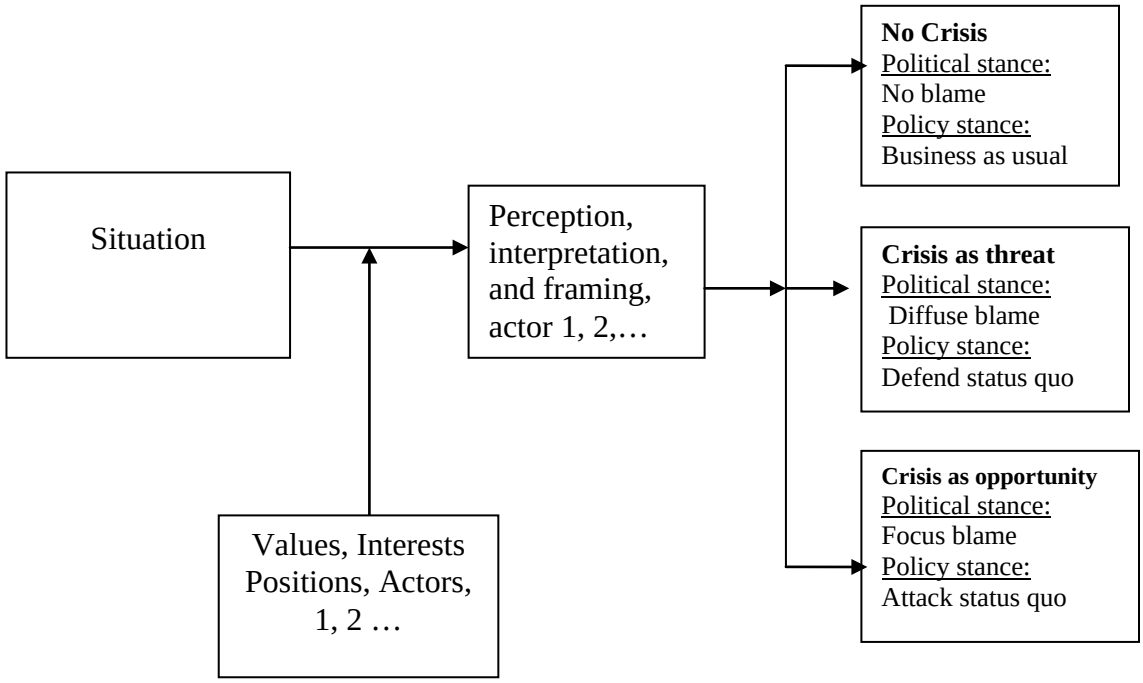

Figure 1 Identifying crisis: perceptions and their political implications Adopted from Boin, `t Hart, and McConnell, 2009, P.84.

Perceptions and its implications: As mentioned above, leaders may take different postures about real incidents due to the differences in their perceptions and postures about the incidents. This has discussed as follow.

1. *Position of no crisis*: Sometimes leaders may deny or downplay the potential threats. For instance, "the Bush administration`s stance on Al-Qaeda prior to 9/11, levee protection in southern Louisiana prior Katrina, or climate change- the message is that there is no crisis" (*Boin, McConnell and Hart, 2009:230)*. This is the manifestation of consideration of incidents as simple unfortunate events. Thus, no significant responses would also be taken.
2. *Crisis as a threat*: This involves the leaders` consideration of events as a critical threat to the social setting and public interest. As shown in the above figure such posture dictates them to defend the system from criticism. As a result, diffusing blames against the policy and organizational policies and practices, maintaining the status quo and adoption of corrective measures to avert the threat are the responses of the office holders.
3. *Crisis as opportunity*: In Marxist theory, crisis is an opportunity for the working class because the crisis is the break or split of capitalist structural system. The central thrust of our interpretation of Marxian theory is to see accumulation as the expanded reproduction of a fabric of capitalist control that is always tenuous and repeatedly threatened by working class struggle (Cleaver and Bell, 2002). Crisis is thus, most basically, the rupture of that fabric and a positive consequence of the development of the working class as subject. The essence of crisis driven opportunity is concerned with leaders` recognition of events as fortunate happening. They hold the position that the event is critical to expose deficiencies of status quo beforehand; and cherishing the blame rather than diffusing. Corollary, they likely devise measures to furnish new organizational set up with discarding the status quo in question.

3.1. Challenges of Crisis Leadership

Some of the challenges of crisis leadership are sense making, decision making, and coordinating, meaning making, terminating and learning (Boin, McConnell & T Hart, 2010:235). *Sense making*: A crisis does not announce its onset, it is unprecedented. Hence, it may be difficult to sense the actual incident as a crisis. The difficulty of extracting coherent and credible signals from the multi-faced abnormal noises of crisis, and the countless and bewildering noises of crisis that impair the

ability to collate and interpret information are the challenges sense of making.

Decision making: Crisis is a litmus test of the quality of leaders` decision. One of the classical examples of crisis is the invasion of Somalia against Ethiopia in 1977. During which the leaders of the revolution, particularly, Colonel Mangistu presented with the intelligence information about the conventional war declared by Somalia. Whatever his choices from the possible alternative options such as air strike, mechanized defensive attack, blockage of arms supply and naval attack, and others. However, it was hard to forecast the exact consequences; one thing seems certain that any decision would have impact on the relationships of Ethiopia with global partners of Somalia. Albeit the situation needed an urgency of decision, the military apparatus of Ethiopia was weak (Fikiressilassie, 2014[1]), not in a position to compete with that of Somalia`s forces. Even no resource to purchase weapons and more importantly there was a must to have willingness from the suppliers of the necessary weapons. America, the long time partner of Ethiopia was not willing to sell, and or give military hardware and spear parts for existing U.S. made Weapons. There was little time to consult with advisors, colleagues, and the likes. The situation was taught and challenges for decision makings.

Coordination: When we see the same case, when Said Bare declared war against Ethiopia, the leaderships of the Derg were in a critical challenge of mobilizing and organizing the public to the campaign due the prevalence of local groups those who were in a civil war with Derg and siding Somalia. On the other hand, the country had too few infrastructures and state machineries. In the face of these uncertainties coordination of the logistics, weapons, diplomacy, and troops was not an easy task. As a result, there were irregularities and communication breakdown between the stakeholders of crisis management. This was an impediment in pursuing effective coordination.

Meaning Making: "In time of crisis, there are high expectations on leaders to quell uncertainty and produce an authoritative account of what is happening, what caused it to happen, and what action needs to be taken" (Boin, McConnell & T Hart, and 2010:235). They can meet the expectation if and only if they are capable of interpret and understand the essence of the crisis. But, this might not be happen due to the abundance of incorrect information, and the inability of leaders to collate and synthesize them in a manner that helps their decision.

Termination: The full-fledged Crisis leadership is about the cessations of the operations and general strategy. This is also concerned with the avoidance of prolonged and too short emergency measures. Such maneuvering necessitates a diminishing and gradual easing of the business of crisis. In this respect, leaders possess authoritative legal or policy powers to terminate a crisis, for example, by ending state of emergency or revoking martial law (ibid). However, the situations challenge to pass effective decisions because the complexities of the environment can constrain the decision of leaders on how to terminate, when to terminate and what are the appropriate measures following termination.

Learning: According to Boin, McConnell & T Hart (2010), only weeks after hurricane Katrina had destroyed the coastal areas of Louisiana and Mississippi, Hurricane Rita entered the Gulf of Mexico. Accordingly, when the tragedy projection of Rita included Houston, the Texas authorities quickly ordered an evacuation; and the lesson of Katrina had been learned. In this case, the authorities learned the lessons. The events before today were histories and they have lessons for today and tomorrow if leaders are positional learners. Unless there would be another crisis and that could aggravate the pre-existing crisis. Drawing lesson is not easy; it is a challenge for crisis leadership.

IV. Crisis leadership in Ethiopia: Case Studies

4.1. The 1989 coup against Mangistu H/mariam

The military Junta by the name of Derg came out of the 1974 revolution that discarded the Solomonic dynasty. It was first organized by the representatives of the Military units of different divisions. After the possession of the political power, the Derg adopted socialism as an ideology of the state and devised radical political and economic policies. From the inception, the formation of government by the military wing had faced extreme criticism by the pro-socialist forces that were the initiators of the change. Most revolutionary groups poked upon the Derg, requested the establishment of civilian rule though the Derg was unwilling. In the heyday of this disagreement, one of the Dé facto party called All Ethiopian Socialist Movement (AESM) formed an alliance with the military group. The other civilian party named by Ethiopian Peoples` Revolutionary Party (EPRP) declared "White Terror" against the leadership of the Derg and AESM. As a result the "Red Terror"[2] was declared by the Derg aided by AESM. Consequently, the Derg had hammered the EPRP until the party`s leaders dismantled. The capacity of the EPRP to challenge the power of the Derg gradually declined. However, the military rule did not defeat the ethnic based resistances of the north and elsewhere.

On the other hand, there were worth-mentioning crises events that the leaders properly endeavored to solve. For instance, the security crises of the nation during the late 1970s was the pivotal decisions of the Derg and the chairman of the committee that saved the nation from the savage and fierce invasion of Siad Bare`s forces. According to Fikresilassie (2015), the leadership of Mengistu in getting support from the socialist countries through diplomatic persuasions, the process of

[1]"The number Ethiopia`s ground forces were half of Somalia`s one, Somalia possessed modern and out numbering Weapons such as the tanks, Cannon, grenades, Machineguns, Armored vehicles, rockets, missiles, ant-tank and anti-air Missiles, varieties of explosives, and light weapons. Regarding the air forces, Somalia has hundreds of Mig-17, Mig-21, and Mig-23 whereas Ethiopia`s forces had tens of U.S. made F-5 fighters" (Fikiresilassie, 2014:388).

[2]"From 1976, a period of violence occurred, where EPRP assassinations of members of AESM and supporters of the Derg were followed by the Red Terror, where the Derg and its supporters haunted EPRP members, imprisoning 30,000 and killing thousands of them"(Holliday and Molyneux, 1981). But the AESM`s dominance within the mass organizations became strong for Mengistu, and from 1977 AESM was violently suppressed" (Aalen, 2002).

maneuvering to mobilize the public, and the deployment of newly recruited troops were successful. In this disastrous time, leaders managed the shift of public attention from the local political problem to the external issue. The result of the combination of different crisis decisions of the leaders culminated with the victory Ethiopia`s forces. The regime enjoyed relative public support. The victory was also an impetus for the initiation of the "Red Star Campaign" against the rebelling group in Eritrea. However, unlike the war against Somalia, the civil war in Eritrea did not end up with the victory of the Derg. Gradually, the rebels such as EPLF and TPLF became strong enough to shake the regime. Military defeats became common.

There were a number of strategic military losses for the Derg especially, in the late 1980s. By March 1988, the mechanized army of the government defeated, weapons and a strategic place in Eritrea called "Afbet" were captured by the EPLF; and 20,000 troops were dismantled (Bahiru Zewdie, 2007). According to Bahiru, before this defeat, the commander of the said front, Major General Tariku Laynie executed by Mingistu following the disagreement between them concerning the leadership of the war. This resulted in the moral damage of the combatant forces. This moral failure was one of the factors for the defeat. In Shire Endasilasie, by February 1989 another defeat occurred, and TPLF got a significant victory. In this battle, the Third Division revolutionary mechanized force with 40,000 troops was obliterated (Ibid). The forces of the regime have withdrawn from the entire Tigray areas. The defeats in Afbet and Shire marked the beginning of the end of the Derg regime. In the midst of these losses, senior officers, known to be dissatisfied with the President's pursuit of protracted civil war, in which the army has suffered from aforementioned severe defeats, staged a coup on 16 May 1989. But, it was foiled within three days in Asmara and Addis Ababa. This unfortunate coup exposed the coup makers for Mengistu`s revenge.

According to Perlez (1989), Major General Merid Negusie, and the commander of the air force, Major General Amha Desta, had been killed in the fighting. Major General Demissie Bultu and a number of his compatriots were killed by the pro-Mengistu regime Commandos in Asmara. The body of Demissie dragged inhumanly on the street of Asmara (Bahiru, 2007). Further, as a result of this crisis, between 300 and 400 officers were reported to be arrested (Research Directorate, Immigration, and Refugee, 1990). On 26 December 1989, Mengistu`s government reported to have charged fourteen military officers with mutiny and attempting to overthrow Mengistu (ibid). Later, "12 of them including the army and police chief executed" by Mengistu (Los Angeles Times, 1990). The situation, particularly the revenges of the President was deterrence for other officers; signaling them that their life had no guarantee.

The coup d'état and specially the merciless measures of regime resulted in drought of leaderships of the military units. Dereje Demissie, the author of the book titled "Father Memoir" (in Amahric-"አባቴ ያችን ሰዓት) has compared the number of Ethiopian military generals killed by the protracted civil war plus Ethio-Somalia war and the number of generals executed by Mengistu. For this author, Ethiopia lost only 5 Generals during the civil war and Ethio-Somalia war where as Mengistu executed above 50 military Generals.

Mengistu had made reshuffling and new appointment of officers to fill the military leadership gap left by the arrested and executed generals. The promoted and newly appointed commanders to fill the vacant positions were ineffective and less experienced. It was because the new comers were inefficient to successes in the position that deserve to be lead by skilled and experienced Generals. More importantly, it is arguable that the soldiers and the new appointed ranks of the military would have no the moral courage of winning the civil war that was not achieved by the leadership of experienced late generals. What would be done to save the complete collapse? The crisis would demand the following actions:

- Negotiation with the coup makers, instead of killing and arresting;
- Negotiation with the rebels;
- Reconsideration of Global partners and
- Resignation of the president

I. Negotiation with Coup makers

In 1989, a dozen generals executed being found guilty of "treason and endangering the unity and territorial integrity" of the nation. Did the measure save the unity and territorial integrity? Indeed, the answer is no. Even the execution had accelerated the complete collapse of the nation. Due to the idiosyncrasy of Mengistu, the coup maker might not expect amnesty from his government but they might have the zeal not to be killed. Given this fact, they would have no motive to reject the call for dialogue that could save their lives and the country as well. It has been told that the master minds of the coup agreed and planned to have negotiations with rebels in view of searching for political solution for the civil war. Therefore, the government would have the chance to look for the political solution for the civil war by letting the coup makers to proceed with their plan of negotiation. Even, the survival and presence of those senior generals would have the power to diminish the hope of winning for the rebels. On the other hand, the determination for discussion with those generals by refraining from revenge would be better to alleviate the leadership drought in the military units.

II. Negotiation with rebels

Eritrea People Liberation Front (EPLF): It is already known that the EPLF had reluctances to continue the war and decided to "negotiate with the Derg by late 1970s"[3] and later in 1989 with the coup makers. This shows that at that particular time (1989) EPLF was in a position to sit for peace deal. So, before the execution of the coup makers, the president has certain chances to continue the peace deal with EPLF. Through ensuring the participation of coup plotters in the truce process, Mengistu would have the chance to attract the heart of the supporters of the coup. Corollary, fear, and moral damage in the military would be insignificant. Even if the negotiation with EPLF resulted in granting the self-rule or secession of Eritrea, the state of Ethiopia still would have the bargaining power to secure the right of

[3] Following the decision of Derg by 1976 to grant an autonomous self administration to Eritrea, there was relative subside of wars. Simultaneously, Negotiation was started by Sisay Habtie, the chairman of Derg`s foreign affairs Committee though it was interrupted upon the death of Sisay (Bahiru Zewdie, 2007).

access to the sea. Moreover, the deal might have the role of separating the EPLF from TPLF. The truce with EPLF (It was pro-peace deal than TPLF) was possible; and it would be an opportunity to buy time to depreciate the moral and material impetus of the hardliners.

Tigray People Liberation Front (TPLF): Though still the regime had the state resources to mobilize, the time was so hard to Mengistu`s government than for the Rebel group, the TPLF. Hence, it was the Derg who was responsible to initiate and search for negotiation with the TPLF. It could exploit all the possible pacific means to be saved from the evil of disintegration. The state resources still would empower the leaders to have the bargaining power. In the process, declaration of temporary ceasefire, opening space to the international mediators including the westerns were possible. Due to the gravity of the crisis, the only way out was negotiation and downsizing the number of enemies. It would also save the regime from the complete collapse. The deal would open a win-win forum: no zero sum game in the power politics. In other saying, Mengistu`s regime—which was zeal to take all—would have some.

III. Reconsideration of Global partners

By 1987 the regime adopted the constitution of People`s Democratic Republic of Ethiopia (PDRE). The provisions foreign policy principles of the constitution have detail articulations about the relations and to whom the state aspired to have friendly relations. In this constitution, the working relations with the socialist' states have given emphasizes. The provisions read as:

1).The people`s Democratic Republic of Ethiopia (PDRE), while safeguarding the national interest of the country, shall promote relations and cooperation with all states on the basis of equality and mutual benefit. It shall respect the rights of states to live under the social and economic system of their choice. 2) The PDRE shall promote all-round relations and cooperation with socialist states, and strengthen with the international working class movement and democratic revolutionary forces, national liberation movements and other democratic peace loving forces. 3) PDRE Shall staunchly, struggle against colonialism, imperialism, neo-colonialism, and other forms of oppression and exploitation (Article 28 of the constitution of PDRE).

In 1989, there were a number of vivid manifestations of power shift and the ease of bipolar world structure. The time demand foreseeing of the mid-1980s onward Gorbachov`s gradual termination of supports to the communist states (even in East Europe). This was the rationale to express the need of making reforms on the diplomatic relations of PDRE. The focus of the reforms would be the complete avoidance of the hostile policy against the western, and the siege mentality. It was better to implement the principle of Non-alignment: non-alignment was the long aged orientation of Ethiopia`s foreign policy (since 1955). This principle was proclaimed in article 27 of the constitution of PDRE[4]. But, in practice, the government was not able to avoid aligning with the socialist camp. The realization of this principle would open the chance of increasing global partners. At that time, although the growth of satellite technology negatively affected the strategic importance of Ethiopia for western intelligence, still the western interests to have close relationship did not ease. Realistically, the political dynamism of the time demanded the pragmatic shift from the slogans such as "death to Imperialism", "Death to Bureaucratic capitalism" (Fikiressilasie, 2014: 329) to "Fair beneficent from globalization and uni-polar world structure." By doing so, the regime could exploit the diversified forms of relationships to pursue the national interest.

IV. Resignation

Since 1970s the difference between Derg and Mengistu has become blurred. He was everything and everywhere in the country`s politics. The crisis was the manifestation of failure in his political leadership, and the coup was the result of loss confidence on his rule. His lingering for power until he lost every single instrument of defending his rule was self evidence that he didn't learn lessons from his predecessor as well as from the course of the crises. In other expression, if he had had the love with the country, he would have had to resign and provide the coup plotting groups with the chance to devise their own solution. Such decision would attract the heart of some dissidents to sit for negotiation. Inter alia, the deal for his resignation would have the possibility of ensuring the territorial integrity of the nation/PDRE/. By the way of summing up, it was much better to resign than fleeing after everything lost.

4.2. Crisis and its leadership under EPRDF

The collapse of the Derg regime by 1991 was a watershed that marked the coming of ethnic based rebel groups in the political scene. The ethnic based rebel groups such as Tigray People Liberation Front (TPLF) and Ethiopian Peoples' Democratic Movement (EPDM) later; renamed "Amhara National Democratic Movement" (ANDM) controlled Addis Ababa by the name of EPRDF. The Oromo People's Democratic Organization (OPDO) and the Southern Ethiopian Peoples' Democratic Front (SEPDF) joined the EPRDF at a later stage. Consequently, Politicization of language and ethnicity became the fashion of the time. The majority seat in the council (with seats 87) of the Transitional Government of Ethiopia (TGE) occupied by those ethnically formed groups. According to Aalen (2002), the TGE included selected individuals and twenty-seven political organizations; a precondition for the organizations to be allowed to take part was that they were ethnically based. "The ethnic-question-comes-first-wing of the student movement had won over those who claimed that class and economy were the crucial issues to understand Ethiopia" (Teshale Tibetu, 1995) and the EPRDF's emphasis on ethnic federalism and ethnic political organization prevent viable trans-ethnic parties to emerge (Aalen, 2002).

Meanwhile, the focal point in the articulations of historical political problems of Ethiopia was the issues of ethnicity. Ethnicity continued to be the vortex in the political philosophy of EPRDF. Ideological issues, leaders' idiosyncrasies, international politics, the philosophy nation building, and other core values have given less emphasis in analyzing the historical problem of the country. For instance, "despite the Derg's appeals to Marxism and a non-ethnic policy, the ethnically based opposition defined Mengistu's government as an Amhara suppresser" (Aalen, 2002). Consequently, these ethnic based parties have

[4]The foreign policy of People`s Democratic republic of Ethiopia is the based on the principles of proletarian internationalism, peaceful co-existence and Non- alignment.

been occupied with naming and shaming against trans-national parties. Especially, where the senior partners of the transnational parties are the Amhara elites, the government defames them as nostalgic of previous regime.

The ethnic based rebel groups` dominated decisions continued to be the general framework of the politics of the country even after the coming into force of the constitution of FDRE in 1995. According to the "Constitution, Nation, Nationalities and People have granted inter alia unconditional right to self- administration, including the right to secession (see article 39). The constitution clearly allows the nationalities to exercise the right of session from the federation even in time when the country`s survival is in question (see article 92).

However, the said strategy of the current regime did not save the country from crisis. The first post-Derg crisis was the irreconcilable hostility between the victorious ethnic based rebels (TPLF with some others).[5] In addition, the 1998 Ethio-Eritrea war, the 2005 election standoff, and the 2016 pervasive instability are some of the crisis situations. The post-2015/16 predicament is the gravest crises in which different ethnic groups have been queued up in forefront of the protests against the rule.

4.2.1. The Features of the post-2015/16 crisis

The general climates, the vigor, and scale of the danger of the 2015/16 Ethiopia's crisis accentuated the "crisis of leadership (Lefort, 2016), and the focus of the discussion of this section is the leadership of the prevailing crisis. The relationship of the party and the government, public service governance, elections and party politics and politicization ethnicity are the key topics to deal with the issue under question.

I. The Party and the government

Realistically, the absence of practices of multi-party democracy and prevalence of the mix up of party and government is rampant in Ethiopia. It is difficult to differentiate the functions of government from the function the party. The speech of Kassahun Birhanu (2016)[6], asserts this claim by arguing that the structure of the government and the Party are excessively intertwined. For instance, in most universities, EPRDF have tens representatives and coordinators. In pursuing of party`s mission such as meeting and conference, the coordinators are receiving per diem from the universities` budget. This has been practicing in other public organizations too. In some sectors, the executive bodies reported to be more powerful than the parliaments of the country. Kassahun (2016) asserted this claim by saying that "due to result of the fusion of the party and the government, the executive bodies have given an excessive power. In addition, some of the heads in different parliamentary grouping (such as foreign affairs, social affairs, security affairs standing committees and so on) are the heads of the executive agencies and thus they have the manipulative power to dominate the parliamentary decisions. The heads of the executive agencies also have power to manipulate members of the parliamentary (MP) because many MPs experts and department heads of those agencies. On the other hand, partisanship with the ruling party proved to be imperative to have job security and easy access to job. As a result, Public servants build trust on the party than the governmental system; and they lack the courage to separate party business from the public services.

II. Governance in Public services

Both the government and other stakeholders of the country agreed up on the prevalence off problems in the public sector. The ruling party reiterated that the problem of the country is the deficiencies in implementation of the policy. In this respect, in many secessions of "deep reform," the government officials argued that the system created a demanding society and the crisis was simply the price of our successes. For them, such incident is a natural in development process, and nothing more than a stage, ordinary and inevitable.

However, practitioners and academicians have disagreed with the problem analysis of the government. According to Eyessuswork Zafu (2017), the current problems are both implementation and systemic. He stated that implementation problems relating to rent-seeking practices were the result of the system problems. Thus, it is impossible to ignore the systemic problem in dealing with the practical problems of the public services. The fusion of the legislative, executive, and judiciary organs (Kassahun, 2016) and the practices of *rule by law* were the sources of the problems. In practice, "there are different types and intensified multi-faced corruption that has never seen in Ethiopian history" (Ibid). Favoritism and the tendency of sabotaging the interest of the government for individuals benefit were visible. Though there are legal systems of controlling the mal-administrations, the personal connection with some political and economic elites has the power to overrule the legal norms.

Elections and Party politics

Constitutionally, democratic election and multi-party system have recognized. Regular elections are conducted, but these are often fraudulent and include severe intimidation of the political opposition (Aalen, 2002). Similarly, Kassahun (2016) argued that "repeatedly, the process and the result of the elections were controversial." The democratic election and the democratic process of the country gradually deteriorated (Lidetu, 2016). The number of seats won by the oppositions in the federal and regional parliaments also gradually diminished to zero by 2015 election. For instance, 21 seats in the 1995 election, 25 seats in the 2000 election, hundreds of seats in the 2005 election, and 1 seat in the 2010 election won by oppositions and individual candidates (ibid). According to the data gained from the National Election Board of Ethiopian (2015), 75 political parties were participated in the election of 2015; but, none of them except the members and affiliates parties of EPRDF won seats in the

[5]The strategic co-operation between the OLF and the TPLF ended in 1986, when the TPLF was trying to get the OLF under its wings. The relationship between the two movements deteriorated in 1990 when the TPLF created its own Oromo satellite, the OPDO; and the animosity escalated into armed fights in the south-east of the country started in August 1991, which also included Somali and Afar factions in 1992 (Aalen, 2002).

[6]EPRDF is of probably the party of five million people but the government of FDRE is the leader of 100 million Ethiopian. But, once the party won the election, it has the duty to formulate policies and follow up the implementation of the policies.

parliament of FDRE. The above data evince that after the 2005 election political competition has showed radical declination.

The country`s electoral rule and proliferation of fledging political parties, have also certain contribution for the defeat of oppositions and the dissipation of votes. To elaborate, proportional or mixed system of election is not allowed by the law. Thus, the party/front or coalition with simple majority votes is eligible to form a government. The oppositions were weak and divided and most of them organized to pursue ethnic agenda and were helpful for EPRDF`s election victory. In 2015, from the 75 registered parties, the numbers of opposition parties engaged in election were more than 60. But, none of them had got parliamentary seats because the votes of the supporters of the oppositions were frittered away. In addition, there were invalidated votes since high number the populations of the country are illiterate—they are unlikely to put proper sign on ballot papers. In this condition, the EPRDF has the chance of winning even the sum total of the number of votes for oppositions and the numbers of invalid votes are exceeding the number of votes of EPRDF.

The ruling group has also been hammering the opposition parties through different maneuverings. It exploited unemployment, poverty, and backwardness as an opportunity to get supporters. The members of the ruling party are fortunate to get job in public institutions. Hence, for the youths, for the sake of survival and job access party membership become the best option. As a result, university students except the few best scorers opted to join the ruling party. On the other hand, most of uneducated mothers were organized under "mothers forums" in which the forums have the indirect mandate to indoctrinate EPRDF`s agenda. Corollary, the fledging opposition parties lacked potential members and sources of finances. Their institutional strength is also challenged by lack of intra-party democracy. Consequently, space to express collective public grievances narrowed. Finally, in the heyday of the crisis, the absence of party politics and accommodative political forums to express collective grievances resulted in the growth of the influence and importance of social media. The Diaspora oppositions snatched the leading power from the government. Protestors had received instruction and order from the exiled oppositions mainly through social media.

III. The Extreme politicization Ethnicity

Currently, most of the political groups have no objection to the federal system. The disagreement is on the extent of accommodation of different political interests and the government`s extreme adherence to politicization ethnicity. From the beginning, according to Aalen (2002:48), the lack of transparency and participation in the process has fed the argument that the EPRDF's ethnic federalism is a way of ensuring TPLF hegemony. Aalen`s argument asserted that the federal arrangement has defects even in ensuring the equality of the members of the EPRDF. Structurally, from the beginning, the party hinges upon ethnicity to analyze the problems of Ethiopia. According to Marera Gudina (2016), the regime favors the weak and ethnically organized parties to realizing its policy of "divide and rule." The introduction of ethnic federalism by EPRDF is a means to institutionalize the principle of "divide and rule" and ensuring the ruling party's position (Abbink, 1997). The above sayings evince that EPRDF`s extreme adherence to the politicization ethnicities is to maintain its political power through discarding competent trans-ethnic political parties or groupings. In addition, in his argument to show the limitation of the existing ethnic federalism, Kassuhun (2016) points out that "the general frame of exaggerated identity based federal system has posed threat of abating the common visions or aspirations, objectives, and benefit of the people of Ethiopia." In different parts of the FDRE elites were mainly organizing and working to realize the objectives of their own ethnic groups. With the exception of few cities, the tendency to form non-ethnic organizations and the aspiration to build country wide vision are low. For instance, the Oromo protests were fundamentally opposed to the implementation of the Addis Ababa Master plan[7] considering it as the plan to expropriate the lands of Oromos. The protest has no or limited trans-ethnic agenda and questions. The protesters also unlikely raised questions relating to the unfair evictions of urban dwellers of Addis Ababa by the name of investment.

The general system also allowed the elites to instigate distinct identities with downplaying the similarities with the others. For instance, in SNNRS, the political and security problems related to the identity questions of Konso people, Wolenie people (Guragie Zone) and Kucha people (Gamogofa zone) were the result of the system. By no means, the resistances of Welqait people in Tigray region and Kimant People in Amhara region have deviations from ethnic questions. Practically, the demands such as recognition of new ethnic identities, the demands for zone, special zone, special Wereda, and Wereda administration for particular ethnic groups, have proliferated.

On the other hand, although the Amhara elites used to propagate Pan-Ethiopianism, nowadays, they have been called Amhara nationalism. The youths have also welcomed the call warmly. The slogans[8] of the 2016 protests in Gonder and Gojam unequivocally showed the boil-over of Amharas` ethnic resistance. This was a shift of political strategy from pan-Ethiopianism to ethnic nationalism. By implication, it was a downplaying move against the leadership of non-Amhara elites for Amhara People (currently, there are key non-Amhara officials within in ANDM).

V. Comparison of Crisis Leadership the Past and the Current

A. Party politics

Under leadership Colonel Mengistu multi-party system was not practiced. During the early stage of the revolution, there were de facto mass parties, EPRP and AESM. Later, there were some organizations formed with socialist orientations. Upon the declaration of the constitution PDRE (1987) multi-party politics

[7]When EPRDF announced its readiness to implement its "Integrated Development Master Plan" in the middle of April 2014, it provoked an immediate reaction from university students across the State of Oromia (Tsegaye, 2017).

[8]Slogans in Gonder and Gojam: "Amhara is not terrorist", "our border is Tekeze" Wolqait is Amhara" "Amhara struggle continues", stop mass killing on Amhara people", and "respect for Amhara-identity, and others.

had outlawed. WPE was the only de jure political party which had allowed controlling the National Shengo. The space for party politics, the forum for collective expression, and the accommodation of diversified views were legally banned. Inter alia, this dark political environment dictated the military generals to plot the 1989 military coup.

The practical situations in the present regime have certain similarity with its predecessor. After the 2005 general election party competition highly declined. EPRDF postured itself as the only legitimate party of the nation though multi-party system has constitutionally recognized. The functions of the party and government have lost distinction, the parties have involved in every business of government. Like that of the WPE, EPRDF has tried to be everything to everyone. Weak and nominal ethnic based parties were proliferated and still recognized to sustain as weak as to challenge the EPRDF. Most of the trans-ethnic parties based in Addis Ababa and they suffered from the tactical and strategic influences of the ruling elites. The elections were symbolic and seem only to renew the licenses of EPRDF and its affiliates to rule the country. In this respect, it has no substantial difference from the former. In addition, like its predecessor, the EPRDF faced an aggravated crisis almost two years after the election victory.

B. Position of the ruling elites on the crisis

The basis for crisis leadership is sense making, meaning making, perception, and problem analysis. Both the Derg and EPRDF regimes considered the crises as the threats, none of which used the crises as opportunities. As a result, no structural or system reforms have been undertaken. In 1989, business continued as usual after the execution and detention of the coup makers and their supporters. Mengistu did not consider the risks of system failure in his decision of executing the military leaders and continuing the civil war. He attempted to diffuse blames and defended the status quo since he regarded the coup as a threat. Today, according to the "problem analysis" of the EPRDF, the current crisis is not systemic; so neither are the constitution or the institutions, nor the political line (Lefort, 2016). Such analysis had shaped the posturing of the government to *consider the ongoing stalemate as a threat.* Prior to 2016, the government has downplayed the impact of the disapproval of Oromo students to the Master Plan and the question of identity of Welqait People. Some of the students who protested against the Master plan received different punishments. In the latter case, the members of the committee formed to amplify the question of Welqait People were harassed, and imprisoned. Later, when the coverage of Oromo protests widened and the Amhara resistance engulfed, the government was forced to recognize the crises.

C. Response to the crisis

Political and Forceful Measures: The Derg regime severely punished the perpetrators of the coup and labeling them as espouse of the secessionists and betrayers of the national integrity. It continued to rule the country without substantial political reform. The civil war continued as it was though the rebels were in a continuous victory. Like its predecessor, the EPRDF attempted to diffuse the crisis. They blamed the protesters as trouble making criminal elements. In both regimes, the military and political measures have been implemented interdependently. The government blamed the Diaspora media and armed groups as instigators of the crisis. As a result EPRDF has used the military forces as an instrument of crisis response. Oromiya and Amhara regions entirely and SNNP and Tigray regions partially fall under military rule. During the state of emergency some of the frontrunners of the protests of the country have been killed, injured, disappeared, tortured, and detained (Alemayehu, 2017). According to the report of the secretary of the Command Post, Siraj Fergesa, in the course of the crisis, more than 600, and more than 21, 000 people were killed and detained respectively. Upon the suspension of the "state of emergency" he reported to the federal parliament that 7737 people were under custody, waiting train on remand.

Officials Reshuffling: In 1989, appointees were reshuffled. New generals and civil officials had appointed after the failed coup. But there was no significant change in the politics of the country. Similarly, the EPRDF has adopted ministerial and middle level leadership changes mainly in the federal government. The September 2015 established cabinet was replaced by new one on 22 October 2016. Most of the new comers in the cabinet were professionals and technocrats. For the second time, by late August 2017, there was another reshuffling in the members of federal cabinet and diplomatic missions. The latter reshuffling is self-evident that evinces the first cabinet change was hurly-burly decision. Regarding the regional government, the cabinet of state of Oromia has taken similar measure- including the appointment of new president. In general saying there was no policy change in both levels.

Substantial differences of the two regimes

Politico-legal measures: During the state of emergency of 2016/2017, the government has devised normative and practical measures of crisis maneuvering. These were nationwide "deep reform," announcing of draft proclamation to ensure the special interest of Oromia in Addis Ababa. However, the draft proclamation will be unconstitutional if the right of participation and self-administration of the people of Addis Ababa is denied. The constitution of FDRE in article 43 (2) has granted the people`s right to have pre-consultation upon the decision that are concerned with their fate.

Inter alia the fundamental and immediate causes of the current crisis were related with the Addis Ababa master Plan and the question welqait Amhara identity. In this respect, the suspension of the master plan and the drafting of law in view of answering the question of Oromo ethnic group have undertaken. The EPRDF decision of drafting law on the basis of article 49 (5)[9] of FDRE`s constitution is a step forward in realizing the constitution though "there are reasons to hold skeptic speculation on the prospect of the decision in bringing general peace."[10] On

[9]The special interest of the State of Oromia in Addis Ababa, regarding the provision of social services or the utilization of natural resources and other similar matters, as well as joint administrative matters arising from the location of Addis Ababa within the State of Oromia, shall be respected. Particulars shall be determined by law.

[10]When system challenged by political forces in Addis Ababa and elsewhere, EPRDF proved to use its Oromo affiliate as a play card to pursue indirect control and to confront its rivals. This was happened in the aftermath of the 2005 election victory of oppositions for the entire seats of the city. In this particular case, EPRDF decided the shift of Oromia region`s capital from

the other hand, the question Welqait seems a "Hot Potato," still untouched. The question is direct to TPLF, a dominant party in EPRDF. However, optimistically, still there is time to give genuine strategic solution for the said identity question by the TPLF.

Discussion with oppositions: In the aftermath of the crisis, unlike its predecessor EPRDF called general discussion. Twenty one (21) fledging political parties have been participating in the discussion with the ruling party. There is escapism on the capacity of negotiations and negotiators in bringing structural changes. Such doubt resulted in the boycotting of the discussion by certain popular and stronger parties. Practically, disregarding to the decision of the majority, the ruling group has the power to reject or and accept the ideas of the oppositions. For instance, according to Alemayehu (2017), EPRDF has objected to discus on the issue of sea outlet/ international border, releasing of political prisoners, national reconciliation, amendment of constitution and three others. The discussion has been undertaking without arbiters; and the extent of the fruitfulness of the said discussion is dependent upon the commitment EPRDF. The final agendas for negotiation presented in June 2017 (Yohhanis, 2017). These are amendments on the electoral law, anti-terror law, Charities and Societies proclamation, Media proclamation, and some others. Optimistically, the ongoing discussion is a step forward in dealing with the crisis.

Corruption related measures: During the Derg regime, there was no massive or systemic corruption. As a result, the issue of corruption had no or little emphases in crisis decision of the time. As stated above, in post-1991 corruption become the game of the system. In response, the incumbent government has been taking sporadic politic-legal measures. Currently, in late July 2017, the federal government imprisoned more than forty middle level officials and experts. This was applauded by the communication minister press release of late July 2017. It was proved that most of the suspects were former middle level officials and experts and thus the measure was accompanied by criticisms[11]. Political activists expressed that the high level officials who had expected to involve in systemic corruption continued to be key actors in detaining the low level corrupters. Generally, due to this and other reasons the corruption measures unlikely attract the attention of the public.

Instrument of regime survival: The Derg had no ethno-linguistic political base; rather it has come out of a committee formed from the armies of the country. The instrument of safeguarding of the regime was the military might and the propaganda of pan-Ethiopianism. Whereas the main root of EPRDF was the former rebel groups that formed along ethnic lines. And currently, gathering of people in their ethnic lines. Unlike the predecessors, the current elites utilize the ethnic plurality for the survival of the regime by the tactic of divide and rule. *Loyalty of the military elites:* The Derg regime was merciless for any misconduct and political divergence of military leaders. The system vividly betrayed by those generals though the root of the Derg was the armies. This was one of the factors that accelerated the collapse. On the contrary, most of the current military chiefs are the commanders and fighters of the former rebels who formed the ruling parties. In other saying, they were the leaders of the military wing of EPRDF and criticized by their allegiance to the ruling party, not for the democratic system.

VI. Concluding Remarks

During and in the aftermath of the 1989 coup, the crisis decision of president Mengistu was shortsighted. He did not consider the coup staged by the senior military leaders as a beginning of the end of his regime. Upon the failure of the coup, the coup makers were mercilessly executed. The political, military, and legal measures against the coup makers supplemented each other. Finally, the national forces left without experienced leaders and the processes resulted in the declining of the combating morals of the troops. In the face of the problem, the obvious military measures of the president against the rebels had continued. Although the regime had certain political bargaining power before and during the crisis of 1989, there were signals of risks of system collapse. The president did consider the majority crises of his leadership as threats, and he did not used it as an opportunity to build a new way of doing state business. As a result, he failed to have genuine negotiation with coup makers and rebels. Negotiation and an inclusive breakthrough with rebels along with the reconsideration of international diplomacy, and resignation of the president would have the possibility to minimize the risks that the country had faced later. If the president did so, the radical ethno-nationalists might not get a chance to realize the principle "divide and rule" in post-1991. Further, arguably, the Ethio-Eritrea (1998) war and the loss of sea outlet would not have the possibility to happen.

With regard to the current crisis of Ethiopia, since the type and the modes of the crisis were different from the past, some of the decisions of EPRDF have certain deviances from its predecessor. The responses for the insurrections in Oromia, Amhara and SNNPRS were peaceful negotiations, legal maneuverings and forceful measures. The government employed these tactics side by side. In the inception, there government attempted to discuss with religious leaders, community leaders, and youths though later the military measures have given priority.

More importantly, the suspension of the Addis Ababa Master Plan, the promise to devise political solution to the question of Welqait people, the undertaking of "deep reform" within the government apparatus and the ongoing negotiation with opposition parties" were some of the political measures. In addition, the drafting of law for the realization of the constitutional rights of Oromo people was one of the tempo changing political decisions of the regime. However, the regime`s problem analysis and the decisions were unlikely to recognize the structural problems related to the extreme ethnic

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Adama to Addis Ababa to counter the wining trans-ethnic party. Currently, the transfer of the issue of Weqait to *Tigray Region*, applauding of the Oromo`s right in Addis Ababa and the historical behavior of EPRDF dictate to express the fear that the effort of EPRDF to answer certain Oromo questions could be used as a tactic of get respite in its effort to diffuse, or to pass bungled responses for Welqait resistances.

[11]The critics said that the detention of those suspects was an attempt of setting agenda to divert the attention of the public from the strike and boycott against the regime`s general policy. Most of the activists reiterated that top level officials who have been suspected in grand corruption were not arrested.

nationalism, ignorance to pan-Ethiopiaism, the mix up of government and party, the deterioration of multi-party politics and democracy.

Moreover, in the history EPRDF, there were limitations in conducting fruitful negotiations with dissents groups. The previous attempts were not ended up with power sharing and accommodating the desires of ethnic nationalist and Pan-Ethiopianists. The ongoing discussions between EPRDF and the opposition political parties have been also accompanied by skepticism and boycotting by some political parties. Regional parties were excluded from the discussion. Most of the parties who have been participating in the ongoing negotiations are pseudo parties; they lack the bargaining power and organizational strength. However, the government has still the opportunity to pursue genuine negotiation that could touch both systemic and operational issues. This may be a way out to save the country from further chaos. Here, the ruling group is the duty bearer since fruitful result is dependent on the political will of the resourceful negotiator than the weaker parties of the negotiation. Generally, the regime is still in need for considering the current crisis as an opportunity to devise the mechanism of systemic reform and accommodation of pluralistic interests.

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Models of Maintenance Control on General Public Vehicles

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Abstract-Transportation is an instrument that we can not simply ignore, because it is a means of public needs, trade,and business circles, so that needed a fast service and guaranteed services both in transporting goods and passengers to the destination, but also accelerates needs of the community which in the sense of closer distance between villages and towns where workers who travel out of town due to residence and work far enough.Based on the geographical location of Indonesia as the largest country of 13,667 islands and clusters of large and small islands.Which may be required to build adequate transportation or carriage as well as support in providing services to the community in far provinces in Indonesia by land, sea, and air. The condition of three-way transportation is encouraging and is a reason for the use of adequate transportation so not prevent the progress and development of this all-modern things becauseit will impact our nation will be left behind with other nations whose have advanced.

Keywords:Transportation, Maintenance Control, Public Vehicles, Indonesia.

I. INTRODUCTION

Transportation is a very important and strategic to smooth the wheels of the economy, strengthen unity and integrity and affect all aspects of thelife of the nation and the state, based on various factors.Based on the geographical location of Indonesia as the largest country of 13,667 islands and clusters of large and small islands.Which may be required to build adequate transportation or carriage as well as support in providing services to the community in far provinces in Indonesia by land, sea, and air. The condition of three-way transportation is encouraging and is a reason for the use of adequate transportation so not prevent the progress and development of this all modern things. Otherwise, it will impact our nation will be left behind with other nations whose have advanced.

Transportation is an instrument that we can not simply ignore, because it is a means of public needs, trade, and business circles, so that needed a fast service and guaranteed services both in transporting goods and passengers to the destination, but also accelerates needs of the community which in the sense of closerdistance between villages and towns where workers who travel out of town due to residence and work far enough.

Development of transportation encourages the development of education in the sector of modern transportation and transportation technology modern transportation facilities and infrastructure, and the law of transportation or modern especially on land, sea, and air.

Article 1:[1]In this case, land transportation is one of the technology sectors that continue to develop. This can be seen from the increasing number and types of vehicles and flow of the traffic from day to day more solid. Innovation in this sector goes on and on as human needs for greater reach and coverage, but on the other hand, if not handled well this technology can turn into a very dangerous killer machine.

The statement above is not excessive, according to data obtained around the world at least every year the victims who died from traffic accidents almost reached 1 million. In Indonesia alone according to the data of the Directorate General of Land Transportation of the Ministry of Transportation (DitjenHubdarDephub), the average number of victims died within 1 year is 10,696 people or more than 20 families each day who lost their family members. Even according to World Health Organization predictions (WHO) that traffic accidents are the highest cause of death by 2020 to come.

The high traffic accidents on the streets have become one of the factors of the soaring family poverty rate. The number of road accidents each year is estimated to be 62.50% of the 30,000 victims died and 13% are seriously injured.

From the data that I've got, we can see the number of victims from several years :

NO	YEAR	INFORMATION
1	2008	17.107 accident 12.308 victim died
2	2009	15.097 accident 11.778 victim died

[1]Muhammad Subair Reform of Public Transportation System as an Effort to Improve Traffic Safety and Road Transportation

		9.002 people heavy injured 10.857 people minor injured 27,3 Billion Rupiah material loss
3	2010	15.097 accident 9.536 victim died
4	2011	12.267 accident 8.762 victim died 6.656 people heavy injured 8.929 people minor injured 41.03 Billion Rupiah material loss

As we know the human error factor is the main cause of the accident. Human here is identical with the driver, actually also in the passengers, pedestrians, street vendors, road builders until the government policy makers. Besides the road factors, weather circumstances as well, regulations and environments are also factors of accidents. But all is still back to the human factor because all other factors can be anticipated and controlled by humans.

The lack of traffic awareness of road users causes frequent accidents in each city and region both within and outside the country. But the highest rates of accident occur within the country, Indonesia in some cities as happened in Situbondo, and other cities.

II. Research Method and Data

1) Research Design

The objective of this study is to give a contribution of thought and brief description to all parties who have the same interest and interest with this research material.

For the authors themselves, this research would like to observe the level of public transport service for the public to use transportation with comfort and safety level guaranteed, so government role is required to be more serious and pay more attention to the rights of the people to obtain transportation services with full responsibility.

2) Research Method

The author uses a normative juridical approach in discussing this research. Take notice the applicable legal norms as well as their application in the problems and rights of the people and solutions.

3) Sources

a. Legal Material Primary Source

The primary legal materials are derived from interviews with the DLAAJR East Java office as public servants as well as autobus transportation corporate and citizens as passengers in the public transportation service process.

b. Legal Material Secondary Source

Secondary law material comes from reading and studies the literature books and legislation, scientific article, newspapers, and magazines that have similar topics to this research.

4) Instruments

The primary data collection procedure is done by conducting a field study through interviews with related parties, namely DLAAJR East Java Officers, Autobus Company and public transport passengers. Secondary data collection is done by literature study, then process the data by collecting, selecting and arranging systematically to obtain accurate data and can be accounted.

5) Data analysis

The data which have been compiled will be analyzed by theanalytical descriptive method, which describes the problem, expresses the views and opinions and finally solves the problems contained in the data.

III. DISCUSSION

Public transportation problems, along with government development activities in line with technological developments that are increasingly rapid and rapidly in the current era. Traffic and road transport is a very important component and its role in the development can not be ignored. In Law No.14 of 1992 on Traffic and Public Transport.

Article 2:[2]"Road transportation as one of the easiest national transportation is based on benefits, joint effort and kinship, fair and equitable, equilibrium, public interest, integrity, legal awareness, and self-belief."

Transportation is one of the main components in the development of a regional economy, therefore a goodtransportation system will have an impact on the improvement of the accessibility so that the region can be easily reached from various regions.

Based on the above, it can be said that transportation will facilitate the achievement of development goals which also means will accelerate the improvement of living standards of the community. Basically, transportation includes three basic dimensions, i.e. :

a. Transportation as a business :

[2]Act number 14 of 1992, article 2

Transportation as a business includes the following characteristics below :

- Based on the agreement
- Economic activity
- Company-shaped
- Using mechanical carrier

b. Transportation as an agreement

It is generally verbal but always supported by transport documents proving that the agreement does not occur.

1. Legal Efforts

On this subject, the author will bring up theamount and the result of traffic accident happened in the area of Polda Metro Jaya (Jakarta) and some practitioners, academic, and social opinion about traffic accident as material to be analyzed. With the increasing number of fatal accidents like wounded people, and the damage is increasing, although it appears to be slightly more than some inadvertence cases of accident. The use of public transportation is declining even though the Government intervenes and provides high subsidies. Inconsistent services, uncertain schedules, and increased tariffs have reduced the use of public transportation.

Population in the metropolitan city consider that the Government needs to take action to reduce traffic density as is done by the Singapore which limits the number of motor vehicles. In spite of all that, the problems seen in the transportation world underline the importance of examining public policy. According to Owen (1976) states that whatever steps are taken by policy makers in the future, they should pay attention to the existing sectors, among others ;

1. The amount of dependence on motor vehicles and how they affect the location of their work.
2. The public transport system shall be able to serve the entire territory effectively.
3. The ability of the Government and its policies to provide a fair transportation system to either people who own cars or not.
4. The combination of new technologies and efforts to create a better city environment over the long-term.
5. New problems become more complicated due to uncertainty in energy supply.
6. Solving the problem of urban transport through the approach of the state sector and private sector and itscost implications on Government policy alternatives.

Traffic Awareness and obedience, increasing the number of vehicles themselves as a result of population growth. While the law is the only one that created to stem the traffic accidents as long as other aspects support. Therefore, the similarity steps of all parties must be fostered to overcome traffic accidents at the earliest possible time, the responsibility of all parties without exception.

If in the last 5 years the number of accidents increased by 11% per year. Perhaps this condition will continue to grow if not accompanied by improvements in land transportation.

In this case, traffic and road transport are organized for :

a. Realization of a safe, orderly, smooth, and integrated Road Traffic and Transportation service with other modes of transportation to support the national economy, promote the common good, strengthen the unity the nation, and be able to uphold, the dignity of the nation;
b. Realization of ethics in traffic and culture of the nation; And Realization of law enforcement and legal certainty for the people

2. Carriage and Transportation Functions

Transportation and carriage function, in order to foster a steady economic development, needs to be achieved by balancing the supply and demand of carriage services, among others:

-freight services have less availability from demand occurs congestion of goods flows, then there was a price fluctuation

-Transportation services exceed demand, there will be anunhealthy competition that causes many companies to lose and stop their activities so that the service offer is reduced and the flow of goods is not smooth.

-The carriage as a passenger and development incentive (The Promotion Sector) and service delivery (The Servicing Sector) of the economy. Carriage sectors must be built ahead of other sectors for smoothness.

The benefits of carriage are not an objective, a means of achieving existing goals with goods and services. To meet diverse needs it can be seen from various aspects of life that can be grouped in economic, social, politic, and territorial benefits.

To reduce the very high number of traffic accidents, future efforts are directed to comprehensive control covering the efforts of development, prevention, regulation, and law enforcement. The development effort is done through increasing the intensity of education and human resources development.

3. Countermeasures Effort

Prevention efforts are made through improvements, roadway monitoring, road facilities, and infrastructure, as well as vehicle feasibility, including more intensive road and traffic controls. Regulatory arrangements include the management and design of traffic and modernization of traffic facilities and infrastructure. Efforts to enforce the law are implemented more effectively through the formulation of clearer legal provisions and the application of more strict sanctions.

Indonesia has not been able to follow the example of other countries where the enactment of safetybelt is very important, the discipline of police officers and cooperation with the community itself. [3]As for an action to conduct raids to find public transportation that does not meet the requirements of safety facilities, accompanied by action by giving a reward and punishment. As commonly, the

[3] Ibid, page 2

construction of passenger vehicles puts the front and rear doors so that emergency exits can be placed in the middle of the left or right side or on the roof of the vehicle.

It reflects how low the concern of the transport company to create a guidance program or provide guidance to the passengers on the safety of the passengers, so that in thecase of accident happen can minimize the victims.Every accident that ever happened, is a lesson that is associated with the science of traffic is theshort-term conclusion, the government should focus on areas of thetraffic situation, especially the safety facilities and vehicle conditions. The government needs to immediately conduct a feasibility test for the bus, truck and public transportation process.

Safety facilities in public transport, buses include emergency exits, sliding glass that must be opened automatically or manually, and glass breakers. It is important to remember that public transport buses do not have any facilities. As a result, all passengers, except drivers and bus assistantcan not save themselves from the raging fire the bus. If a violation of the regulation of the facility is met, the government is entitled to impose punishment in accordance with the applicable regulations of the company or service.

The maximum loading of passengers which exceeding the capacity becomes one of the most difficult issues to prevent, which leads to uncomfort the passengers, and this is a violation of the provisions of the Act which may result in accidents.

Drivers who are not disciplined and do not comply with the Rules of Law are the main reasons that cause traffic accidents, disobedience of the driver is the proof that the human resources are still low discipline, plus the law enforcement is not assertive and inconsistent and this is further evidence that the enforcement road transport law is very weak.

IV. Conclusion

Good traffic enforcement is highly dependent on a number of factors that have been hardly noticed, namely: enforcement of legal compliance from law enforcers themselves, straightforward attitude (zakelijk) from law enforcement, traffic regulation adjustment with respect to An effort to cultivate an understanding of traffic regulations, an explanation of the concrete benefits of the regulation, and appeal to the community to help enforce traffic rules.

Law enforcement on the roadway is a very complicated thing. First of all law enforcers must be able to maintain his authority for the benefit of his profession. On the other hand, he must have confidence in himself to take a wise judgment, resulting in justice. A prospective driver's calibration in order to obtain a driver's license should be considered in terms of the driver's intelligence level, the ability to take immediate action, the physical aspect of the driver/applicant driver.

V. Suggestion

The road users must have courtesy ethics on the road and obey traffic rules, for example to the left of the road continue or to follow the lights signal if want turn to the left, parking is prohibited also Cannot throw garbage on the street carelessly. Driving speed should be adjusted to the road conditions, whether the road is crowded or vacant,in the morning, noon, evening, or night. For public transport so as not to raise or put down of passengers carelessly. In using the road, we must realize that not only us who use the road, but everyone is entitled to use it. everyone is obliged to keep courtesy on the road, one of them is obeying traffic rules.

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Building a Revolutionary Breakthrough in Virtual Banking Innovation- Malaysian Banks Perspective

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Abstract: The purpose of this study is to understand how banks can build revolutionary breakthrough in virtual banking innovation by understanding customers' future banking needs and future banking trends by using Porter's generic strategies to build competitive advantage to maintain relevance and staying profitable. This paper will be a conceptual survey of literature and implications in implementation of generic strategies in banking industries. Through the study of literature, it is observed that Malaysian local banks are moving towards banking revolution in innovation to meet customers' future banking needs and this study identifies how Porter's generic strategy will assist Malaysian local banks in achieving its' competitive strategy. The banking industry in Malaysia has gone through series of transformation to remain resilient and relevant. Therefore, this paper focuses on uncovering strategies for a breakthrough in virtual banking services in Malaysia. It is suggested that future study to evaluate the significant contribution of Michael Porter's generic competitive strategies in virtual banking as a revolutionary breakthrough in virtual banking innovation for local banks in Malaysia. This paper presents a proactive way of understanding customers' future banking needs and thus, gives an insight to Malaysian local banks on the most prevailing strategies to remain competitive.

Keywords: *Revolutionary breakthrough; Virtual Banking; Innovation; Malaysian local banks*

I. INTRODUCTION

Amidst of all turmoil with an unprecedented financial crisis, Malaysian banking industries were among few to maintain resilience. However, due to changes in customers' expectation and technology revolution, Malaysian banks need to create a revolutionary breakthrough in virtual banking platform to distinguish themselves from their competitors and grow their customer base. Doukanaris (2016) stated that, corporate customers want flexibility, transparent and innovative solutions. The rise of multi-bank platforms and competition between banks have opened opportunities to non-financial competitors, who approach innovation with a different mind-set that may be seen as a breakthrough in innovative edge. Hines (2016) viewed innovation as opportunities for banks to offer improved services in information processing and transparency, increased visibility over cash flows positions, cash-flow forecasting and a better risk management. Banks customers' sees innovation, not about incubators and accelerators, but about simplification, increasing usability, straight through processing and digitization.

The twenty first century development in innovation brought significant changes even in a customarily staid and stodgy field in banking services. ATM which is now known as an ancient invention compares to the recent development of "Robo-advices" in the financial industry have benefited banking customers. As a result, with the emergence in information technology, customers are enjoying the ability to move money virtually and to access their banking information. Hines (2016) stated that for global banks, lack of liquidity is stifling investment. As such, banks will remain focused on cost savings, then on, growth where most innovation in banking to date merely makes a manual process electronic rather than transforming it. Besides lack of liquidity, banks are held back by their internal compliance regulations, new competitors and growing customers demand. These forces are ratcheting up the pressure for most banks to innovate (Doukanaris, 2016).

The significance of this study is to build a revolutionary breakthrough in virtual banking innovation. The objective of this study is therefore;

1. To identify the initiatives of banks in Malaysia towards sustainability and growth.
2. To identify virtual banking breakthrough in innovative strategies.
3. To look at recent banking trends and studies being carried out to have a better understanding on customers' expectation and future banking needs.

This study will focus on Michael Porter's generic competitive strategies combines with digital innovations in various studies to assist the authors in finding a revolutionary breakthrough in virtual banking innovation. At the end of this study, it is hoped that this study will be able to provide insights to Malaysian

local banks on customers' future expectation on virtual banking solutions, suggestions on several strategic recommendations, and, can be used by future researchers to further evaluate the significant contribution of Michael Porter's generic competitive strategies in virtual banking innovation.

II. REVIEW OF LITERATURE

Industry structure drives competition and profitability is not limited to products and services it produces or solely by engaging in advanced technology. There are several factors which affect industry profitability and this may include economic influence, business cycle, industry nature and a company's manifestation in competitive forces. Therefore, by understanding the company's competitive forces and underlying causes, will assist a company to reveal the roots of its' current competencies and profitability which will provide a framework for anticipating in competition and thus, increase profitability over time (Porter, 1980).

Effect of technology transformation to banks and overall economic growth

Service sector technology has gone through a dynamic transformation in the recent years and has greatly been influenced by a country's economic growth. The rapid evolution and transformation in technology, web-based services and high tech environmental services indicates that the impact of technology advancement can no longer be ignored but to be embraced with consistent evolution in innovation and breakthrough. Sanjay (2013) stated that the banking sectors in this twenty first century have gradually evolved into a market driven, competitive system as it is greatly being influenced by the liberalization of financial services and technological revolution.

In Malaysia, due to demand for efficient banking services which is faster, cheaper and simpler, Financial Technology (Fintech) has become an important topic of interest and has created a more efficient payment ecosystem (Fong, 2016). Introduction of Fintech is believed to create a more prominent business models to business, delivery channels will evolve to replace the existing channels and transaction costs will be reduced significantly. However, the Fintech revolution should be embraced as an opportunity to meet the revolution in technology innovation (Ibrahim, 2016). Maybank, CIMB Bank, RHB Bank and AmBank are the 4 largest banks in Malaysia embracing Fintech into their ecosystem to efficiently reach out to their customers (Fong, 2016).

Broeders and Khanna (2015) stated that institutions that resist digital innovation will experience a steep fall in net profit to as much as 35%, whereas institution that successfully innovates, automate processes and use digital technologies will experience increased revenues by up to 40%as referred to Table 1.

Table 1: Digital Banking Innovation, Potential Rewards and Losses

Source: Bank's Strategic Choices in Digital Edge. McKinsey (2015)

Technology evolution will continue to affect every aspect of banks operation. Today, in many markets, movement of new entrance into the financial sector is inevitable. In China as an example, within the2nd year after launching wealth-management platform, Alibaba has attained $100 billion in assets. The importance of digitized payment solution sees more innovation from Apple Pay's contactless-payment technology (Denecker, Gulati and Niederkom; 2015). Therefore, it is crucial to create successful strategies based on how digital creates value on consumer behavior and how to carefully prioritize potential digital instrument (Broaders and Khana; 2015).

According to Broaders and Khana (2015), there are 4 fundamentals ways in which banks can use digital capabilities to create values;

1. Digital capability enables banks to effectively connect to its customers, employees and suppliers by the extension of online interactivity and payment solutions which has greatly improved mobile functionality and opportunities.
2. Digital technology provides advanced analytical platform which enables banks to use information collected for decision making, thus, gives customers the exact tailored services and price.
3. Digital technologies simplify processes; saves time, boost productivity and workflows.
4. Digital technology forms away of fostering innovation across all products and services and such crowd source support and digital centered business models.

However, for a complete digital transformation, high level coordination, planning and prioritization needs to be in place which include;

1. **Customized customer experience**.
   Customer's journey and experience in using banking services should be highly differentiated and compelling, personalised, speed, and simplicity which includes applying as well as getting approval for banking applications.
2. **Personalization, data leveraging and advanced analytics.**
   The advancement in technology has improved data collection. However, most data are still unused (Broaders and Khana, 2015). Applying advanced analytics to create targeted offerings will create great value if real time date being analysed, transformed into useful information to generate insights for banks to create next product or services tailored for individual customer.

Banks need to innovate and differentiate themselves from their competitors

The importance of continuous innovation and differentiation can no longer be ignored by Malaysian local banks. Flattening returns in the area of operation profits as well as return on assets and declining price earnings ratios compels banks to rethink their growth strategy from the inside out of the traditional banking industry, as it shows a declining confidence by the market on the bank's ability to grow. Besides declining returns, the emergence of new competitions for new players, consolidation among the largest banks most of the basic retail banking products and services forces banks to reinvent and innovate. Thus, innovation is the only way to achieve that (Goyal *et. al*., 2016).

Porter (1998) stated that competitive advantage create value for its customers, which customers are willing to pay, and often, this value exceeds its own cost. These values are of often of superior benefit compared to what their competitors have to offer. Competitive strategies involves taking a defensive and offensive action to create a defendable position in the industry, and with generic strategies firms will be able to cope with the five forces in the industry and compete with its' competitors. Generic strategies include overall cost leadership, differentiation as well as segmentation strategy which, often, only one strategy has been pursued (Tanwar, 2013).

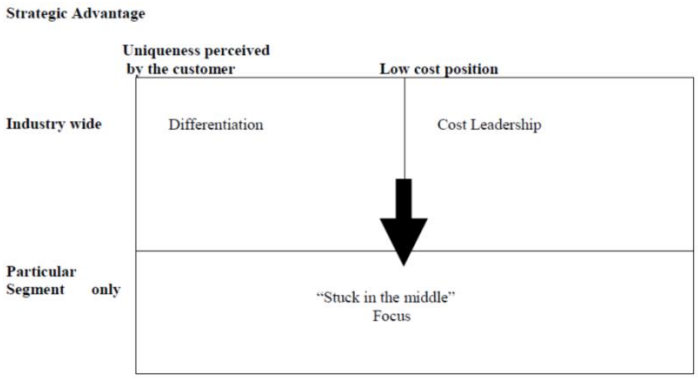
Business challenges today are making change imperative. Analysis and hedging about core systems transformation has to take place due to the market challenges which is currently impeding growth and business expansion, these include growth in mobile wallet, the need for new sources of revenue and the need to accelerate time to market for a new product or service, regulation imposed on businesses as well as banks after the financial crisis, increasing competition from new entrants such as Walmart and PayPal, banks' requirement for managing credit risk, complex environment, emphasises on total cost of ownership (TCO), the requirement for faster return on investment (ROI) and investment in information technology due to depleting capital.

Management decision to achieve their strategic visions affects its' competing firms as a whole. As such, firms have to fit into resource exchange and competitive action effort with other firms in an industry to form an adaptive system to remain competitive. The configuration of Porter's generic strategies differs by industry and this structure will determine the strength of Porter's generic forces. FIGURE 2 explains Porter's generic competitive strategy.

Porter's Generic Competitive Strategies

According to Michael Porter, firms may achieve sustainable competitive advantage in three fundamental ways. These include differentiation strategy, cost leadership's strategy and focus strategy. By being a cost leader, a firm may exploit as well as take advantage and aims for being a low cost producer in the industry. A firm who is said to have adopted a differentiation strategy seeks to be unique in the industry by offering products and services which are highly valued by its customers. Whereas, a firm adopts focus strategy, tailors its strategy to serve a specific group in a narrower scope (Tanwar, 2013).

FIGURE 2 : Michael Porter's Generic Model



Source: Porter (1985)

Porter (1985) argued that attractiveness of a firm and its' position in an industry forms the primary determinant of a firm's profitability. A firm which is optimally positioned has potential to achieve superior returns by leveraging its' strength to position itself in the industry. Porter (1985) has also argued that a firm will either be a cost leader, adopt a differentiation strategy or focus strategy, but not all at once as generic strategies are not necessarily compatible to each other. Companies that combine these generic strategies will likely to be stuck in the middle, whereby, customers will find more value

in the firm's competitors with more defined position in the industry. Therefore, a firm that needs to succeed must achieve at least one of these strategies. A firm can succeed with multiple strategies by creating a separate strategy in different business units. By adopting a separate strategy in different business segments, different policies and cultures, organization is believed to be able to avoid "stuck in the middle".

FIGURE 3: Generic Business Strategy

Source: Strategy and Competitive Advantage in Banking Business Technology (2014)

Differentiation Strategy

Cost leadership and differentiation strategies seek competitiveness in a broader range of market or industry segments. Whereas, cost focus strategy and differentiation focus are adopted in a smaller market or industry segments. Porter (1985) stated that, a low cost leader must find all sources of cost advantage without ignoring the sources of differentiation which means being a cost leader, a firm must succeed in gaining differentiation proximity or parity. Porter (1985) further states that cost leadership is suitable when a firm has economies of scale and possess the ability to further reduce its' cost to experience a curve effect.

Differentiation strategy develops a unique product or service that offers values to the customers that is not price sensitive, less competitive market segments, and where customer perceives these products and services to be better or unique from the competitors. Customer's need and demands must be accurately defined, valued and delivered. A firm may differentiate itself from its competitors through unique product features, establishing brand image, exclusive product features, product line and technology. In a highly competitive market such as banking industry where products are highly identical and with nearly the same price, brand image will be the shortest route to differentiation, product features and customer service (Auka, 2014).Auka, (2014) further stated that implementing differentiation strategy requires overall consideration in an organizational structure, involvement of management decision and controls, and implementation of cost leadership strategies. These implementation arrangements and tools should not only fit, but also include enforcement of strategies (Auka, 2014).

Differentiation strategy also provides a firm the ability to reduce five threats of rivalry, threats of entry, threats of suppliers and threats of buyers, substitutes, besides creating value as well as the ability for firm to charge a premium price.

Cost Leadership

Cost leadership means offering a lower price to customers compared to its' competitors with a similar product or service. Cost leadership allows companies to operate efficiently, become an effective price leader, undermining its competitors and gaining a growth advantage in the industry through a successful price war. Besides using cost leadership strategy to achieve competitive advantage in a particular industry, a firm can also improve its product and services by offering value leadership strategy to gain customer satisfaction, though this may require a higher cost from the customers, a firm still able to attain high margin (Porter 1980). A firm with a successful cost leadership strategy derives its cost advantage from multiple sources within the value chain and frequently configuring its cost structure, it is able to create a sustainable cost advantage.

Focus Strategy

The focus strategy aims at attending to specific niche which requires specially customised features and prices. Porter (1985) proposed this strategy of penetrating into a niche market segment by either focusing on differentiation on products, services or on costs. Focus strategy aims at achieving competitive advantage in selected segments but not overall. Focus strategy takes advantage of competitors who may not be meeting customer specific expectation in the segment, thus opens the possibility of differentiation focus. If competitors have a broader target, this may lead to a higher cost due to over performing in meeting customer needs. However, this may open an opportunity for cost focus.

A focus strategy takes advantage of sub-optimization where competitors may be under-performing in meeting special customer needs in the segment. If competitors have broad targets they might be over-performing in meeting customer needs in the segment, this leads to higher costs than necessary

for serving the segment. This opens up the opportunity for a cost focused.

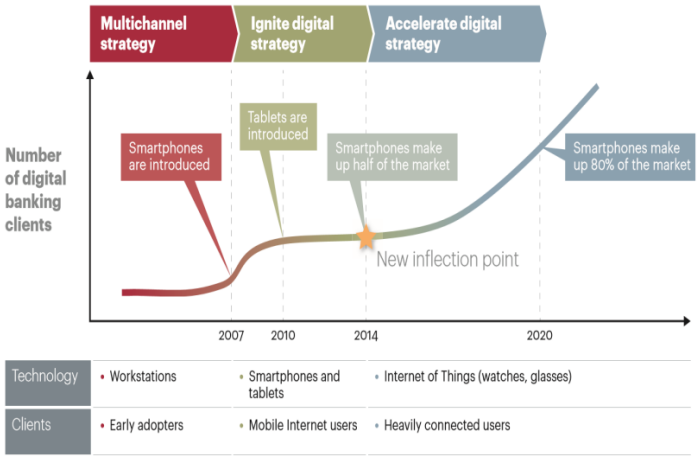
III. METHODOLOGY

This paper will be a conceptual study based on literature reviews. For the purpose of this study, the official website of few selected banks in Malaysia was selected, namely, Maybank, CIMB Bank and RHB Bank were being analyzed to understand products and services that are currently available within the respective bank's virtual banking platform. This study also looks into previous studies being done by previous researchers with regards to the future of virtual banking and the impact of technology evolution in virtual banking settings. This study will then explore the effect of Porter's generic competitive strategies in Malaysian local bank's competitive environment to how competitive advantage is attainable by understanding Porter's generic competitive advantage and its profound contribution in innovation and revolution in virtual banking. Porter (1998) suggested that, investment decision does not only make it difficult to forecast certainty in an equilibrium setting of an industry, but, industries may evolve using a different path, at different speeds depending on these decisions.

IV. FINDINGS

Maybank, RHB Bank and CIMB Bank have begun their virtual banking journey years ago, yet, these banks are still facing rapid changes. Revolution strategy, therefore needs to be in place to address customers' banking needs. Perhaps, the most important step, however, is for Maybank, RHB Bank and CIMB Bank to acquire a drastic breakthrough of how banking staff should respond to customers' need. Adopting Porter's focused differentiation strategy allows banks be conscious about personalizing customers' needs to gain market share faster in the banking industry. Understanding the banks' organization create significant obstacles to new banking solutions for its customers. Therefore, most importantly is for banks to look into its own bank's internal setting, changing organizational beliefs and existing habits exclusively to facilitate customers' needs and to successfully drive and evolves in innovation.

FIGURE 4: Banks Acceleration of Digital Banking Strategies



Source: A.T Kearney Analysis (2014)

Virtual banking is no longer a new development. A survey conducted by A.T. Kearney (2014) found that smartphones will make up 80% of the market in 2020. In Latin America as an example, mobile transactions have overtaken volume across all other channels, whereas in Europe, clients have more contacts through mobile than on a computer. Smartphones and digital payment evolutions offered by non-financial institutions can no longer be ignored. In the case of Malaysian Local banks, which have been on the digital journey platform for the past years back, the adoption rate is just halfway through. The global pick up pace and spread of smartphones, Internet of Things which will greatly evolve customers' behavior and thus, will compel Malaysian local banks to look through its virtual banking offerings, a breakthrough is therefore inevitable.

FIGURE 5: Mobile Banking Penetration Rate in Malaysia

Internet Banking

million	Number of Subscribers			Penetration to population (%)
	Total	Individual	Corporate	
2005	2.6	2.5	0.1	9.8
2006	3.2	3.2	0.0	12.0
2007	4.6	4.5	0.1	16.9
2008	6.2	6.1	0.1	22.5
2009	8.1	8.0	0.2	28.9
2010	9.8	9.6	0.2	34.4
2011	11.9	11.6	0.2	40.9
2012	13.7	13.4	0.2	46.4
2013	15.5	15.2	0.3	51.9
2014	17.6	17.3	0.3	58.2
Mar-15	18.2	17.8	0.3	60.0

Mobile Banking

000	Number of subscribers	Penetration rate (%)	
		To population	To mobile subscribers
2005	127.6	0.5	0.7
2006	246.7	0.9	1.3
2007	367.6	1.4	1.6
2008	574.6	2.1	2.1
2009	675.0	2.4	2.2
2010	898.5	3.1	2.6
2011	1,560.3	5.3	4.3
2012	2,446.2	8.2	5.9
2013	4,378.8	14.6	10.2
2014	5,639.2	18.6	12.9
Mar-15	6,158.6	20.4	14.1

Source: Balance of Payment (Bank Negara Malaysia Report, 2015)

Bank Negara Malaysia report (2015) shows the increase in growth of adoption rate in internet banking and mobile banking in Malaysia from 2005 to Mar 2015. FIGURE 5 shows a penetration rate of less than 20% of the total mobile or internet subscriber. With the spread of mobile banking which is forming

a new rule for retail banks in Malaysia as banks seek to meet customers' expectation, the digital banking strategy may need to incorporate ;

1. Visual, easy and smart to use interfaces services.
2. To consequently cultivate and develop the emotional relationship with their customers to be "always connected" through various channels.
3. Secured and trusted platform for customers.
4. Constantly innovate and keeping pace with latest technologies.

Revolution of virtual banking and its implementation in Malaysian local banks and adopting Porter's differentiation focus strategy will anchor 3 dimensions; open innovation, client centricity, and organizational flexibility.

1. Openness to Innovation, will require a mix of digital and marketing teams to produce a concrete innovation that is ready for customer use. A combination and close connection of internal and external know-how market realities with lead to a valuable innovation and revolution.

2. Client centricity focuses on the customers' experience and in-depth examination of the role of a branch. Three success factors to be considered; be attentive and pragmatic to customers' expectation, be ready and creative to enhance customer experience in innovative banking solutions by referring to Porter's focused strategy and to rethink the role of branches. Changing the role of branches may change the habits, beliefs, incentives and experience of bank staff to adapt to cultural changes, acquire new knowledge and skill to the newly digitized customers.
3. Organizational flexibility is crucial for banks. With the technology proliferation and the crucial need for faster time to market for new service, fundamentally renowned IT platform is needed; where it is able integrate external cloud services with bank's front end IT. Therefore, an overall change in banks cultural setting need to embrace the latest technology, emphasize and drive mind set which is focused on customer solution.

The future of virtual banking experience will need to lead customers to a new paradigm in Malaysia. Banking products and services delivery model need to integrate with internal as well as external forces and the integration between employees, IT personnel, customers, suppliers can no longer be ignored. By applying Porter's 5 forces competitive strategies and Porter's generic competitive strategy, will provide a clearer view of strategies most suitable for different market segments and different customer needs in Malaysia. Porter (1985) stated that generic competitive strategies could not be implemented simultaneously in a same market. However, implementing different strategy in different market settings by a single bank will create competitive strategy. Example, adopting a different model of differentiation strategy in different markets in Malaysia such as personalized product of service to different individual will help banks to penetrate markets, gain market shares compared to its competitors where these customers' who are not reachable by competitors.

Standard Chartered as an example, had rolled out Retail Workbench in countries such as Korea, India, China, Bangladesh, Malaysia, Singapore, the UAE, Kenya, Nigeria and Pakistan. Retail Workbench is a form of "bank in iPad" sales and service tools which is integrated with the banks' back-end infrastructure. This enables bank staff to access customer's information and meet customers anytime and anywhere to open an account, perform a transaction or approve a loan completely paperless, fast and simple (Global Finance 2016).Korea innovation on "Touch Login Biometric Technology" which was introduced in Singapore early 2016 will expect to be able to reach out to 5.5 million clients in over 16 markets in Asia, Middle East and Africa by the end of 2016 (Hines, 2016). Standard Chartered's example of differentiation focus strategy has taken it a step ahead compared to its' competitors in terms of innovation and time to market and has evolved into brands preferred by customers for financial solution.

Curry (2016) stated that, Asia's is an emerging market with great potential and it is an important destination in driving capital inflows from other emerging markets and mature markets due to its massive growth in the recent years but requires extensive automation and new services. Being part of Asia's emerging market, Malaysian local banks need to therefore learn a new approach in meeting customers' changing needs while customizing and segmenting by customer's sophistication, looking into bank's operating strength, capability and the customer's preferences will boost customers' experience, thus therefore improves margin and profitability by identifying and organizing different cluster within them. Malaysian local banks need to organize its' products and services around by a clear understanding of what customers really want rather than assuming what customers really want. Customers want a simple, secure, efficient, invest their funds with surety and certainty and these has to move with speed, watertight solutions using new technological environment with more opportunities in subverting transactions.

V. CONCLUSION

Maybank, RHB Bank and CIMB Banks have implemented virtual banking solution. However, with the low internet and mobile banking adoption rate in Malaysia (Bank Negara

Malaysia, 2015), revolution and breakthrough are essential for these banks to be competitive with foreign banks in Malaysia and in developed countries.

The purpose of the current study was to assist the authors in finding a revolutionary breakthrough in virtual banking innovation by assessing Porter's generic competitive strategies, combining it with various studies on digital innovations with an objective to identify the initiatives for Malaysian banks towards sustainability and growth. Economic influence, business cycle, the nature of banking industry and the bank's own manifestation affects the profitability of banking industries. By understanding the bank's competitive forces and underlying causes, it will assist the bank to reveal its competencies, which in turn will provide a framework for banks to anticipate in competition, meeting customers' needs and achieve customer satisfaction.

Maybank, RHB Bank and CIMB Bank are among three largest bank in Malaysia which have been taken for the purpose of this study and the findings to emerge from this study is that these banks need to acquire a drastic breakthrough of how banking staff should respond to customers' need. Though virtual banking is no longer new in Malaysia, the adoption rate remains low with a penetration rate of less than 20% of total mobile or internet subscriber as reported by Bank Negara Malaysia in 2015. Customers need trusted, personalized, tailored services with most reasonable prices, digitally simplified processes and secured banking platform to perform their banking transactions. The findings in this study enhances our understanding of Porter's focused strategy, in general, allows banks to be conscious about customers' needs by first looking into the bank's own organizational settings, its' competencies and strength, and, the overall demographic settings. In addition, banks need to change its' own internal settings, organizational beliefs exclusively to successfully facilitate customers' needs and evolves in innovation. Virtual banking revolution in Malaysia needs to incorporate strategies which are visual, easy with smart use of interfaced services, consequently, develop the emotional relationship with customers and enhanced with secured and trusted platform.

Finally, a number of important limitations in this study need to be considered. The current study was limited to, study of previous literature and banking reports. Conceptual framework and where statistical analysis confirming this theory is yet to be done. More broadly, further studies need to be carried out to confirm the significant relationship between Porter's generic competitive strategies in contribution to banks' competitiveness in forming its strategy to achieve breakthrough in virtual banking innovation. In the new world of customer centric, application has to be able to communicate with each other, embeds with integrated, end-to-end solution. Applying Porter's generic competitive strategy by understanding what customers really want rather than assuming what the customer really needs, clustering around customer segmentation along with an integrated innovative digital experience will create a breakthrough in virtual banking solution among local banks in Malaysia.

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Use of Mental Accounting in Purchase Decision Making with Reference to Demographic Characteristics of Consumer

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Although the term Mental Accounting sounds strange to many people but knowingly or unknowingly every people is aware about mental accounting. Every human being allocates their budget mentally before attempt a purchase. Mental accounting plays a decisive role in purchase decision making. Thus after considering this psychological fact of people, the present study tries to explore the importance of mental accounting in purchase decision. The present study doesn't confine to only exploration of importance of mental accounting in purchase decision but also tries to place mental accounting as a vital stage in buying decision making process. The findings of such a study is expected to hold much importance in better understanding the basic and analytical manner in which the customers' minds work while deciding on their purchases; which, in turn, would be helpful in developing various marketing strategies in respect of timing of offers, pricing, payment aids, product launches, transaction facilitation, so on so forth. Moreover, this paper tries to add some more ingredients in mental accounting theory which was propounded by Richard H. Thaler.

Keywords: Mental Accounting, Consumer Decision Making Process, mental accounting process.

I. Introduction:

Today market is totally consumer oriented. Consumer is the king in today's marketing world and the priority of marketer is to make consumers always happy. There are different types of decisions taken by consumer in order to get final purchase of "what to buy, how to buy, when to buy and how much to buy." But the question arises that how they take their purchase decisions, how they allocate money for everything they need to purchase. So now the concept of Mental Accounting arises which means to the tendency for people to separate their money into different accounts made by consumer themselves according to the origin of the money and intent for account.

The term mental accounting is named by Richard Thaler. Mental accounting is the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities. Mental accounting theory states that a people separate their money into mental accounts, necessarily treating a rupee in one account differently from a rupee in another since each account has a different significant. The overarching notion behind the theory is that people think of value in relative rather than absolute terms. They derive pleasure not just from an object's value, but also the quality of the deal.

A core idea of mental accounting it that people treats money differently, depending on factors such as the money's origin and intended use, rather than thinking of it in terms of formal accounting.

Objectives of the study:

The objectives of the study are laid down as follow:

(i) To determine the importance of mental accounting in purchase decision with regard to different types of purchase behavior

(ii) To show Mental Accounting as a stage in buying decision making process with regard to different types of purchase behavior

II. Review of Literature:

Hasting& Shapiro (2012)carried out a study on "Mental Accounting and Consumer Choice: Evidence from Commodity Price Shocks." They embeded the test in a discrete choice model of product quality choice and estimate the model using micro data on gasoline purchase. They evaluate the qualitative performance of a set of psychological models of decision making in explaining the pattern they observe.

Heath, *et al.* (1995**)**studied on "Mental Accounting and Changes in Prices: The frame dependence of reference dependence." Their findings demonstrate that mental accounting principle, principle perception, and reference dependence are sensitivity to the ways in which deviations from reference state are framed.

Karlson. (1998) studied on "Mental Accounting and Self Control". His study tested the hypothesis that future consumption is considered to a lesser extent when money is available as current income compared to when current assets have to be used. He found that the uncertainty of future expenses imposed by greater distance in time increased the difference in decisiveness to buy between current asset and income.

Aggarwal& Liu.(2012)conducted their study on "Mental Accounting in Consumer Brand Relationship." They contributed by outlining the multitude of ways in which the application of mental accounting framework to consumer based relationship can give deeper insights into the antecedents, processes and consequences underlying consumer behavior.

Thaler, R.H. (1999)carried out a study on "Mental Accounting Matters". This paper summarizes the current state of our knowledge about how people engaged in mental accounting activities. The paper concerns with three components of mental accounting which receives the most attention and his paper comes into conclusion that each of the components of mental accounting violates the economic principle of fungibility.

Thaler, R.H. (1985)studied on "Mental Accounting and Consumer Choice". He develops a new model of consumer behavior using a hybrid of cognitive psychology and microeconomics. He also incorporated household budgeting process to complete the characterization of mental accounting.

Kivetz, R. (1999)studied on "Advances in Research on Mental Accounting and Reason Based Choice." This paper explores recent research on the role of mental accounting and reason based choice. The paper also discussed the construction of preference as a process where in certain cases consumer chooses reasons rather than options.

Heath &Soll. (1996)studied on "Mental Budgeting and Customer Decisions". Consumer often set budgets for categories of expenses and track expenses against their budget. Their study how's that consumer track expenses, the studies demonstrate that budgeting effects are larger for purchase that are highly typical of their category.

Prelee, D &Loewenstein, G (1998) studied "The Red and he Black: Mental Accounting of Saving and Debt." They developed central assumption of the model which we called perspective accounting is that consumption that has already been paid for and can be enjoyed as if it were free and that the paying associated with payment is better by thoughts of the benefits that the payment will finance.

III. Methodology of the study

For the present study, survey method has been used where state of Assam of India has been selected as the area of survey on purposive basis. The study by nature has been considered as explorative as well as analytical.The study is based on both primary and secondary data and only two demographic variable age and monthly income has been taken respectively. The primary data have been collected through circulating questionnaires among the respondentsfromfive regional divisions of Assam. The secondary data have been collected from various books, journals, newspapers, articles, published materials and by visiting various websites.To carry out the study and to improve the quality of the study, the questionnaire was pre tested on small sample of ten respondents and a minor change was made in the questionnaire. No restriction was made on the basis of age, sex, location and religion.To carry out the present study 100 consumers, 20each from fiveregional divisions of Assam have been selected which are Upper Assam Division, Lower Assam Division, North Assam Division, Central Assam Division and Barak Valley Division The respondents are selected by adopting a method of convenience sampling.

Research Questions of the study:

The following written are the research question, which are taken into consideration for the present study:

(i) Is there any process in Mental Accounting?
(ii) Does Mental Accounting apply in purchase decision making?
(iii)Is there any differentiation in mental accounting process with regard to varying demographic characteristics?

IV. Data Analysis

This analysis and interpretation of data and information of the study has been shown below:

Analysis 1:

Table 4.1: Comparative analysis of different buying behavior under different age group

Statement	21-30 Years (100%)	31-40 Years (100%)	41-50 Years (100%)	51 years & above (100%)
C.P(i)	Budget (80%)	Budget (92%)	Budget (84%)	Budget (76%)
H.P(i)	Budget (44%)	Time (44%)	Time (48%)	Time (56%)
C.P(ii)	Yes (96%)	Yes (100%)	Yes (100%)	Yes (92%)
H.P(ii)	Yes (68%)	No (80%)	No (80%)	No (100%)
C.P(iii)	Yes (92%)	Yes (64%)	Yes (76%)	Yes (76%)
H.P(iii)	Yes (64%)	No (92%)	No (100%)	No (100%)
C.P(iv)	Prioritizing your purchase (56%)	Prioritizing your purchase (84%)	Prioritizing your purchase (64%)	Prioritizing your purchase (64%)
H.P(iv)	Prioritizing your purchase (52%)	Use existing pocket of disposable income for the purpose and let the future take care of itself (36%)	Use existing pocket of disposable income for the purpose and let the future take care of itself (56%)	Accessing different sources of funds to make both purchases at the same time (56%)
C .P(v)	Yes (100%)	Yes (96%)	Yes (92%)	Yes (92%)
H.P(v)	Yes (60%)	No (96%)	No (100%)	No (100%)
C.P(vi)	Yes (88%)	Yes (92%)	Yes (84%)	Yes (84%)
H P(vi)	Yes (68%)	Yes (60%)	Yes (80%)	No (80%)

C.P(vii)	Brand and quality (40%)	Brand and Quality (56%)	Band and Quality (56%)	Product (56%)
H.P(vii)	Brand and quality (48%)	Product (48%)	Product (80%)	-----
C.P(viii)	Yes (56%)	No (56%)	Yes (56%)	Yes (56%)
H .P(viii)	No (56%)	Yes (52%)	No (100%)	No (100%)
C.P(ix)	Yes (84%)	Yes (96%)	Yes (96%)	Yes (96%)
H.P(ix)	No (52%)	No (76%)	No (100%)	No (100%)
C.P(x)	Yes (84%)	Yes (92%)	Yes (96%)	Yes (96%)
H.P(x)	-----	-----	-----	-----
C.P(xi)	Yes (84%)	Yes (68%)	No (60%)	No (60%)
H.P(xi)	-----	-----	-----	-----
C.P(xii)	Behavior of seller (60%)	Window Display (56%)	Window Display (64%)	Window Display (64%)
H.P(xii)	Behavior of seller (40%)	Behavior of seller (60%)	Behavior of seller (52%)	Window Display (52%)
C.P(xiii)	Debit/Credit Card (52%)	Debit/credit Card (36%)	Debit/Credit card (68%)	Debit/Credit card (68%)
H.P(xiii)	Cash payment (52%)	Cash payment (92%)	Cash payment (92%)	Cash payment (92%)

Source: Field study

From the above comparative table it has been found that in complex buying behavior almost in every age group “Budget” comes in the mind of respondents first while in case of habitual buying behavior only respondent of 21 – 30 year age consider “Budget” first and all other respondents above 30 years said that “Time” comes in their first. It can be easily interpreted from the above table that all the respondents agrees that they evaluate the sources in their mind before raising funds for the purchase in case of complex buying behavior whereas in case of habitual buying behavior, except respondent of 21-30 years all other respondent do not evaluate the sources in their mind before raising funds for the purchase. Furthermore table also said that in case of majority off the respondents thinks about solution for repayment or adjustment to the sources from where they going to raise their fund but same is not in case of habitual buying behavior except of respondents of 21-30 years.The table also provides necessary information about the behavior of respondents in more than one purchase, where in case of complex buying behavior they tend to prioritize their purchase according to their need whereas in case of habitual purchase the same is happen only in case of respondents of 21-30 years. Respondents between 30-50 prefers to use existing pocket of disposable income and they care very less about future expenses while respondents above 50 years tend to access different source of fund to make both the purchase at the same time. In case of complex buying behavior most of the respondents of each age groupsearchinformation prior to making their high priced purchase but the same is not in case of habitual buying behavior except the respondents of 21-30 age group.It has also been found from the table that majority of the respondents in complex and habitual buying behavior of each of each group prefers to restrict their monetary limit before gathering information about the purchasing high-priced products.Majority of the respondents of each group consider brand and quality most in case of complex buying behavior except the age group of 51 & above who consider the product more and totally opposite case of habitual buying behavior. The table also provides information that in case of complex buying behavior, after searching for information respondents generally tend to change their budget but the respondents of age group 31-40 years do not prefer to change their budget whereas in case of habitual

purchase it has been observed that only respondents of 31-40 do not prefer to change their budget. It has also been found from the table that in case of complex buying behavior, majority of all the age group respondents tends to evaluate alternatives and they mainly evaluate alternatives in product or services, brands, price categories and offers and payment whereas in case of habitual purchase majority of the respondent of every age group do not prefer to evaluate alternatives in their purchase.

After evaluating the alternatives, it can be said from the table that in case of complex buying behavior, respondents from 21-40 years prefer to make changes in their budget whereas respondents of above 40 years generally don't prefer to make changes in their budget.Furthermore the table also provides information about window display which is most preferable for the respondents of above 30 years andbehavior of the seller is more preferable for the respondents of 21-30 years. But taking about habitual buying behavior respondents age between 21-50 years, considered behavior of seller most except budget while age group of 51 & above prefer window display most except budget.In addition to the above information the table also reveals that Debit/Credit card payment is the most preferablemodeof payment to use in case of complex buying behavior.

Analysis 2: Comparative analysis of different buying behavior under differentmonthly income

Table 4.2:

Statement	**Below 10,000 (100%)**	**10,000 - 24,999 (100%)**	**25,000 – 39,999 (100%)**	**40,000 & above (100%)**
C.P(i)	Budget (76.92%)	Budget (86.66%)	Budget (69.23%)	Budget (77.77%)
H.P(i)	Budget (65.38%)	Time (40%)	Budget (38.46%)	Budget (38.88%)
C.P(ii)	Yes (96.15%)	Yes (76.66%)	Yes (80.76%)	Yes (83.33%)
H.P(ii)	Yes (76.92%)	No (63.33%)	No (65.38%)	No (55.55%)
C.P(iii)	Yes (96.15%)	Yes (93.33%)	Yes (61.53%)	Yes (61.11%)
H.P(iii)	Yes (76.92%)	No (83.33%)	No (73.07%)	No (72.22%)
C.P(iv)	Prioritizing your purchase (61.53%)	Prioritizing your purchase (46.66%)	Prioritizing your purchase (61.53%)	Accessing different sources of funds to make both purchases at the same time (50%)
H.P(iv)	Prioritizing your purchase (61.53%)	Use existing pocket of disposable income and let the future take care of itself (50%)	Prioritizing your purchase (53.84%)	Prioritizing your purchase (50%)
C.P(v)	Yes (84.61%)	Yes (100%)	Yes (80.76%)	Yes (72.22%)
H.P(v)	Yes (61.53%)	No (76.66%)	No (73.07%)	No (72.22%)
C.P(vi)	Yes (80.76%)	Yes (80%)	Yes (84.61%)	Yes (66.66%)
H.P(vi)	Yes (65.38%)	No (66.66%)	Yes (53.84%)	No (72.22%)
C.P(vii)	Product (34.61%)	Band and Quality (33.33%)	Product (42.30%)	Product (33.33%)
H.P(vii)	Brand and quality (34.61%)	Product (33.33%)	Product (34.61%)	Brand and quality (16.66%)
C.P(viii)	Yes (76.92%)	Yes (56.66%)	Yes (65.38%)	Yes (100%)
H.P(viii)	Yes (65.38%)	No (86.66%)	No (65.38%)	No (61.11%)

C.P(ix)	Yes (80.76%)	Yes (86.66%)	Yes (76.92%)	Yes (77.77%)
H.P(ix)	Yes (61.53%)	No (80%)	No (61.53%)	No (85.55%)
C.P(x)	Yes (65.38%)	Yes (83.33%)	Yes (76.92%)	Yes (66.66%)
H.P(x)	Yes (57.69%)	Yes (13.33%)	Yes (26.92%)	Yes (27.77%)
C.P(xi)	Yes (61.53%)	No (50%)	Yes (53.84%)	Yes (66.66%)
H.P(xi)	Yes (57.69%)	Yes (13.33%)	Yes (23.07%)	Yes (38.88%)
C.P(xii)	Behavior of seller (53.84%)	Window Display (46.66%)	Behavior of seller (53.84%)	Behavior of seller (44.44%)
H.P(xii)	Behavior of seller (57.69%)	Behavior of seller (60%)	Behavior of seller (65.38%)	Behavior of seller (55.55%)
C.P(xiii)	Cash payment (50%)	Debit/credit Card (46.66%)	Debit/Credit card (53.84%)	Debit/Credit card (61.11%)
H.P(xiii)	Cash payment (80.76%)	Cash payment (66.66%)	Cash payment (76.92%)	Cash payment (83.33%)

Source: field study

From the table no. 4.2, it has been found that in complex buying behavior almost in every age group "Budget" comes in the mind of respondents first while in case of habitual buying behavior only respondent of 21 – 30 year age consider "Budget" first and all other respondents above 30 years said that "Time" comes in their first. It can be easily interpreted from the above table that all the respondents agrees that they evaluate the sources in their mind before raising funds for the purchase in case of complex buying behavior whereas in case of habitual buying behavior, except respondent of 21-30 years all other respondent do not evaluate the sources in their mind before raising funds for the purchase. Furthermore table also said that in case of majority off the respondents thinks about solution for repayment or adjustment to the sources from where they going to raise their fund but same is not in case of habitual buying behavior except of respondents of 21-30 years. The table also provides necessary information about the behavior of respondents in more than one purchase, where in case of complex buying behavior they tend to prioritize their purchase according to their need whereas in case of habitual purchase the same is happen only in case of respondents of 21-30 years. Respondents between 30-50 prefers to use existing pocket of disposable income and they care very less about future expenses while respondents above 50 years tend to access different source of fund to make both the purchase at the same time. In case of complex buying behavior most of the respondents of each age group search information prior to making their high priced purchase but the same is not in case of habitual buying behavior except the respondents of 21-30 age group. It has also been found from the table that majority of the respondents in complex and habitual buying behavior of each of each group prefers to restrict their monetary limit before gathering information about the purchasing high-priced products. Majority of the respondents of each group consider brand and quality most in case of complex buying behavior except the age group of 51 & above who consider the product more and totally opposite case of habitual buying behavior. The table also provides information that in case of complex buying behavior, after searching for information respondents generally tend to change their budget but the respondents of age group 31-40 years do not prefer to change their budget whereas in case of habitual purchase it has been observed that only respondents of 31-40 do not prefer to change their budget. It has also been found from the table that in case of complex buying behavior, majority of all the age group respondents tends to evaluate alternatives and they mainly evaluate alternatives in product or services, brands, price categories and offers and payment whereas in case of habitual purchase majority of the respondent of every age group do not prefer to evaluate alternatives in their purchase.

After evaluating the alternatives, it can be said from the table that in case of complex buying behavior, respondents from 21-40 years prefer to make changes in their budget whereas respondents of above 40 years generally don't prefer to make changes in their budget. Furthermore the table also provides information about window display which is most preferable for the respondents of above 30 years and behavior of the seller is more preferable for the respondents of 21-30 years. But taking about habitual buying behavior respondents age between 21- 50 years, considered behavior of seller most except budget while age group of 51 & above prefer window display most except budget. In addition to the above information the table also reveals that Debit/Credit card payment is the most preferable mode of payment to use in case of complex buying behavior.

V. Findings of the study

On the basis of age groups:

After a deep and thorough analysis of the responses of the sample respondents the important findings which came out from the study has been summarized below:

I. The present study reveals that while purchasing any item budget comes first in the minds of the respondents in case of complex purchase but time comes first when need is arises in habitual Purchase.

II. The study shows that in case of complex purchase, majority of the respondents evaluate the sources in their mind, from where they will raise the fund for purchase whereas in case of habitual purchase majority of the respondent does not evaluate the sources fromwhere they will raise fund for purchase.

III. Out of total respondents, majority of the respondents thinks about solution for repayment or adjustment to the sources from where they are going to raise their fund but in case of complex purchase but in case of habitual purchasemajority of the respondents does not prefer to think about repayment or adjustment to the sources from where they will raise their fund.

IV. In case ofmore than one complex purchase vast majority of respondents like to priorities their purchase but in case of habitual purchase respondents prefer to use their existing pocket of disposable income and bother very less about future expenses.

V. A vast majority of respondents prefers to search information prior to making complex purchase whereas majority of the respondentsdoes not search for information while making habitual purchase.

VI. The study reveals that in both complex and habitual purchases, majority of the respondent prefers to restrict their monetary limit before gathering information about products.

VII. Out of total respondents, majority of the respondents prefers brand and quality most in case of complex purchase whereas in case of habitual purchase respondents tend to search information about products

VIII. The study reveals that in case of complex purchase, after searching the information majority of the respondents prefer to make changes in their budget whereas in case of habitual purchase respondents do not prefer to make changes in their budget.

IX. In case of complex buying behavior, majority of the respondent evaluates alternatives in products/services, brands, price categories and offers and payment facilities whereas in case of habitual purchase majority of the respondent do not prefer to evaluate alternatives.

X. It is found from the study that after evaluating alternatives in complex purchase half of the total respondents do not prefer to make changes in their budget whereas other half prefers to make changes in their budget.

XI. Except budget, window display is considered most by majority of the respondents in complex purchase whereas behavior of the seller is considered most in habitual purchase.
XII. Debit card/Credit card is considered as the most preferred option for payment in complex purchase whereas cash payment is considered most in habitual purchase.

On the basis of Monthly Income:

After a deep and thorough analysis of the responses of the sample respondents the important findings which came out from the study has been summarized below:

I. The present study reveals that while purchasing any item budget comes first in the minds of the respondents both in case of complex and habitual purchase.
II. The study shows that in case of complex purchase, majority of the respondents evaluate the sources in their mind, from where they will raise the fund for purchase whereas in case of habitual purchase majority of the respondent does not evaluate the sources from where they will raise fund for purchase.
III. Out of total respondents, majority of the respondents thinks about solution for repayment or adjustment to the sources from where they are going to raise their fund but in case of complex purchase but in case of habitual purchase majority of the respondents does not prefer to think about repayment or adjustment to the sources from where they will raise their fund.
IV. In case of more than one complex and habitual purchase vast majority of respondents like to priorities their purchase.
V. A vast majority of respondents prefers to search information prior to making complex purchase whereas majority of the respondents does not search for information while making habitual purchase.
VI. The study reveals that in both complex and habitual purchases, majority of the respondent prefers to restrict their monetary limit before gathering information about products.
VII. Out of total respondents, majority of the respondents prefers brand and quality most in case of complex purchase whereas in case of habitual purchase respondents tend to search information about products
VIII. The study reveals that in case of complex purchase, after searching the information majority of the respondents prefer to make changes in their budget whereas in case of habitual purchase respondents do not prefer to make changes in their budget.
IX. In case of complex buying behavior, majority of the respondent evaluates alternatives in products/services, brands, price categories and offers and payment facilities whereas in case of habitual purchase majority of the respondent do not prefer to evaluate alternatives.
X. It is found from the study that after evaluating alternatives in complex purchase half of the total respondents do not prefer to make changes in their budget whereas other half prefers to make changes in their budget.
XI. Except budget, window display is considered most by majority of the respondents in complex purchase whereas behavior of the seller is considered most in habitual purchase.
XII. Debit card/Credit card is considered as the most preferred option for payment in complex purchase whereas cash payment is considered most in habitual purchase.

Answers to the research questions:

(i) What is Mental Accounting?

Mental Accounting refers to the tendency for people to separate their money into separate accounts based on a variety of subjective criteria, like the source of the money and intent for each account.

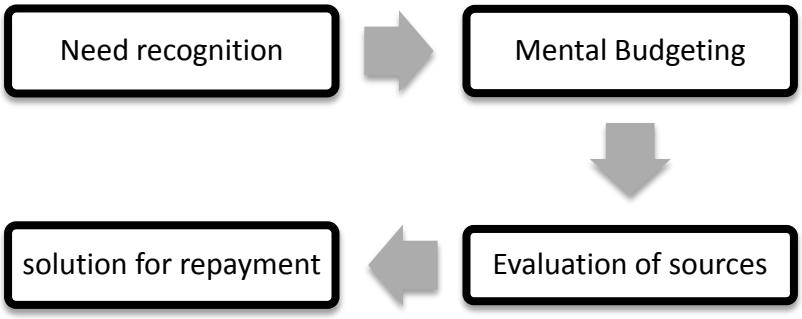
(ii) Does Mental Accounting apply in purchase decision making?

Answer: From the study it has been found that mental accounting is applied in purchase decision. It has been found from the study that people knowingly or unknowingly do mental accounting while taking purchase decisions especially in case of complex purchase as the involvement is very high. As soon as need is recognized by the people they tend to make an account in the name of that need in their minds. And after making the account in their mind they tend to keep proper record of that account and they adjust the account whenever necessary. So as we know that we tend to follow certain steps in purchase decision making and it can be said from this study that Mental accounting comes after the need recognition and before information search because in this study most of the respondents said they tend to set their budget before searching information. So Mental accounting can be seen as a stage which comes after need recognition stage and before the information search stage.

(iii) Is there any process of Mental Accounting?

Answer: Mental accounting is a process which take place in the minds of the consumer as it has been found from the study that first the need for money arises as soon as the need for any product/service arises. Then majority of the respondents tries to make tentative budget for their monetary requirement which is needed to satisfy the need. After making budget people tries to evaluate the sources in their mind from where they will raise their fund also consider the solutions for repayment and adjustments to those sources. After this they acquire the money from the appropriate source and go for information search regarding product or services.

So we can show it as a Mental Accounting Process like:



(iv) Is there any differentiation in mental accounting process with regard to varying demographic characteristics?

Answer: It has been observed from the study that Mental accounting process applies only in case of complex purchase because in case of habitual purchase people do not tend to follow the mental accounting process just like in case of purchase decision making.

5.3 Conclusion of the study:

The main purpose of the study was to create a deeper and through consideration about mental accounting and its importance in purchase decision making. As we know how important mental accounting can benow a days and how much it influence the purchase decision of a consumer. In order to comply with the study, a

questionnaire has been distributed among 200 respondents and the study reveals that mental accounting has a strong and positive influence in purchase decision making. The study also reveals that in the purchase decision making people tend to follow mental accounting especially in a case of complex buying behavior. In this study it has also been found thatwhilepurchasing, budget is something which comes to the mind of the customer first. The study reveals that people generally tend to make accounts in their mind for all expenses and after making accounts in their mind they go through a process which we can call as mental accounting process where they consider the source for the money, repayment to those sources etc. but mental accounting process generally very effective only in case of complex purchase where the involvement of the consumer is very high.

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QUESTIONNAIRE

PERSONAL INFORMATION (SECTION A)

Name (optional)

Age:

Gender:

Income (Monthly):

Married/Unmarried Status:

Number of Dependents:

Objective 1 (SECTION B)

A. <u>In Case of Complex Buying Behaviour:</u>

If you felt the necessity (problem recognition) to buy one or more than one a high price and equally essential product/service(**say a car or Home appliance**) then:

(i) which of these comes to your mind first……
a) Budget ☐ b) Time ☐ c) Information ☐ d) Past experience ☐

(ii) Do you evaluate the sources in your mind, from where you will raise your fund for the purchase?
Yes ☐ No ☐

(iii) Before acquiring the money, do you think about solutions for repayment or adjustment to the source from where are you going to raise your funds?
Yes No

(iv) which of these do you consider the most in case of more than one purchase …

(a) prioritizing your purchase(b) accessing different sources of funds to make both purchases at the same time(c) use your existing pocket of disposable income for the purpose and let the future take care of itself .

(v) Do you search for information prior to making your high-priced purchases?
Yes No

(vi) Do you set your budget or restrict your monetary limit before gathering information about the purchasing high-priced products?
Yes No

(vii) If yes, while searching for information, which of do you consider most
(a) Product quality (c) nd (d) Ratings

(viii) After searching the information, do you generally prefer to make changes in your budget?
Yes No

(ix) Do you evaluate alternatives while making your high-priced purchase?
Yes No

(x) If yes, do you consider alternatives in (a) products/services (b) brands (c)Availability(d) offers and payment facilities ?
Yes No

(xi) After evaluating the alternatives, do you generally prefer to make changes in your budget?
Yes No

(xii) What do you consider the most except money while purchasing……

a) behaviour of the seller b) window display c) location and cleanlinessd) Others

B. Habitual Buying Behaviour:

If you felt the necessity (problem recognition) to buy one product/service where involvement is high but very few perceived difference among brands (**say a sugar or toothpaste**) then:

(i) which of these comes to your mind first ?
a) Budget b) Time c) Information d) Past experience

(ii) Do you evaluate the sources in your mind, from where you will raise your fund for the purchase?
Yes No

(iii) Before acquiring the money, do you think about solutions for repayment or adjustment to the source from where are you going to raise your funds?
Yes No

(iv) which of these do you consider the most in case of more than one purchase …

(a) prioritizing your purchase b) accessing different sources of funds to make both purchases at the same time (c) use your existing pocket of disposable income for the purpose and let the future take care of itself .

(v) Do you search for information prior to making your habitual purchases
Yes No

(vi) Do you set your budget or restrict your monetary limit before gathering information about the habitual purchase?
Yes No

(vii) If yes, while searching for information, which of do you consider most
(a) Product quality (c) nd (d) Ratings

(viii) After searching the information, do you generally prefer to make changes in your budget?

Yes No

(ix) Do you evaluate alternatives while making your habitual purchase?

Yes ☐ No ☐

(x) If yes, which of these do you consider alternatives in (a) products/services (b) brands (c) Availability(d) offers and payment facilities

Yes ☐ No ☐

(xi) After evaluating the alternatives, do you generally prefer to make changes in your budget?

Yes ☐ No ☐

(xii) what do you consider the most except money while purchasing……

a) behaviour of the seller ☐ indow display c) ☐ ion and cleanlinessd) other

(xiii) Which of the modes of payment you consider most:

(a) Cash payment ☐ Cheque (c) D ☐ Credit card payment (d) Net Ban ☐

☐

Analysis of Space Frame under Pattern Loading

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Abstract- The use of reinforced concrete buildings has become a general scene in the contemporary world. The analysis, design and construction processes have been idealized through various building design codes and design philosophies. Buildings are designed to withstand all the loads that may occur with a certain degree of probability during its entire lifetime. Different categories of loads have been classified by codes in accordance with the purpose and location of the structure. Among all the loads, imposed load has the moving tendency and can translate from one span to the other forming different patterns of loading. In present study, a G+1 storey, 5 bay x 5 bay frame subjected to an imposed load of 5 kN/m^2 located in seismic zone II, has been taken as a base frame and analysis is done using STAAD Pro software. The member forces of a building are compared between conventional loading (i.e. seismic and all span gravity loading) and pattern loading (i.e. conventional loading plus 5 patterns of imposed load) to determine the necessity of pattern loading. In beam members the values of bending moment are significantly higher for pattern loading as compared with conventional loading. This increase in moment is found more in beam sagging moment compared to hogging moment. The effect of pattern loading is felt more on the upper storey exterior beams compared to the lower storey beams. Pattern loading causes insignificant changes in the beam shear force and column axial force.

Keywords- Imposed load; Conventional loading; Pattern loading; STAAD Pro etc.

1. INTRODUCTION

A structure can be defined as a body which can withstand the applied loads without any appreciable deformations. Civil engineering structures are created to serve some specific functions like human transportation, human habitat, bridges etc. in a safe and economical way. A structure is an assemblage of individual elements like truss elements, beam elements, columns, shear walls, slabs, cable or arch. Structural engineering is concerned with the planning, designing and the construction of structures. Structure analysis involves in determining the forces and displacements that are caused due to various forces on the structures or components of a structure. Analysis is performed to calculate the response of a structure to applied external loads. Building standard codes recommends that arrangement of imposed load should be such that the values of critical forces at all sections in the structure can be evaluated and accounted for in the design. However there are numerous pattern by which live load may be subjected on a structure, evaluating all those patterns is practically not possible. So various approaches have to be developed to limit the loading arrangements to such cases which can be handled easily and also at the same time provide rational and realistic values of the forces generated in the structure.

1.1 Literature Review

Many researchers have presented work on different arrangements of live load and how to minimize the number of patterns to find the critical pattern. Such works have been discussed in chronological order in this section.

Large (1950) presented a method which is mainly based on the concept of influence lines diagrams. According to this method the number of live load combinations required to obtain support moments are equal to the number of beam-column joints. Additionally, two load combinations are required to obtain the span bending moments. However it can be clearly seen that this method is time consuming as it requires a large number of loading arrangements to be considered also the number of these arrangements will go on increasing with increase in number of storey and bays.

Furlong R.W. (1981) approached this problem as a practical designer and claimed that all possible live loads combinations do not have to be considered for the following reasons. The probability of occurrence of the most critical combination decreases with increase in load combinations. Member forces are not sensitive to loading for members to adjacent to such members. Linear elastic analysis is just an approximation for reinforced concrete structure in which I and E change due to cracking and creep. Considering these points, Furlong proposed some simple imposed load arrangements which he claimed would give reasonable values for shear and bending moment in beams and columns. The live load arrangement proposed by Furlong is shown in figure, for a five bay, five storey frames. Furlong gave the following equation for determining the no of loading patterns which is dependent on the no bays of the structure. No of load combinations = 2+ (m-1), where m is the no of spans in a multistory frame structure.

Ugur E. (1992) gave a method where no. of loading cases is constant and is always equal to 5 irrespective of no of storey's and bays. Apart from some specified points, his results were comparable to that of Furlong. Ersoy proposed two different arrangements for frames for maximum and minimum span moments which results in simple checker board loading. For maximum support moments and shears in beams the basic loading is shown in figure. Other patterns consist of continuous loaded members leaving one unloaded span in between. On each storey the basic train loading is shifted one bay to the right as compared to the storey above. This arrangement will also yield maximum moments for some of the frame columns. In figure the loading arrangements proposed by the author are applied to the frame shown. As may be observed, the number of live load arrangements is independent of the number of bays and is five for all cases.

Quimby (2002) proposed the method of influential superposition which is based on the concept of superposition and hence is valid for linear systems. In this method unit loads of the same nature as the real live loads are applied individually on the

spans of the structure forming different loading cases, number of which are equal to the number of spans in the structure and the effects are determined at points of interest for each case of loading.

Akiner M.E. (2012) has based the work on the previous works done by ERSOY and Furlong and developed his third approach called approach no 3 using genetic algorithm. Genetic algorithms are search algorithms based on the mechanics of natural selection and natural genetics. Their basic idea is what lies behind the nature itself, "Survival of the Fittest". A third approach was presented which required analysis of five cases irrespective of the no of storey's and bays. The aim of approach no3 (AN3) is as the aim of Furlong approach and Ersoy approach, to obtain sufficiently accurate results with a reasonable number of loading cases. First two loading cases are Classical Checkerboard Loading and as same as first two loading case of Ersoy approach. Loading cases for finding maximum negative moments are different than Furlong and Ersoy approach in AN3, starting from the first beam, at the upper left, two adjacent beams are loaded and third one is unloaded. This loading continues until all beams are dealt with.

Ansari and Garg (2016) presented a journal on Structural behaviour of building frame under pattern loading. The loading patterns considered were similar to that of Ugur Ersoy on a two dimensional building frame and compared the results with that of the conventional loading pattern with all spans loaded. It was concluded that the values of bending moment are significantly higher for pattern loading as compared with conventional loading for both beam and column members. The effect of pattern loading is felt more on interior beam members as compared with the exterior beam members of the same floor also it is observed that pattern loading effects the top floors interior beam the most as compared with any other beam member. The effect of pattern loading is more on beam sagging moment as compared to hogging moment.

2. PROPOSED WORK

The present study investigates the structural behavior of an RC frame (G+1 Commercial building) under pattern loading. The base frame under consideration is used for storage purpose. An Imposed load of 5 kN/m^2 is considered on floors of the building. The slab weight is taken as 3 kN/m^2. A wall load of 7 kN/m is considered on the outer periphery of first floor whereas a load of 3 kN/m for parapet wall is considered on the outer periphery of second floor. The structure is analyzed for two loading cases. In first case (Conventional loading) structure is analyzed for seismic forces and all span gravity loading and in second case (Pattern loading) structure is analyzed for conventional loading plus five different loading patterns. The analysis is performed by using structural analysis software i.e. STAAD Pro. The analysis results of structure for conventional and pattern loading are compared to evaluate the effect of pattern loading on the RC structure.

The geometrical and seismic parameters used for modelling of proposed problem are shown in Table 1 and Table 2. Isometric view and plan of proposed structure under consideration is depicted in Fig.1 and Fig.2. Column and beam member numbering is shown in Fig.3 to Fig.10. Loading patterns considered in the study is shown in Fig.11.

Table 1 Geometric Parameters

Sr. No.	Parameters	Values
1.	No. of storey's	2
2.	No. of span in X-direction	5
3.	No. of Span in Y-direction	5
4.	Floor to Floor height	3.5m
5.	Span length in X and Y-direction	4m
6.	Size of beam	0.2m x 0.3m
7.	Size of column	0.25m x 0.25m
8.	Slab thickness	0.120m

Table 2 Parameters for Seismic load

	Parameter	Value

Sr. No.		
1	Location (ZONE II)	Zone Factor = 0.10
2	Response reduction factor (Ordinary RC Moment Resisting Frame)	RF = 5
3	Importance factor (All General Building)	I = 1
4	Rock and soil site factor (Medium soil)	SS = 2
5	Type of structure (RC Frame Building)	ST = 1
6	Damping ratio	DM = 0.05

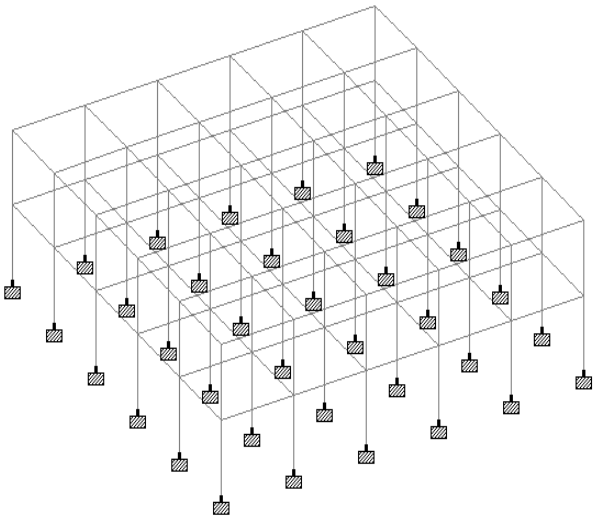


Fig 1 Isometric view of proposed structure

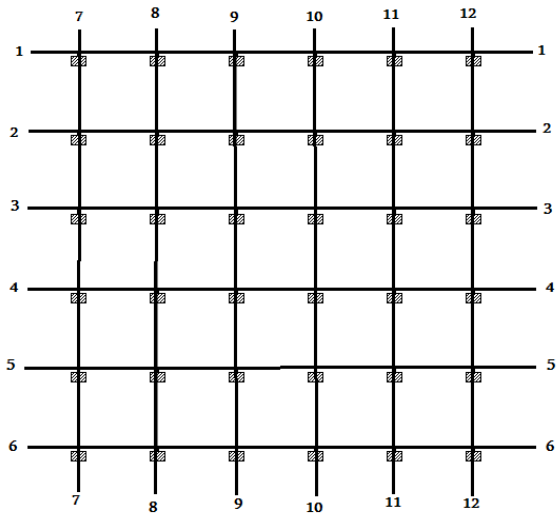


Fig 2: Plan of base frame

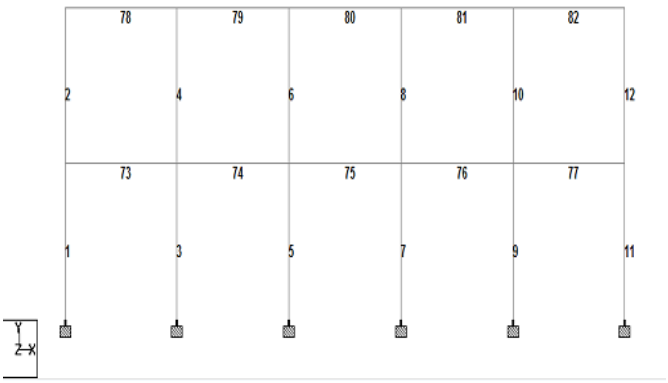


Fig 3: Section 1-1

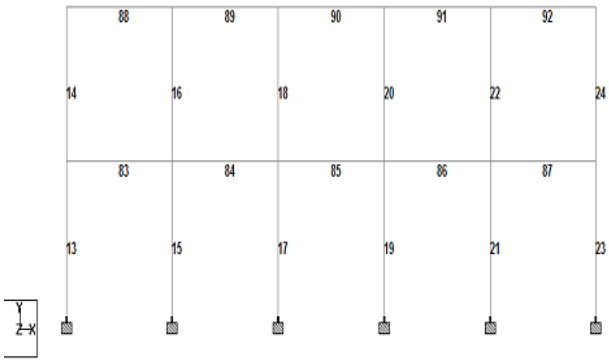


Fig 4: Section 2-2

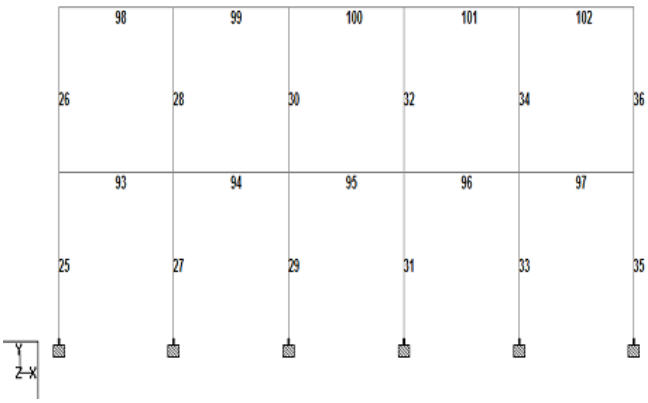


Fig 5: Section 3-3

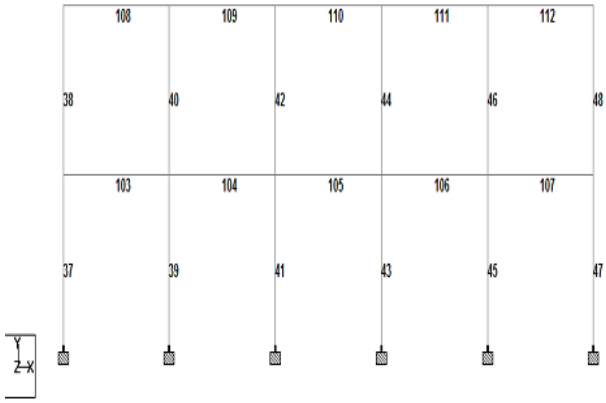


Fig 6: Section 4-4

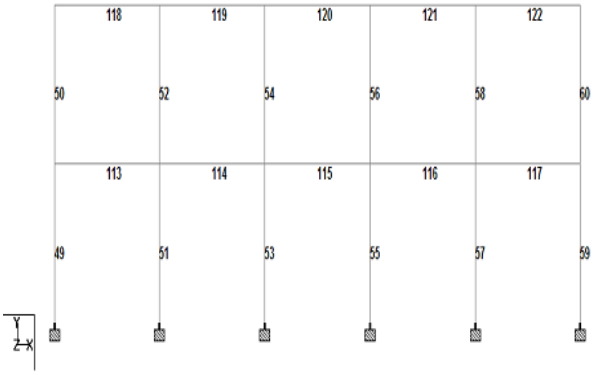


Fig 7: Section 5-5

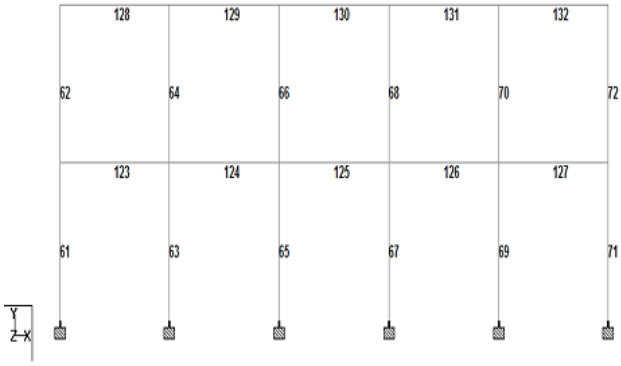


Fig 8: Section 6-6

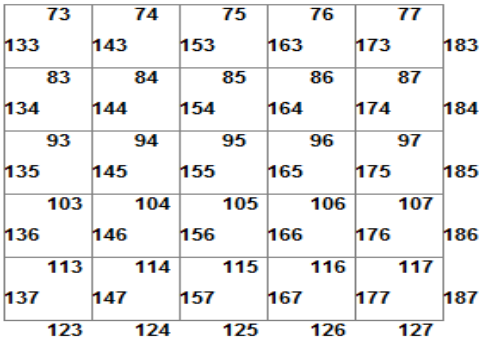


Fig 9: Beam numbering at first floor

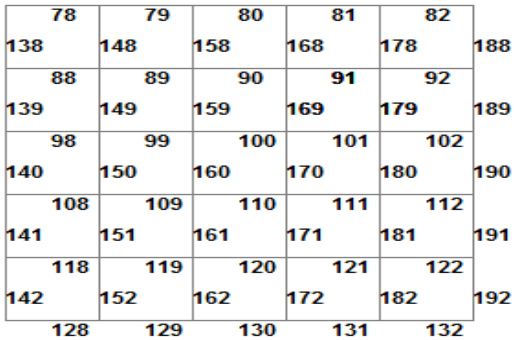


Fig 10: Beam numbering at top floor

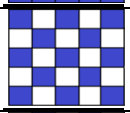
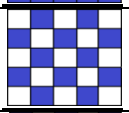
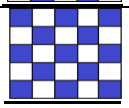
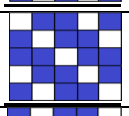
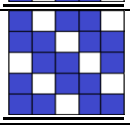
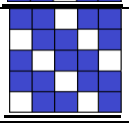
LOADING TYPE	SECOND FLOOR	FIRST FLOOR
CONVENTIONAL LOADING		
PATTERN 1		
PATTERN 2		
PATTERN 3		
PATTERN 4		
PATTERN 5		

Fig 11: Loading patterns on G+1 storey structure

2.2 Load cases and combinations

Primary loads and their combinations considered in the study area as follows:

Primary loads
LC 1:- EQ X = EQ in +X direction
LC 2:- EQ Z = EQ in +Z direction
LC 3:- DL = Dead load
LC 4:- Conventional load
LC 5:- Pattern 1
LC 6:- Pattern 2
LC 7:- Pattern 3
LC 8:- Pattern 4
LC 9:- Pattern 5

Load Combinations

LC 10:- LC 3*1.5 + LC 4*1.5
LC 11:- LC 3*1.5 + LC 5*1.5
LC 12:- LC 3*1.5 + LC 6*1.5
LC 13:- LC 3*1.5 + LC 7*1.5
LC 14:- LC 3*1.5 + LC 8*1.5
LC 15:- LC 3*1.5 + LC 9*1.5
LC 16:- LC 3*1.2 + LC 4*1.2 + LC 1*1.2
LC 17:- LC 3*1.2 + LC 4*1.2 + LC 2*1.2
LC 18:- LC 3*1.2 + LC 4*1.2 – LC 1*1.2
LC 19:- LC 3*1.2 + LC 4*1.2 – LC 2*1.2
LC 20:- LC 3*1.5 + LC 1*1.5
LC 21:- LC 3*1.5 + LC 2*1.5
LC 22:- LC 3*1.5 - LC 1*1.5
LC 23:- LC 3*1.5 - LC 2*1.5
LC 24:- LC 3*0.9 + LC 1*1.5
LC 25:- LC 3*0.9 + LC 2*1.5
LC 26:- LC 3*0.9 - LC 1*1.5
LC 27:- LC 3*0.9 - LC 2*1.5

3. RESULTS AND DISCUSSION

In the present study, a G+1 building has been modeled and the values of member forces generated by conventional loading (i.e. all span load plus seismic load) have been compared to the forces generated in the members being subjected to pattern

loading (i.e. conventional loading along with the set of 5 different pattern loads). Pattern/Conventional ratio is determined to evaluate the impact of pattern loading.

3.1 Effect of pattern loading on column forces

In this section the effect of pattern loading on the columns of base frame is studied and the results have been tabulated. Bending moment (M_z) and axial forces (F_x) in the column members are analyzed and compared for conventional and pattern loading to evaluate the effect of pattern loading on column members. Effects of pattern loading on column forces are shown in Table 3.

3.1.1 Effect on Bending moment

Table 3 indicates that there is no increase in bending moment values for pattern loading in comparison to conventional loading for all column members. This implies that the lateral loads applied have greater impact than pattern gravity loads in generating critical bending moments in column members.

3.1.2 Effect on Axial force

The highest value of Pattern/Conventional ratio for axial force is 1.04 as shown in table 3. The maximum variation is observed in the member nos. 2, 6, 8, 12, 26, 36, 38, 48, 62, 66, 68 and 72 which are upper storey exterior columns. This indicates despite the increase in value of axial force, the effect of pattern loading is insignificant. It is observed that the exterior columns in the central bay are more affected by pattern loading as compared to the interior columns. The effect of pattern loading can be seen more on upper storey columns as compared to the lower ones.

Table 3: Comparison of forces in columns between conventional and pattern loading.

Column No.	Max/Min Values	Pattern Loading		Conventional loading		Pattern/Conventional ratio	
		Bending Moment (kN-m)	Axial force (kN)	Bending Moment (kN-m)	Axial force (kN)	Bending Moment	Axial force
1	Max +ve	13.87	174.84	13.87	173.02	1.00	1.01
	Max –ve	-14.24	*	-14.24	*	1.00	**
2	Max +ve	18.77	76.82	18.77	74.05	1.00	1.04
	Max –ve	-16.50	*	-16.50	*	1.00	**
3	Max +ve	12.07	291.54	12.07	291.54	1.00	1.00
	Max –ve	-12.58	*	-12.58	*	1.00	**
4	Max +ve	10.89	136.02	10.89	133.01	1.00	1.02
	Max –ve	-9.68	*	-9.68	*	1.00	**
5	Max +ve	12.14	281.96	12.14	281.96	1.00	1.00
	Max –ve	-12.06	*	-12.06	*	1.00	**
6	Max +ve	9.06	132.79	9.06	127.74	1.00	1.04
	Max –ve	-9.32	*	-9.32	*	1.00	**
7	Max +ve	12.06	281.96	12.06	281.96	1.00	1.00
	Max –ve	-12.14	*	-12.14	*	1.00	**
8	Max +ve	9.32	132.70	9.32	127.74	1.00	1.04
	Max –ve	-9.06	*	-9.06	*	1.00	**
9	Max +ve	12.58	291.54	12.58	291.54	1.00	1.00
	Max –ve	-12.07	*	-12.07	*	1.00	**
10	Max +ve	9.68	135.75	9.68	133.01	1.00	1.02
	Max –ve	-10.89	*	-10.89	*	1.00	**
11	Max +ve	13.87	174.57	13.87	173.02	1.00	1.01
	Max –ve	-14.24	*	-14.24	*	1.00	**
12	Max +ve	18.77	76.82	18.77	74.05	1.00	1.04
	Max –ve	-16.50	*	-16.50	*	1.00	**
13	Max +ve	15.40	291.54	15.40	291.54	1.00	1.00
	Max –ve	-14.61	*	-14.61	*	1.00	**
14	Max +ve	24.92	135.80	24.92	133.01	1.00	1.02
	Max –ve	-20.47	*	-20.47	*	1.00	**
15	Max +ve	13.77	455.51	13.77	455.51	1.00	1.00
	Max –ve	-14.06	*	-14.06	*	1.00	**
16	Max +ve	12.84	230.40	12.84	230.40	1.00	1.00
	Max –ve	-11.22	*	-11.22	*	1.00	**
17	Max +ve	13.72	443.50	13.72	443.50	1.00	1.00
	Max –ve	-13.67	*	-13.67	*	1.00	**
18	Max +ve	10.78	222.91	10.78	222.91	1.00	1.00
	Max –ve	-11.09	*	-11.09	*	1.00	**
19	Max +ve	13.67	443.50	13.67	443.50	1.00	1.00

	Max –ve	-13.72	*	-13.72	*	1.00	**
20	Max +ve	11.09	222.91	11.09	222.91	1.00	1.00
	Max –ve	-10.78	*	-10.78	*	1.00	**
21	Max +ve	14.06	455.51	14.06	455.51	1.00	1.00
	Max –ve	-13.77	*	-13.77	*	1.00	**
22	Max +ve	11.22	230.40	11.22	230.40	1.00	1.00
	Max –ve	-12.84	*	-12.84	*	1.00	**
23	Max +ve	15.40	291.54	15.40	291.54	1.00	1.00
	Max –ve	-14.61	*	-14.61	*	1.00	**
24	Max +ve	24.92	135.75	24.92	133.01	1.00	1.02
	Max –ve	-20.47	*	-20.47	*	1.00	**
25	Max +ve	15.75	281.96	15.75	281.96	1.00	1.00
	Max –ve	-15.27	*	-15.27	*	1.00	**
26	Max +ve	25.52	132.87	25.52	127.74	1.00	1.04
	Max –ve	-20.84	*	-20.84	*	1.00	**
27	Max +ve	14.58	443.50	14.58	443.50	1.00	1.00
	Max –ve	-14.86	*	-14.86	*	1.00	**
28	Max +ve	13.51	222.91	13.51	222.91	1.00	1.00
	Max –ve	-11.79	*	-11.79	*	1.00	**
29	Max +ve	14.51	431.11	14.51	431.11	1.00	1.00
	Max –ve	-14.46	*	-14.46	*	1.00	**
30	Max +ve	11.40	215.04	11.40	215.04	1.00	1.00
	Max –ve	-11.72	*	-11.72	*	1.00	**
31	Max +ve	14.46	431.11	14.46	431.11	1.00	1.00
	Max –ve	-14.51	*	-14.51	*	1.00	**
32	Max +ve	11.72	215.04	11.72	215.04	1.00	1.00
	Max –ve	-11.40	*	-11.40	*	1.00	**
33	Max +ve	14.86	443.50	14.86	443.50	1.00	1.00
	Max –ve	-14.58	*	-14.58	*	1.00	**
34	Max +ve	11.79	222.91	11.79	222.91	1.00	1.00
	Max –ve	-13.51	*	-13.51	*	1.00	**
35	Max +ve	15.75	281.96	15.75	281.96	1.00	1.00
	Max –ve	-15.27	*	-15.27	*	1.00	**
36	Max +ve	25.52	132.70	25.52	127.74	1.00	1.04
	Max –ve	-20.84	*	-20.84	*	1.00	**
37	Max +ve	15.75	281.96	15.75	281.96	1.00	1.00
	Max –ve	-15.27	*	-15.27	*	1.00	**
38	Max +ve	25.52	133.06	25.52	127.74	1.00	1.04
	Max –ve	-20.84	*	-20.84	*	1.00	**
39	Max +ve	14.58	443.50	14.58	443.50	1.00	1.00
	Max –ve	-14.86	*	-14.86	*	1.00	**
40	Max +ve	13.51	222.91	13.51	222.91	1.00	1.00
	Max –ve	-11.79	*	-11.79	*	1.00	**
41	Max +ve	14.51	431.11	14.51	431.11	1.00	1.00
	Max –ve	-14.46	*	-14.46	*	1.00	**
42	Max +ve	11.40	215.04	11.40	215.04	1.00	1.00
	Max –ve	-11.72	*	-11.72	*	1.00	**
43	Max +ve	14.46	431.11	14.46	431.11	1.00	1.00
	Max –ve	-14.51	*	-14.51	*	1.00	**
44	Max +ve	11.72	215.04	11.72	215.04	1.00	1.00
	Max –ve	-11.40	*	-11.40	*	1.00	**
45	Max +ve	14.86	443.50	14.86	443.50	1.00	1.00
	Max –ve	-14.58	*	-14.58	*	1.00	**
46	Max +ve	11.79	222.91	11.79	222.91	1.00	1.00
	Max –ve	-13.51	*	-13.51	*	1.00	**
47	Max +ve	15.75	281.96	15.75	281.96	1.00	1.00
	Max –ve	-15.27	*	-15.27	*	1.00	**
48	Max +ve	25.52	132.79	25.52	127.74	1.00	1.04
	Max –ve	-20.84	*	-20.84	*	1.00	**
49	Max +ve	15.40	291.54	15.40	291.54	1.00	1.00
	Max –ve	-14.61	*	-14.61	*	1.00	**

50	Max +ve	24.92	136.48	24.92	133.01	1.00	1.03
	Max –ve	-20.47	*	-20.47	*	1.00	**
51	Max +ve	13.77	455.51	13.77	455.51	1.00	1.00
	Max –ve	-14.06	*	-14.06	*	1.00	**
52	Max +ve	12.84	230.40	12.84	230.40	1.00	1.00
	Max –ve	-11.22	*	-11.22	*	1.00	**
53	Max +ve	13.72	443.50	13.72	443.50	1.00	1.00
	Max –ve	-13.67	*	-13.67	*	1.00	**
54	Max +ve	10.78	222.91	10.78	222.91	1.00	1.00
	Max –ve	-11.09	*	-11.09	*	1.00	**
55	Max +ve	13.67	443.50	13.67	443.50	1.00	1.00
	Max –ve	-13.72	*	-13.72	*	1.00	**
56	Max +ve	11.09	222.91	11.09	222.91	1.00	1.00
	Max –ve	-10.78	*	-10.78	*	1.00	**
57	Max +ve	14.06	455.51	14.06	455.51	1.00	1.00
	Max –ve	-13.77	*	-13.77	*	1.00	**
58	Max +ve	11.22	230.40	11.22	230.40	1.00	1.00
	Max –ve	-12.84	*	-12.84	*	1.00	**
59	Max +ve	15.40	291.54	15.40	291.54	1.00	1.00
	Max –ve	-14.61	*	-14.61	*	1.00	**
60	Max +ve	24.92	136.02	24.92	133.01	1.00	1.02
	Max –ve	-20.47	*	-20.47	*	1.00	**
61	Max +ve	13.87	175.18	13.87	173.02	1.00	1.01
	Max –ve	-14.24	*	-14.24	*	1.00	**
62	Max +ve	18.77	77.11	18.77	74.05	1.00	1.04
	Max –ve	-16.50	*	-16.50	*	1.00	**
63	Max +ve	12.07	291.54	12.07	291.54	1.00	1.00
	Max –ve	-12.58	*	-12.58	*	1.00	**
64	Max +ve	10.89	136.48	10.89	133.01	1.00	1.03
	Max –ve	-9.68	*	-9.68	*	1.00	**
65	Max +ve	12.14	281.96	12.14	281.96	1.00	1.00
	Max –ve	-12.06	*	-12.06	*	1.00	**
66	Max +ve	9.06	133.06	9.06	127.74	1.00	1.04
	Max –ve	-9.32	*	-9.32	*	1.00	**
67	Max +ve	12.06	281.96	12.06	281.96	1.00	1.00
	Max –ve	-12.14	*	-12.14	*	1.00	**
68	Max +ve	9.32	132.87	9.32	127.74	1.00	1.04
	Max –ve	-9.06	*	-9.06	*	1.00	**
69	Max +ve	12.58	291.54	12.58	291.54	1.00	1.00
	Max –ve	-12.07	*	-12.07	*	1.00	**
70	Max +ve	9.68	135.80	9.68	133.01	1.00	1.02
	Max –ve	-10.89	*	-10.89	*	1.00	**
71	Max +ve	13.87	174.84	13.87	173.02	1.00	1.01
	Max –ve	-14.24	*	-14.24	*	1.00	**
72	Max +ve	18.77	76.82	18.77	74.05	1.00	1.04
	Max –ve	-16.50	*	-16.50	*	1.00	**
						Bending Moment	**Shear Force**
Maximum variation						**1.00**	**1.04**

3.2 Effect of pattern loading on beam forces

Bending moment and shear force in beam members for conventional and pattern loading are compared to evaluate the effect of pattern loading on beam forces.

3.2.1 Effect on Bending moment

It has been indicated in table 4 that there is an increase hogging moment values for pattern loading in comparison to conventional loading for most of the beam members. The maximum Pattern/Conventional ratio for hogging moment is 1.12. The highest value of Pattern/Conventional ratio obtained for hogging moment is for top floor's exterior beam member (beam number 80, 130, 140 and 190).

Table 5 indicates that all the members are affected due to pattern loading and their sagging moment values increases. The maximum pattern/conventional ratio for sagging moment is found to be 1.25. The values of sagging moments are more affected as compared to hogging moment which is represented by higher values of Pattern/Conventional ratio. On every floor the exterior beam of central bay has higher value of Pattern/Conventional ratio than the interior beams. The values of Pattern/Conventional ratio follow an increasing trend from ground floor beams to top floor beams for both hogging and sagging moment. The highest value of Pattern/Conventional ratio obtained for sagging moment is for top floor's exterior beams which are adjacent to the beams having maximum hogging moment (beam number 79, 81, 129, 131, 139, 141, 189 and 191).

3.2.2 Effect on Shear force

The highest value of Pattern/Conventional ratio for shear force is 1.06. These values exhibit that the increase in values of shear force obtained through pattern loading are insignificant. The maximum value of Pattern/Conventional ratio is observed in exterior beam members of top storey (beam number 80, 81, 130, 131, 139, 141, 189 and 190). The Pattern/Conventional ratio for shear force follows an increasing trend from ground floor beams to the top floor beams.

Table 4: Beam members having Pattern/Conventional ratio for hogging moment greater than 1.06

Member No.	Max +ve Values	Pattern Loading (Critical) value	Conventional loading value	Pattern/Conventional ratio
		Bending Moment (kN-m)	Bending Moment (kN-m)	Bending Moment
130	Max +ve	32.11	28.67	1.12
140	Max +ve	32.11	28.67	1.12
80	Max +ve	31.65	28.67	1.10
190	Max +ve	31.65	28.67	1.10
129	Max +ve	33.16	30.51	1.09
141	Max +ve	33.16	30.51	1.09
75	Max +ve	39.67	36.80	1.08
185	Max +ve	39.67	36.80	1.08
79	Max +ve	32.68	30.51	1.07
191	Max +ve	32.68	30.51	1.07
125	Max +ve	39.37	36.80	1.07
135	Max +ve	39.37	36.80	1.07
76	Max +ve	40.36	37.86	1.07
184	Max +ve	40.36	37.86	1.07
126	Max +ve	40.13	37.86	1.06
134	Max +ve	40.13	37.86	1.06

Table 5: Beam members having Pattern/Conventional ratio for sagging moment greater than 1.13

Member No.	Max -ve Values	Pattern Loading (Critical) value	Conventional Loading value	Pattern/Conventional ratio
		Bending Moment (kN-m)	Bending Moment (kN-m)	Bending Moment
79	Max -ve	-19.70	-15.79	1.25
81	Max -ve	-19.70	-15.79	1.25
129	Max -ve	-19.70	-15.79	1.25
131	Max -ve	-19.70	-15.79	1.25
139	Max -ve	-19.70	-15.79	1.25
141	Max -ve	-19.70	-15.79	1.25
189	Max -ve	-19.70	-15.79	1.25
191	Max -ve	-19.70	-15.79	1.25
80	Max -ve	-20.35	-16.57	1.23
130	Max -ve	-20.35	-16.57	1.23
140	Max -ve	-20.35	-16.57	1.23
190	Max -ve	-20.35	-16.57	1.23
74	Max –ve	-22.88	-20.06	1.14
76	Max -ve	-22.88	-20.06	1.14
124	Max -ve	-22.88	-20.06	1.14
126	Max -ve	-22.88	-20.06	1.14
119	Max -ve	-27.63	-24.47	1.13
151	Max -ve	-27.63	-24.47	1.13
89	Max -ve	-27.62	-24.47	1.13
181	Max -ve	-27.62	-24.47	1.13
121	Max -ve	-27.59	-24.47	1.13
149	Max -ve	-27.59	-24.47	1.13
91	Max -ve	-27.58	-24.47	1.13
179	Max -ve	-27.58	-24.47	1.13

4. CONCLUSION

In the present study the need of pattern loading in the analysis of building frames has been discussed by comparing the values of member forces obtained by conventional loading with that of pattern loading. The result indicates that the values of bending moment are significantly higher for pattern loading as compared with conventional loading for all beam members. This increase in moment is found more in beam sagging moment compared to hogging moment. The effect of pattern loading is felt more on the upper storey exterior beams compared to the lower storey beams. Pattern loading causes insignificant increase in beam shear force and column axial force. There is no impact of pattern loading on the bending moment of column members. This indicates that the conventional loading is adequate to design column members.

The summary of results obtained by the analysis to evaluate the need of pattern loading in the design of buildings has been tabulated in table 6.

Table 6: Summary of results for evaluation of need of pattern loading

Sr. No.	Particulars		Maximum values of Pattern/Conventional ratio
1	Beams	Hogging moment	1.12
		Sagging moment	1.25
		Shear force	1.06
2	Columns	Bending moment	1.00
		Axial force	1.04

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Fungal elements isolated from stretchers of the Clinic of the Uniabeu University Center Physiotherapy School

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Abstract- Despite many efforts in preventing the transmission of pathogens in health care facilities, little has been done related to the potential of contamination and transmission of microorganisms between users on health services. Fungal elements may be important sources of contamination in physiotherapy ambulatory. The aim of this research is to identify fungal elements on physiotherapy clinic stretchers. Methodology: sterile swabs embedded in sterile saline solution were used to collect the material, which were rolled in zigzag movements over the entire surface of 60 stretchers from the Clinic of the UNIABEU University Center Physiotherapy School. The material was seeded in Petri dishes containing the media Sabouraud dextrose agar and Mycosel culture. The plates were sealed with adhesive tape and maintained at room temperature (±30°C). Colonies of filamentous fungi in microcultures were identified by cultural and morphological characters and yeasturiform fungi by Gram staining and biochemical tests. The following fungi were isolated: *Penicillium* spp. 15 (25%), *Aspergillusfumigatus* 4 (6.7%), *Aspergillusniger* 4 (6.7%), *Trichophytonrubrum* 3 (5%), *Rhodotorula* spp. 3 (5%), *Fusarium* spp. 2 (3.3%), *Cladosporium* spp. 2 (3.3%), *Epidermophytonfloccosum* 1 (1.7%). There was a particularly high number of fungal pathogens species as contaminants of the examined stretchers, which can be considered as possible sources of contamination if there isn't an efficient cleaning at the gap time between the use within the patients. Monitoring should be done mainly in the clinics intended to immunocompromised patients, who are more sensitive to develop infections by environmental pathogens or coming from the health professionals.

Index Terms- fungal elements, stretchers, health facilities, nosocomial infections

I. Introduction

Nosocomial infection occurs when the source of contamination is the hospital environment. In this environment, the proximity between health professionals and patients offers favorable conditions for the transmission of pathogens through contact with contaminated organic secretions or fluids, medical instruments and devices or inanimate contact surfaces. The pathogenic microorganisms contained in these sites may survive for long periods at the environment waiting for an opportunity to infect a susceptible host1,2.

Nowadays, researchers and health professionals directed their attention for an implementation of preventive measures in order to avoid the transmission of pathogens in hospital environment or outpatient care facilities. Many factors influence the risk of microbial transmission in health care services, including conditions as individual characteristics of the people, care intensity, invasive procedures, exposure to environmental sources, among others3. In this sense, the maintenance of a biologically safe environment is essential to the prevention of cross contamination, and the hands of health professionals are recognized as the most common pathway of pathogen transfer. Generally, the environment occupied by colonized or infected patients may become contaminated. Under these conditions, inanimate surfaces and equipment are identified as potential reservoirs of microorganisms, including those resistant to antimicrobials.

There is a progressive increase in hospital infection rates due to fungal elements, a raising number of cases and high rates of morbidity and mortality4,5. Part of these fungal infections are from endogenous origin, while others can be exogenously acquired, transmitted by health professionals, contaminated injectable solutions, biomaterials and inanimate environmental sources3,6,7. The objective of this research was to isolate and identify the fungal elements contaminating the surface of the stretchers used for examination and procedures of the outpatient clinic of the UNIABEU University Center Physiotherapy School.

II. Material and Methods

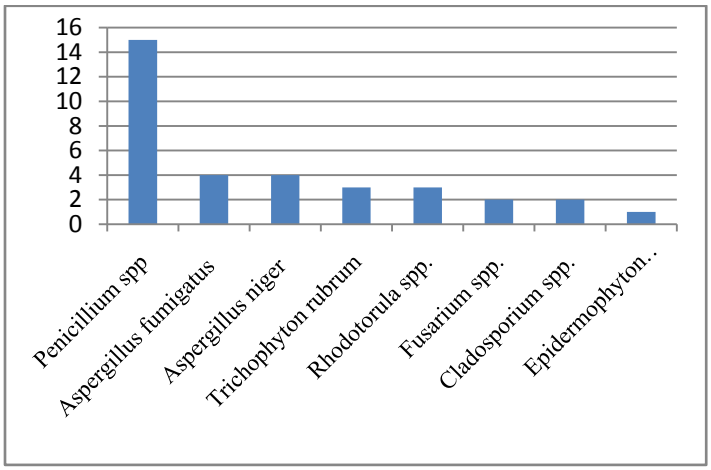
Sterile swabs embedded in sterile saline solution were used for the collection of the material, which were rolled in zigzag movements over the entire surface of 60 stretchers used in the physiotherapeutic procedures of the clinic-school of the Physiotherapy School Clinic of the UNIABEU University Center. The material was seeded in Petri dishes containing the media Sabouraud-dextrose-agar and Mycosel. The plates were sealed with adhesive tape and kept at room temperature (±30°). Colonies of filamentous fungi were identified in microcultures by morphological and cultural characters, and yeasturiformes fungi by Gram staining and biochemical tests through BioMerieuxVitek system.

III. Results

From the cultures of the material collected from the

surfaces of the stretches, the following fungal elements were isolated: *Penicillium* spp. 15 (25%), *Aspergillusfumigatus* 4 (6.7%), *Aspergillusniger* 4 (6.7%), *Trichophytonrubrum* 3 (5%), *Rhodotorula* spp. 3 (5%), *Fusarium* spp. 2 (3.3%), *Cladosporium*spp. 2 (3.3%), *Epidermophytonfloccosum* 1 (1.7%).

Graphic 1- Number of fungi species by stretches found in 60 examined stretches of the Clinic of the Uniabeu University Center Physiotherapy School.



IV. DISCUSSION

Although the importance of the study of the stretche's surfaces in the epidemiology of hospital and outpatient facilities infections was clarified, few studies about fungal monitoring and hygiene of these environments were found.

According to Honorato3 and Coura5, we daily live in contact with a large number of genus and species of fungi and most of these do not cause problems in healthy individuals, but in immunocompromised patients they can become devastating. In the hospital environment, there are often immunocompromised patients, making this environment a risk place depending to the levels of fungal contamination. Basic diseases such as malnutrition, cancer, infections or specific conditions, also procedures that include surgeries, intubation, transplanted, prolonged administration of medications, make these previously debilitated patients more vulnerable to opportunistic fungal infections. The authors also considered that cleaning of the health care outpatient clinics and hospital environment is the best way to control levels of fungal contaminants when performing with the correct procedures. The ideal procedure would be that in the act of this cleaning an ambient sterilization be performed, which is not possible. Therefore, the effectiveness of the cleaning process shall promote the greater safety of the environment as possible, lowering the risks of fungal contamination to the patients and health professionals. According to our results and observations, we can corroborate the idea of these authors.

According to the control of the transmission of pathogens in health care facilities, we agree with the indications of the researchers Oliveira & Damasceno8 when affirming that besides the cleaning and disinfection of surfaces and equipment, the cleaning of the hands excel for the guarantee of safe care. The hands of healthcare professionals and people who move in the hospital environment are an important pathway for disseminating pathogens between patients, visitors and health professionals to the environment and vice versa. However, hand sanitation have not sufficient observance among health professionals, probably due to multiple attributions, difficulties in accessibility to lavatories, level of knowledge, motivation, belief, among other reasons.

The hygienization of health care sectors aims to remove dirt with the application of germicidal substances and friction, thus preventing the microorganism dispersion which is on the surfaces of the furniture. However, when the disinfection of the surfaces have failures, they only move the dirt from one place to another and the microorganisms remain on the surfaces, persisting the source of contamination2,9,10,11. We suggest that health and cleaning professionals must be trained to rectifying their habits in order to reduce the levels of hospital or outpatient infection both through direct contact with patients as through the manipulation of inanimate objects that may become sources of infection in the sector of physiotherapy.

V. CONCLUSIONS

A high number of pathogenic fungi species was found, contamining the examined stretchers, and it may be considered as possible infection sources when there is no sufficient or adequate cleaning in the gap between patients treatment. The pathogen monitoring should be performed mostly in immunocompromised specialized outpatients, which are more susceptible to develop infections by ambient pathogens, health professional transmitted or hospital-linked infections.

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Impact Of Dairy Effluent On Biochemical Constituents in Gills, Liver and Muscle Of Fresh Water Fish, Blue Gourami

(*Trichogaster trichopterus*)

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Abstract- Water used in domestic and industrial application can become polluted to varying degrees. The dairy industry is an important part of the overall food industry which contributes materially to fluid wastes. Hence an investigation had been carried out to study the physico chemical parameters of dairy effluent and its effect on biochemical constituents present in different organs of fish, blue gourami (Trichogaster trichopterus). The results of analysis of physicochemical parameters revealed that industry treated dairy effluent was greyish black in colour with disagreeable odour. pH was alkaline with low organic load such as EC, TSS, TDS, BOD and COD, indicating high pollution potential of the effluent. The results of impact of industry treated dairy effluent on biochemical constituents present in different organs of fish, blue gourami showed that among the different organs of fish such as gills, liver and muscle studied for biochemical estimation, gills was most affected organ which showed decreased amount of biochemical constituents than that of liver and muscle of fish and also carbohydrates was decreased drastically than lipid and protein.

Index Terms- Industry treated dairy effluent, physicochemical parameters, biochemical constituents, gills, muscle and liver, fresh water fish, blue gourami (Trichogaster trichopterus).

I. Introduction

Pollution is the introduction of contaminants into the natural environment that cause adverse change to the environment. Water is one of the most important requirements of all living beings for performing essential life functions and is considered as a precious natural resources. But due to the rapid growth of industries in the country, pollution of natural water by industrial waste has increased tremendously (Muthusamy and Jayabalan, 2001)[1]. Water pollution is one of the biggest environmental issues we have today.

Water is often contaminated by pollutants like fertilizers, pesticides, effluent discharged from industries, sewage and so on. Organic waste include pesticide residues, solvent and clearing fluids dissolved residue from fruits, vegetables and lignin from pulp and paper can also contain inorganic wastes such as brink salts and metals. Excessive chemicals used for the above process, when discharged, harden the texture of the soil, act as flocculating agents that deprive the soil, its water holding capacity .

The treated effluents are discharged into aquatic culture ponds where large quantities of fish are cultivated. Untreated industrial effluent discharged on surface cause severe ground water pollution in the industrial belt of the country. Industrial effluent contaminating water bodies adversely affect organisms particularly the fish. Evolution of metal based industries has lead to the contamination of environment with heavy metals (Larson et al. ,1985)[2]. With the growing industrialization and urbanization boost the economy of the century on one hand and on the other hand act as threat to environment, Sangeetha Arora et al. ,(2011) [3].

Alteration in biochemical components in response to environmental stress are authenticated by many authors which revealed that effluent treatment can cause alteration in level of biochemical components depending on the toxic ingredients, individual ingredient quantity and exposure period. keeping these views in mind, it is decided to investigate the impact of dairy effluent on biochemical constituents of fish, blue gourami (*Trichogaster trichopterus*) that is used as environmental biological indicator of pollution.

II. Materials and Methods

2.1 Procurement of test fish

The fresh water fish, blue gourami (*Trichogaster trichopterus*) having average length 15±1 cm and weight about 40±5 gm were collected in the clean containers of 10 liters capacity from the pond, located in Chennai. ensuring that they were not harmed either physically during collection and transportation. They were brought to the laboratory and transferred to aerated aquarium for acclimatization. The fishes were fed daily with commercial fish feed.

2.2 Collection of dairy effluent

For the present study, the industry treated dairy effluent was collected from dairy industry located in Chennai, Tamilnadu, India. Dairy effluent were collected in 40 liters capacity polythene containers, stored in the refrigerator at 20º c until further analysis.

2.3 Physicochemical parameters of dairy effluent

The physicochemical parameters such as colour, odour, pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease (O & G), Sodium, Chloride of industry treated dairy effluent were determined by following the standard methods of APHA,(1989)[4].

2.4 Plan of Experiment

Blue gourami*(Trichogaster trichopterus*) small in size and indicating dots to represent with the same they are shorter finger lings. As practically undergone with an dilution in ml (milliliters). Since the five fishes have undergone a practical demonstration. Each fish consist of 1L of water (1L = 1000 ml) around five fishes have on an same tub with an quantity of water (5L = 5000 ml).A range finding bioassay was conducted by exposing the test animals to 5 %, 10%, 20 %, 40 % and 80 % concentrations of industry treated dairy effluent, diluted with an dilution in ml with probation (duration) of 96 hrs and mortalities were recorded in that order of 5 % to 80 % dilutions respectively. The LC_{50} values were also calculated. The fishes were starved prior to the experiment for the period of 24 hrs. After 96 hrs, the animals of both control and experimental were sacrificed by decapitation without anaesthetization. The tissues such as gills, liver and muscle of both control and experimental fishes were selected, excised and used for biochemical estimation.

2.6 Biochemical Methods

2.6.1 Anthrone method - Used to determine total glycogen content in tissues .Seifter et .al., (1950) [5].

2.6.2 Lowry's Method -Total protein content was determined with Folin Ciocalteau reagent. Rosenbrough et. al.,(1951). [6]

2.6.3 Sulphophosphovanillin method – Lipid were estimated by sulphosphovanillin reagent .Barnes and Blackstock (1973) .[7]

III. Results

The results obtained in the investigations are summarized in table 1 and 2. The analysis of physicochemical parameters (table -1) showed that the industry treated dairy effluent was greyish black in colour with disagreeable odour. The electrical conductivity(EC)of treated dairy effluent was 2207 µmhos/cm. TSS level of treated dairy effluent was 12 mg/L. TDS of the treated dairy effluent was 1540 mg/L. BOD levels of the treated dairy effluent was 60 mg/L. COD levels of the treated dairy effluent was 180 mg/L. Calcium content in the industrial treated effluent was 76 mg/L. Sodium content in industrial treated effluent was 325 mg/L. The sulphate content in industrial treated effluent 134 mg/L. Nitrate content in the industrial treated effluent was 44 mg/L. and Chloride content in industrial treated effluent was 267 mg/L.

The Table 2, shows the results of estimation of protein, glycogen and lipid content in different organs of gills, liver and muscle. Period dependant decrease in the biochemical constituents was observed throughout the exposure period. The toxicity of blue gourami *(Trichogaster trichopterus*) showed correlation with the concentration of industry treated dairy effluent and period of exposure.

3.1 Glycogen

The glycogen content were found to be 0.35 ± 0.04, 0.26 ± 0.04, 0.23 ± 0.03, 0.28 ± 0.02 mg/g wt of tissue in liver of fishes exposed for 24, 48, 72 and 96 hrs, respectively which were linearly decreased in comparison with control 1.3 ± 1.14 mg/g wt of tissue. The mean value of glycogen content in the muscle of experimental groups were 0.39 ± 0.47, 0.52 ± 0.07, 0.25 ± 0.05, 0.28 ± 0.04 mg/g wt of tissue for 24, 48, 72 and 96 hrs exposure of tissue and that of control groups was 0.54 ± 0.04 mg/g wt of tissue. The mean value of liver glycogen content in the experimental groups were 0.92 ± 1.10, 0.44 ± 0.33, 0.24 ± 0.06, 0.34 ± 0.22 mg/g wt. of tissue for 24, 48, 72 and 96 hrs exposure of tissue and the control group was 0.32 ± 0.055mg/g wt. of tissue.

3.2 Protein

In present investigation, total protein content in liver of control fish was found to be 4.76 ± 0.45 mg/g wt. of tissue whereas in treated fish at sub lethal concentration for 24, 48, 72 and 96 hrs were 1.25 ± 0.87, 2.3 ± 0.55, 4.53 ± 0.50, and 3.5 ± 2.30 mg/g wt. of tissue respectively, these values shows decreasing trend according to exposure period. The protein content in muscle of control fish was 3.0 ± 0.55 and that of in experimental fishes were 6.3 ± 2.8, 2.0 ± 1.26 and 2.5 ± 1.23 mg/g wt of tissue for 24 to 96 hrs. which was found to be decreased considerably, The protein content in gills of control fish was 6.9 ± 2.57 and that of in experimental fishes were 5.2 ± 0.98, 2.6 ± 0.94, 2.03 ± 0.90 and 4.8 ± 2.03 mg/g wt of tissue for 24, 48, 72 and 96 hrs exposure which was drastically decreased.

3.3 Lipid

The lipid in gill was recorded as 1.23 ± 0.16, 3.5 ± 0.15, 1.1 ± 0.67 and 1.3 ± 0.23 mg/g wt of tissue for 24 to 96 hrs respectively in experimental group which was decreased considerably when compared with control i.e. 1.66 ± 0.33 mg/g wt. of tissue. The lipid content in muscle was found to be 1.1 ± 2.86, 3.8 ± 0.15, 1.46 ± 0.09 and 2.8 ± 1.15 mg/g wt. of tissue for 24 to 96 hrs and 4.03 ± 0.15 mg/g in control fish. The lipid content in liver of control fish was 2.0 ± 0.152 mg/g and that of in experimental fishes were 2.9 ± 3.98, 2.4 ± 1.44, 1.7 ± 0.21, and 1.8 ± 0.23 mg/g wt. of tissue for 24, 48, 72 and 96 hrs. which was decreased considerably.

IV. Discussion

In the present study, the analysis of physico chemical parameters of industry treated dairy effluent showed that the dairy effluent was greyish black in colour with disagreeable odour, high BOD, COD, TSS and TDS which is in agreement with the work of Capoor and Singh et al. , (1998). [8] colour and disagreeable odour of the effluent could be due to decomposition of organic matter or presence of various aromatic and volatile organic compounds. The pH of dairy sample was 7.9 mg/L, which is within the CPCB (1995) [9] limit for discharge of effluents into inland surface water irrigation . Though the pH is alkaline in fresh water conditions, the waste become acidic due to decomposition of lactose into lactic acid, under anaerobic conditions and may cause corrosion of sewers Joseph(1995).[10] The electrical conductivity(EC) of industry treated

effluent was 2207 µmhos/cm and they were found to be within the permissible limits (3000µmhos/cm) issued by irrigation guidelines . Suspended solids was 12 mg/L.With regards to the TDS, the value was 540 mg/L when compared to the permissible limit (2100 mg/L). TDS level of water exceeded 500 mg/L. BOD value was 60 mg/L. which was high than the permissible limit of BOD is (30 mg/L) prescribed by CPCB (1995) for effluent discharged into inland surface waters.

The ions especially calcium, sulphate, sodium and total hardness, affect the water and make it unsuitable for drinking by the animals. It may be noted that the Ca, Na, SO_4 and including chloride were found to be less in concentration prescribed by CPCB (1995) [9]. Analysis of physicochemical parameters of the dairy effluent confirms that the waste water released from the dairy industry has higher concentration of BOD and Sodium compared to other permissible limits . Apart from BOD and Sodium other physicochemical parameter values are within the permissible limits. (Goel, 2000) [11].

With regards to acute toxicity studies of the fishes were transferred into five dilutions along with an sub lethal concentration. Sub lethal concentration which varies from 20 % to 80 % as per the dilution in the water accumulated (added). with an concentration of 20 % exposed for 96 hrs and recorded the mortality rate of the fishes. The 96-h LC_{50} values of industry treated dairy effluent on fish, blue gourami (*Trichogaster trichopterus*) was 20 % respectively. The effect of industry treated dairy effluent on biochemical constituents present in the gills, liver and muscle of experimental fish, blue gourami (*Tichogaster trichopterus*) exposed to various periods revealed a significant decrease in glycogen, protein and lipid content. . During stress, organism need sufficient energy which is supplied from reserve food material i.e. protein, glycogen and lipid. In present investigation glycogen, protein and lipid content were recorded to be decreased in various organs of fish .similar results were reported by Satyavardhan(2013) .[12], Lakhmanan (2013) .[13].

V. Conclusion

Based upon the results of the present study, it can be concluded that changes in glycogen, protein and lipid content in fish, indicates biochemical manifestation due to the toxic action of toxicants. Toxicant induce its effect at cellular or even at molecular level and ultimately causes biochemical alterations as evidenced in the present study. The changes in biochemical composition of fishes will naturally affect the nutritive value of aquatic fauna and deteriorating the value of fish and in turn it will also be great danger to human being due to continuous consumption of such fish.

VI. Acknowledgement

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Table1 :Physico – Chemical Characteristics Of Industry Treated Dairy Effluent

Physical Examination	**CPCB(1995)**	**Industrytreated dairy effluent**
Colour	Colourless	Greyish Black
Odour	Odourless	Disagreeable
Electrical Conductivity µmhos/cm	3000	2207
Total Suspended Solids mg/L	2100	1540
Total Dissolved Solids mg/L	3000	2207
Chemical Examination		
pH	6.5 - 8.5	7.99
BOD	30	60
COD	250	180
Total hardness (as $CaCO_3$) mg / L	600	290
Calcium (as Ca) mg / L	150	76
Sodium (as Na) mg / L	200	325

Nitrate (as NO_3) mg / L	50	44
Chloride (as Cl) mg / L	750	267
Sulphate (as SO_4) mg / L	750	134

Table 2 : Effect of industry treated dairy effluent on the biochemical constituents in different organs of fish, blue gourami (Trichogaster trichopterus)

Tissue	Biochemical Constituents	Control	24 hrs	48 hrs	72 hrs	96 hrs
Gill	Glycogen mg /g wt. of tisse	1.3 ± 1.14	0.35 ± 0.04	0.26 ± 0.04	0.23 ± 0.03	0.28 ± 0.02
	Protein mg/g wt. of tissue	6.9 ± 2.57	5.2 ± 0.98	2.6 ± 0.94	2.03 ± 0.90	4.8 ± 2.03
	Lipid mg/g wt. of tisse	1.66 ± 0.33	1.23 ± 0.16	3.5 ± 0.15	1.1 ± 0.67	1.3 ± 0.23
Liver	Glycogen mg /g wt. of tissue	0.32 ± 0.055	0.92± 1.10	0.44 ± 0.33	0.24 ± 0.06	0.34 ± 0.22
	Protein mg/g wt. of tissue	4.76 ± 0.45	1.25± 0.87	2.3 ± 0.55	4.53 ± 0.50	3.5 ± 2.30
	Lipid mg /g wt. of tissue	2.0 ± 0.152	2.9 ± 3.98	2.4 ± 1.44	1.7 ± 0.21	1.8 ± 0.28
Muscle	Glycogen mg / g wt. of tissue	0.54 ± 0.04	0.39 ± 0.47	0.52 ± 0.07	0.25 ± 0.05	0.28 ± 0.04
	Protein mg/ g wt. of tissue	3.0 ± 0.55	6.3 ± 2.8	2.0 ± 1.26	1.66 ± 0.96	2.5 ± 1.25
	Lipid mg/g wt. of tissue	4.03 ± 0.15	1.1 ± 2.86	3.8 ± 0.15	1.46 ± 0.09	2.8 ± 1.15

± - Satandard deviation

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The Effect of Attitudinal and Satisfaction Factors on Household Broadband Penetration in Malaysia

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ABSTRACT

The aim of this paper is to investigate the effect of attitudinal construct and satisfaction towards household broadband penetration (HBP) in Malaysia. Information and communication technology (ICT) is the most efficient way to develop the literacy of knowledge and skills among its users, and broadband is the key factor to spread the ICT infrastructure. By understanding the factor of continuance of broadband intention (CBI), the researcher explores the factors that affect HBP as well. Furthermore, this study will gauge the effectiveness of the Universal Service Provision (USP) projects especially 1Malaysia Internet Center1Malaysia (Pi1M) towards CBI. The findings will provide evidence and suggestions for policy makers and service providers to improve the implementation of USP projects or to suggest any better projects to ensure a sustainable growth of broadband penetration in Malaysia. The study adapted the model of adoption of technology in household (MATH) and the information system (IS) continuance usage model using a cross-sectional, survey-based study. The relations among the constructs of the proposed model were then hypothesised according to the literature findings and examined using SMART PLS 3.0. The population and samples of the study were drawn from the users of Pi1M in six regions of Malaysia (northern, central, southern, east coast, Sabah, and Sarawak). The cross-sectional study was conducted between October and December 2016 and involved 406 respondents. The results indicate that attitudinal construct is the key factor that has shaped customers' continuing behaviour intentions towards broadband usage and subscription. On the contrary this study find negative association between satisfaction and CBI among Pi1M users. Despite the growing number of studies on intention and adoption of technology, little research has been done on theory-building and the linkage between CBI and the two aforesaid factors: attitudinal construct under the MATH model and satisfaction. This study was conducted to fill the gap.

Keywords: Continue Broadband Intention (CBI), Satisfaction, MATH Model, Public telecenters, Smart PLS, Digital divide

1.0 Introduction

In many countries the policy to ensure the growth of broadband coverage is very important because it serves as the catalyst for internet penetration (1). Nowadays, broadband affects daily business productivities. The International Telecommunication Union (ITU) estimates a ten-percent increase in broadband penetration especially on mobile broadband technology, which in turn, could increase a country's total productivity factor by 4.2% in the long run (1). However, only few studies have been conducted on the critical technology management especially in terms of broadband penetration in households.

Many other initiatives have been introduced by the government to ensure the growth of HBP and reduce the digital divide. One of the key projects is the deployment of 1Malaysia Internet Center1Malaysia (Pi1M) in 2012 (skmm.gov.my, 2014). Pi1M was chosen as the subject of this study due to the significant amount of investment made by MCMC on telecenters types of projects since 2009. Given this point the present research intends to study the impact of Pi1M's deployment on HBP after years of implementation nationwide. Without prejudice, the key objective of this deployment is to introduce the usage of broadband among the dwellers within a particular area. As explained by Kiran and Vasantha (2), consumers' inclination towards a product or services is important in creating purchase intention. However, a study by Aziz, Razak, and Malek et.al (3) uncovered that MCMC has been facing challenges on how to increase attraction and has continuously motivated people to use broadband either in the telecenters or at home. Nevertheless, in some places, telecenters are still seen as a place for users to access government's websites and play games.

1.1 The 1Malaysia Internet Center

1Malaysia Internet Center (PI1M) has now reached eight years of execution and it has brought numerous social and financial effects to the users, especially the rural dwellers. This is precisely the expectations of the Commission, which is to give broadband services and administrations to underserved zones. The Commission has always endeavoured to move forward the usage of PI1M

every now and then. In 2013, they began presenting PI1M in urban territories, focusing on underserved areas and poor group, particularly by incorporating the debilitated and the groups who live in Individuals' Housing Project (PPR). Other than providing access to broadband services (4), Pi1M also offers ICT and entrepreneurship development trainings, and users can utilise other services such as printing, overlaying, photocopying at very minimum charges. Unfortunately, there is no recent study on the impact of Pi1M on any telecenter deployed by MCMC to the HBP. One study by Aziz et al. (3) find that telecenters have been focusing heavily on introducing the Internet and at certain extent, are still seen as places where children, teenagers, and youth access government's websites and play games only. Given these points, this study is considered necessary for policy makers to understand the factors that have influenced the usage and success of public telecentres in order to improve broadband penetration.

1.2 Household Broadband Penetration (HBP)

Household broadband penetration (HBP) is an international index by International Telecommunication Union (ITU) (1) established with the objectives to gauge a country's broadband penetration rate. Eventhough HBP in Malaysia for 2015 already surpassed 71% and is on upward trend (5), surprisingly the rate in some states has significantly dropped and was inconsistent (Figure 1.1). This was notable in states with the lowest HBP, such as Perlis, Negeri Sembilan, and Terengganu, which marked a significant drop of 23% from end of June 2014 to further 39%, but increased to 57.3% at the end of 2016. In contrast, Putrajaya recorded the highest penetration among the states, with 96% of HBP in 2014 which increased to 98.5% in 2015, although a steep fall (61.9%) was noted at the end of 2016.

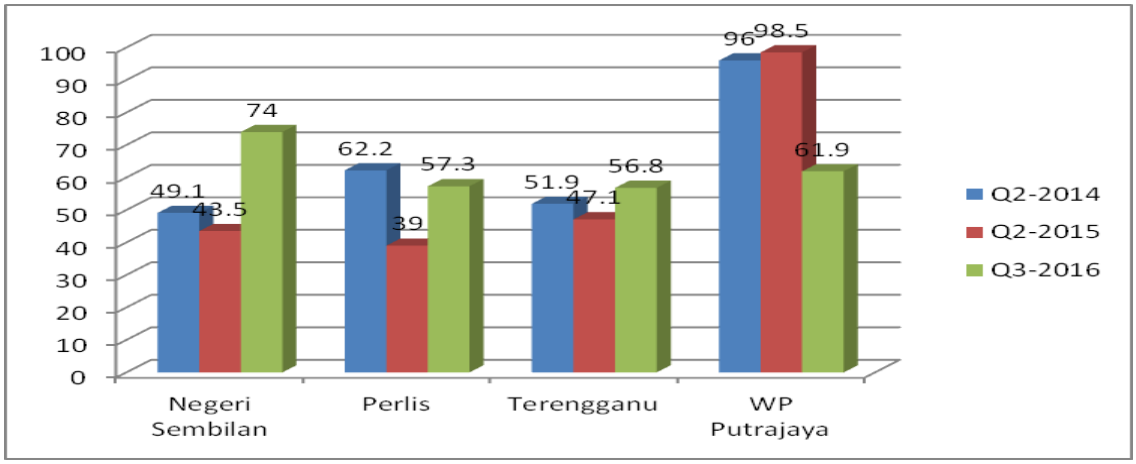

Figure 1.1 The comparison of household broadband penetration for 1 year period from Q2 2014 to Q3 2016. (Source: Communication & Multimedia Pocketbook, www.skmm.gov.my, 2015)

As indicated by Prieger (6), the drop of household broadband penetration may be caused by a few factors, such as (1) the facility being too expensive, (2) low service quality, (3) inadequate service quality, or (4) users' lacking of exposure to computers. A number of studies were conducted on the initial use and adoption of information system (IS), but only a few focused on broadband penetration in households. In another study by Muraina (7), factors that determine broadband intention were uncovered. Niehaves and Plattfaut (8) found that the MATH model has more explanatory power (R^2) compared to UTAUT. Furthermore, Kim and Malhotra (9) argue that the adoption and the first use of any technology does not necessarily lead to the desired managerial outcome unless the use continues. Given these points, the present study will provide new knowledge with regard to the continuance of broadband intention model. The study hence set the following objectives:

i. To investigate the relationship between attitudinal construct in MATH model and CBI among the users of public telecenters in Malaysia.

ii. To investigate the relationship between satisfaction and CBI among the users of public telecenters in Malaysia.

iii. To investigate the impact of the moderating factor of gender on CBI among the users of public telecenters in Malaysia.

Research Hypotheses

Many studies have provided empirical evidence on the intention to use technology and several studies have also examined the use of the information system (IS) theories. Nevertheless, the issues were addressed in different perspectives thus have produced solutions only on some issues (7). As mentioned by Tan and Teo (10), the positive attitude of individuals will most likely form an intention to perform the behaviour. Accordingly, the present study will focus on the theoretical models of MATH and the IS continuance usage model as a foundation to the research.

1.3 Model of Adoption Technology in the Household (MATH)

A considerable amount of literature has been published on the MATH model. Developed by Venkatesh and Brown (2001), the model proposes attitudinal, normative, and control constructs to predict people's intention to adopt technology in a household.

1.4 Attitudinal Construct

The attitudinal construct consists of relative advantage (RA), utilitarian outcome (UO), hedonic outcome (HO), and service quality (SQ). The construct is one of the major determinants that create individuals' perceptions towards behaviour. The

acceptance and willingness to use broadband especially in low broadband penetration areas will determine the success of any applications or systems especially *e*-Government websites or portal. Therefore, it is crucial for the government to develop an excellent system, although the success is much influenced by the collaboration between government and the willingness of the citizens to use the technology (11). One study (12) proposes and validates relative advantage and other factors such as UO, HO, and SQ to determine the adoption of an innovation. Given these points, the following research question (RQ) and hypothesis are posited:

RQ1: What is the effect of attitudinal construct on the CBI among public telecenter users?
H1: Attitudinal construct will have a positive relationship on CBI.

1.5 IS Continuance Usage Model

It is believed that users are viewed as the central part of information system, therefore as suggested by Muraina (13), the determinant of both satisfaction and dissatisfaction of technology will determine the onward usage. The present study will use the model proposed by Muraina (14), which suggests that the factor of user satisfaction be a means of measuring the success of information system. Other studies by Jung, Chung, and Leue (15) mention that satisfaction is a critical measure of the success and effectiveness of information system. At the same time, Chen et al. (15 p.30) define satisfaction as "the degree to which one believes that an experience evokes positive feelings." Accordingly, the present study hypothesises the following linkage to answer the second RQ:
RQ2: What is the effect of satisfaction on the CBI of public telecenter users?
H2: Satisfaction will have a positive relationship with CBI.

Therefore, this study adopts the research model as in Figure 2.3.

1.6 Moderator

Ooi et al. (17) suggest that future research include a moderating construct to examine the inter relationship among the adoption factors. Additionally, Rahman and Aziz (18) mention that demographic characteristics (such as age, income, gender, and race) are often assumed to have significant effects on consumers' perceptions. Nevertheless, the present research focuses only on gender due to the simpler analysis on categorical data for the moderating construct, and other demographic variables will need to be assessed further in future research. The research question and hypothesis of moderating effect are as follows:

RQ3: Does gender moderate the effect of attitudinal construct on CBI?

RQ4: Does gender moderate the effect of satisfaction to CBI?

H3a: Gender will moderate the effect of attitudinal construct on the CBI among public telecenters users.

H3b: Gender will moderate the effect of satisfaction on the CBI among public telecenters users.

Therefore based on the underpinning theory for this research, the following framework (Figure 2.1) is proposed.

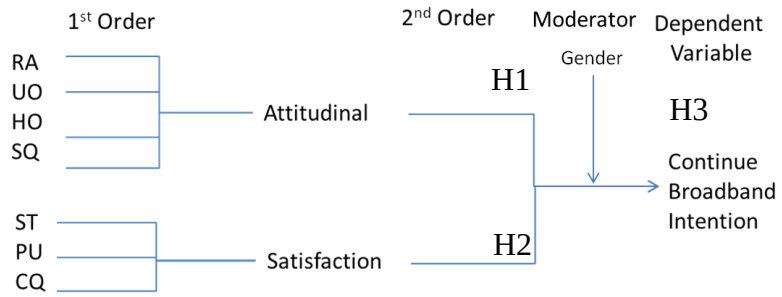

Figure 2-1 The research framework for the continue broadband intention (CBI)

Research Methodology

Puspa and Ishi (19) state that an appropriate research design is crucial in determining an appropriate data collection method, such as type of data, data collection technique, and sampling methodology. In the present cross-sectional study, the data collection was performed only once in a determined period of time. Thirty–four self-administered questionnaires were used in a survey (20) form (Table 3). The questions were divided into two categories: (i) multiple choice questions that capture demographic variables such as age, gender, education, income and background of broadband usage; and (ii) a five-point Likert scale questions that were designed to address issues related to continue broadband intentions. The questionnaires were reviewed by six experts in academia and industries and minor improvements were made based on their feedback. A total of 1200 questionnaires were distributed nationwide, and in every region, four Pi1M centres were selected randomly and one-hundred questionnaires were given to the manager of each centre. The questionnaires were later given randomly to the respondents who are the registered users of the Pi1M. Weekly follow-ups were made to the Pi1M managers and the questionnaires were then collected after two months. A total of 406 completed questionnaires were received and 20 were excluded due to missing data. Ultimately a response rate of 36.5% was obtained, about the same result as Chin et.al (21). The collected data were then analysed using Smart PLS 3.0 for

measurement and structural model analysis. Smart PLS 3.0 was chosen because it makes minimal demands on the data distributions, sample size, and measurement of scales; in fact, this study was predictive in nature. Nowadays, the use of PLS path modelling is becoming more appropriate for real world applications and more advantageous for complex models in which the primary and crucial measures for data reliability was successfully performed.

Data Analysis and Results

A total of 1200 questionnaires were distributed to twelve telecenters in six regions. Altogether, 406 responses were received hence representing a 33.8% (n = 406) response rate. However, 20 samples with 20% missing data were removed from the analysis, leaving 386 samples. Among the respondents, 61% (n = 235) are females and 31 % (n = 151) are males and 39% (n = 149) are in the group of 17 to 24 years old and the least (6%) (n = 23) are the respondents between 44 to 55 years of age. In terms of education level, most of the respondents were undergraduate or have higher diploma (35%) (n = 136) and postgraduates recorded the second highest (n = 83) and diploma holders were the least with 7% (n = 27).

1.7 Convergent Validity

The collected data were first analysed on the measurement model using Smart PLS as this was the crucial measures for evaluating data reliability. As illustrated in Figure 4.1, the latent constructs such as relative advantage (RA), utilitarian outcome (UO), hedonic outcome (HO), and service quality (SQ) that formed the second order construct (attitudinal) were measured. At the same time Content Quality (CQ) and Perceived Usefulness (PU) forming the second –order construct for Satisfactions. It is called second-order construct because it contains all indicators of its first-order subconstructs, and later, prediction of the model was made on the basis of the second-order construct Lowry and Gaskin (22). The first order construct was qualified to be conceptually explained before the hypothesising of the second-order construct. The modified path analysis (Figure 4.1) with a standardised loading of at least 0.5 (as stated by Bagozzi et. al [18,19]) demonstrates adequate support for convergent validity to ensure that only good items are carried over to the CFA stage of validation. The internal consistency of the model was measured by measuring the instrument's convergent validity, which consists of composite teliability (CR) and average variants extracted (AVE). The measurements were performed using Smart PLS 3.0.

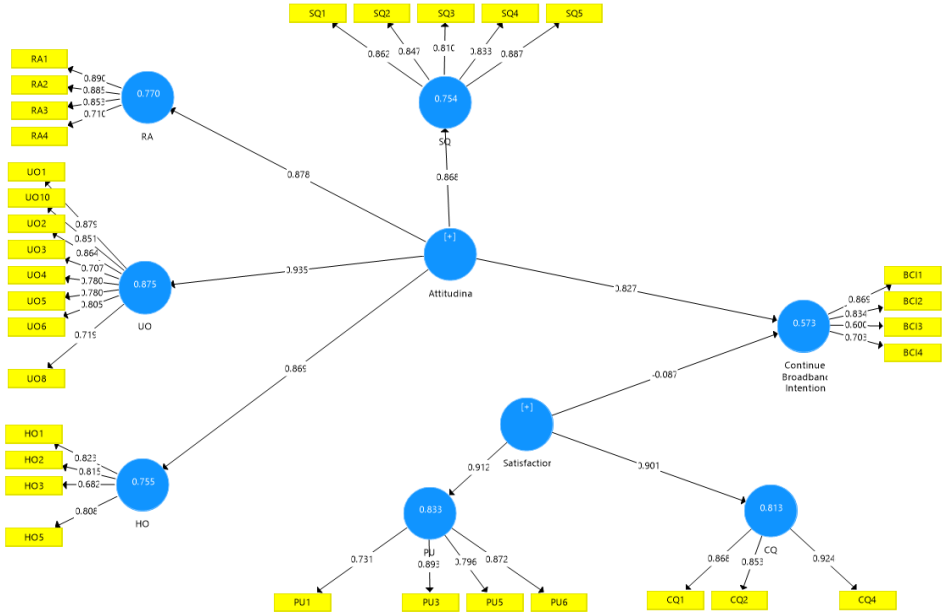

Figure 4.1 Modified path analysis

The convergent validity results are shown in Table 4.1 where all items construct are above the minimum requirement, thus satisfy the reliability requirements as stated by Bhattacherjee et. al (13, 20). (The requirement is for the composite reliability to be greater than 0.70 and AVE greater than 0.50.)

1.8 Discriminant Validity

The discriminant validity was tested using Fornel and Lacker criteria, and Heterotrait Monotrait Ratio (HTMT). Fornel and Lacker was assessed by comparing the correlations construct (R^2) and the square root of the AVE for each construct as illustrated in Table 4.2. A square root of the AVE greater than the correlation indicates an adequate Fornel and Lacker value for the discriminant validity.

Table 4.1 Convergent Validity

Construct	Item	F.Loading	CR	AVE	Validity Met

	Ist Order				
Continue Broadband Intention	BCI1	0.869	0.842	0.576	Yes
	BCI2	0.834			
	BCI3	0.600			
	BCI4	0.703			
Content Quality	CQ1	0.868	0.913	0.778	Yes
	CQ2	0.853			
	CQ4	0.924			
Hedonic Outcome	HO1	0.823	0.864	0.615	Yes
	HO2	0.815			
	HO3	0.682			
	HO5	0.808			
Perceived Usefulness	PU1	0.731	0.895	0.681	Yes
	PU3	0.893			
	PU5	0.796			
	PU6	0.872			
Relative Advantage	RA1	0.890	0.903	0.701	Yes
	RA2	0.885			
	RA3	0.853			
	RA4	0.710			

Table 4.1 (Continue)

Construct	Item	F.Loading	CR	AVE	Validity Met
Service Quality	SQ1	0.862	0.928	0.720	Yes
	SQ2	0.847			
	SQ3	0.810			
	SQ4	0.833			
	SQ5	0.887			
Utilitarian Outcome	UO1	0.879	0.934	0.641	Yes
	UO10	0.851			
	UO2	0.864			
	UO3	0.707			
	UO4	0.780			
	UO5	0.780			
	UO6	0.805			
	UO8	0.719			
	2nd Order				
Attitudinal	RA	0.878	0.959	0.529	Yes
	HO	0.869			
	UO	0.935			
	SQ	0.868			
Satisfaction	PU	0.912	0.927	0.560	Yes
	CQ	0.901			

Further analysis of HTMT was done to indicate discriminant validity. According to Henseler et.al (21), HTMT and discriminant validity are valid if the HTMT does not exceed 0.9 as shown in Table 4.3, or else one can conclude lack of discriminant validity on the measurement model. Therefore as a conclusion this measurement model demonstrated adequate convergent and discriminant validity.

Table 4.2 Discriminant Validity: Fornel and Lacker Criterion

	CQ	HO	PU	RA	SQ	UO
CQ	**0.882**					
HO	0.583	**0.784**				

PU	0.706	0.619	**0.825**			
RA	0.567	0.734	0.665	**0.838**		
SQ	0.743	0.676	0.697	0.704	**0.848**	
UO	0.699	0.77	0.766	0.743	0.718	**0.8**

Note: The diagonal values (bolded) are square root of AVE; off diagonal is correlation among the first order construct

Table 4.3 Discriminant Validity: Heterotrait Monotrait Ration (HTMT)

	CQ	HO	PU	RA	SQ	UO
CQ	1					
HO	0.671	1				
PU	0.826	0.708	1			
RA	0.661	0.831	0.79	1		
SQ	0.838	0.757	0.79	0.79	1	
UO	0.774	0.84	0.862	0.836	0.77	1

1.9 Hypothesis Testing

This study utilised standardised estimates for all the hypothesised paths. The findings show that the attitudinal factor has positive influence and significant result (β = 0.827, t = 13.142, $p < 0.05$) on continuance of broadband intention (CBI). However, satisfaction has negative influence but insignificant result of (β = -0.087, t = 1.327) towards CBI (lesser that the minimum requirement of T-value 1.645). Further analysis on attitudinal with effect size of f^2 = 0.491 reflects a large effect size on continuance of broadband intention. Among the attitudinal factors, UO (Q^2 = 0.514) gives the highest effect and HO (Q^2 = 0.410) the lowest. As for the effect of satisfaction, CQ recorded a higher value (Q^2 = 0.586) compared to perceived usefulness. Summary of the bootstrapping results are shown in Table 4.4.

Table 4.4 Summary of Result for Hypothesis Testing using PLS Algorithm and Bootstrapping

Path Coefficient	Beta	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Significant
Attitudinal -> CBI	0.827	0.063	13.142	0.000	Yes
Satisfaction -> CBI	-0.087	0.065	1.327	0.185	No

1.10 Moderating Effect Gender

The moderating analysis of this study found that gender moderates the effect of attitudinal and satisfaction factors on CBI. Figure 4.2 shows the weakening effect of the moderators on the two independent variables. The effect size of the moderating factors to attitudinal is medium (f^2 = 0.345), and a very small moderating effect of gender was noted on satisfaction (f^2 = 0.002). The overall moderating factor of gender strengthens the effects for both attitudinal and satisfaction when the value of R^2 improved from 0.573 to 0.645.

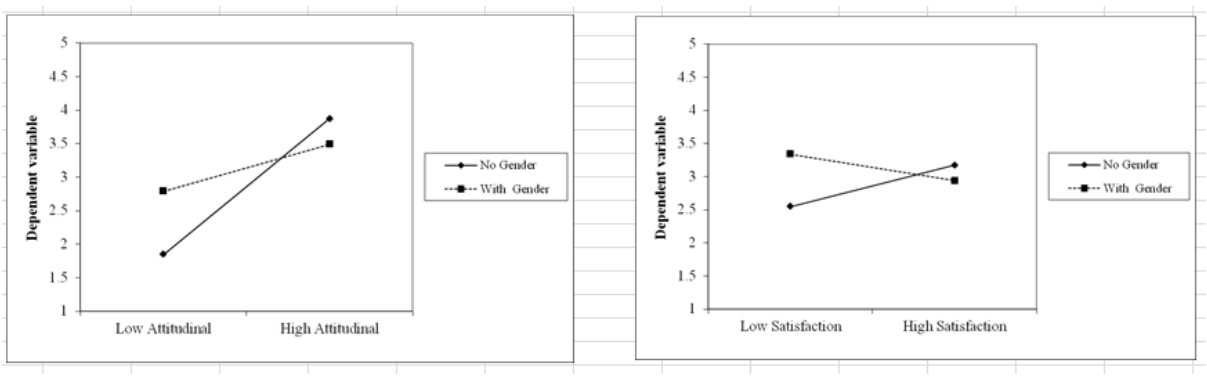

Figure 4.2 Moderating effects of gender on attitudinal and satisfaction

CONCLUSIONS

By adapting the MATH model, the present research investigates the roles of some factors towards the continuance of broadband intention (CBI) among the users. The results were obtained by using Smart PLS 3.0 and the findings reveal that the second order construct of attitudinal factor is significant, whereas satisfaction is not. The findings also attest that among the attitudinal factors, utilitarian outcome is the most important factor that policy makers and service providers need to focus on in order to ensure the sustainable growth of household broadband penetration in Malaysia. In fact, the deployment of broadband across many countries is a continuing effort, therefore the findings attest that policy makers also need to focus on the quality of the content. It needs to be updated from time to time especially on the benefits of the broadband and what it can offer. This study also find that gender factor plays an important role towards CBI where it had significantly moderate the effect towards CBI especially on attitudinal construct. The adoption of new technologies in households is always a complex process (26), but from time to time the diffusion of broadband has attracted unprecedented attention in the research and political community.

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Effectiveness of an Educational Program on Nurse's Knowledge about Managing of Respiratory Distress Syndrome on Pediatric Units at Al-Diwaniyah City Hospital

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***Abstract*- the study aims**: To assess pediatric nurse's knowledge about managing of Respiratory Distress Syndrome, to determine the effectiveness of the educational program through comparing nurse's knowledge in pre and post education program. And to find out the association between nurse's knowledge and their demographic data.**Methodology**A pre-test and post-test quasi-experimental study design was carried out in order to evaluate theeffectiveness of an educational program on nurse's knowledge about management of newborn babies with Respiratory Distress Syndrome (RDS) in pediatric units at Al Diwaniyah teaching Hospital. The study began from September 20th 2016 to August 6th, 2017.A quasi-experimental design was carried out from March 12th to June 22nd, 2017. A purposive sample comprised of (40) nurses was divided into two groups (study and control) groups. The study group was consisted of (20) nurses were exposed to the educational program. While, the control group had only (20) nurses without exposing to the educational program.The study questionnaire divided in two parts (Onyejuruwa, 2014). **Part I**: Self-managed questionnaire sheet identified with demographic for nurses' information: This part of questionnaire contains (age, gender, level of education, training sessions, number of training sessions, years of experience in pediatric units. **Part II**: Self-controlled poll sheet related to nurse's knowledge information about management of pediatric with respiratory distress syndrome.statistical data analysis approaches are used in order to analyze the data of the study under application of the statistical package (SPSS) ver. (22), and the Microsoft excel (2016). **Descriptive Data Analysis**: Tables (Frequencies and Percentages). Statistical figures (Bar Charts). Summary Statistics tables including: Mean, Mean of scores, Standard Deviation (SD), and relative sufficiency (RS%).In addition, the assessment by mean of scores (1.5) due to the correct and incorrect items scales with two levels of assessment, pass (<1.5), and fail (>1.5).**Results**: Shows the statistical analysis of demographic data of study sample was mainly females (60%) in the study group as well as in the control group (65%) females. According to age groups, the most age group was (25-29) years (35%) for the study and control groups. Regarding to educational, the study found that most nurses in the study group were graduated from secondary nursing school (80%) and (70%) in the control group. In regard to respiratory distress syndrome training nurses were (55%) in the study group and (45%) in the control group. Number of training coursesfor nurses was (1-3) courses in the study group (35%) and (40%) for the control group. Owing to the number of work and experience years were (45%) in the study and control groups.**Conclusions:** A large portion of nurses in pediatric units had information shortfall concerning administration of patient with Respiratory distress syndrome. **Recommendations:** Urging nurses to be selected in instructional courses and meeting to enhance their insight and stay up with the latest toward Respiratory distress syndrome.

***Index Terms*-** Effectiveness, Educational Program, Nurse, Knowledge, Management, Respiratory distress syndrome

I. Introduction

Respiratory Distress Syndrome (RDS) affects 40,000 infants each year in USA and accounts for approximately 20% of neonatal deaths. RDS typically affects infants <35 weeks' gestational age (GA) but may affect older infants who have delayed lung maturation[9]. Most common causes of newborn deaths at birth are respiratory distress syndrome, premature and low birth weight. Among those with normal birth weight, common causes of mortality were respiratory distress (90.4%), prematurity (27.7%), congenital malformations (26.5%), hypoglycemia (14.5%), infections (8.4%) and brain insult due to hypoxia (8.4%)[5]. Neonatal period is around from (0 to 28 days of life) which is the most hazardous period of life because of various problems/diseases of neonates. Some newborns in developing countries have intrauterine growth retardation life, reflecting the nutritional status of mothers [5]. About 42% of the infant's death in Iraq occurs within the first 28th days of life. Neonatal morbidity and mortality increasing in developing countries day by day due to lack of available resources [10].The sources of anxiety and fear among parents are due to death of a newborn child. Anxiety and fear are the responsibility of medical and nursing staff. Fear and anxiety are both in developed and developing worlds, while the changes in mortality rate among newborn children all over the world are decreasing very slowly despite the development of the world [5].

II. Study Objectives

1- To assess pediatric nurse's knowledge about managing of Respiratory Distress Syndrome.
2- To determine the effectiveness of the educational program through comparing nurse's knowledge in pre and post education program.
3- To find out the association between nurse's knowledge and their demographic data.

III. Methodology

Study Design: A pre-test and post-test quasi-experimental study design was carried out in order to evaluate theeffectiveness of an educational program on nurse's knowledge about management of newborn babies with Respiratory Distress Syndrome (RDS) in pediatric units at Al Diwaniyah teaching Hospital. The study began from September 20th 2016 to August 6th, 2017.

Setting of the Study: The study is conducted in Al Diwaniyah City/ Al Diwaniyah Health Directorate / Maternity and Pediatric Educational Hospital in Diwaniyah.

Study Sample: A quasi-experimental design was carried out from March 12th to August 6th, 2017. A purposive sample comprised of (40) nurses was divided into two groups (study and control) groups. The study group was consisted of (20) nurses were exposed to the educational program. While, the control group had only (20) nurses without exposing to the educational program.

Instrument Construction: To appraise the viability of educational program on nurses' knowledge about management of respiratory distress syndrome in Pediatric units at Maternity and Pediatric Teaching Hospital in Al-Diwaniyah city, the researcher constructed and modified a questionnaire format to achieve the study aims. The study questionnaire divided in two parts [(7)].

Part I: Self-managed questionnaire sheet identified with demographic for nurses' information: This part of questionnaire contains (age, gender, level of education, training sessions, number of training sessions, years of experience in pediatric units.

Part II: Self-controlled poll sheet related to nurse's knowledge information about management of pediatric with respiratory distress syndrome.

This part was to evaluate nurse's information about management of pediatric with respiratory distress syndrome. The questionnaire is additionally reviewed by nurses to understand its content previously. The time consumed for replying the questionnaire by each nurse was (45-60) min. This part was contained (30) multiple choice questions.Each question composed from three answer types. Each question's score answer was as fallow: The right answer score was two, but the wrong answer score was only one.

Statistical Analysis: The following statistical data analysis approaches is used in order to analyze the data of the study under application of the statistical package (SPSS) ver. (22), and the Microsoft excel (2016):

1. Descriptive Data Analysis:

a- Tables (Frequencies and Percentages).
b- Statistical figures (Bar Charts).
c- Summary Statistics tables including: Mean, Mean of scores, Standard Deviation (SD), and relative sufficiency (RS%).In addition, the assessment by mean of scores (1.5) due to the correct and incorrect items scales with two levels of assessment, pass (<1.5), and fail (>1.5).

2. Inferential Data Analysis:

This approach used to accept or reject the statistical hypothesis, which includes the following:

a- Pearson correlation coefficient to determine the study instrument reliability by using the test and re-test reliability technique.
b- Independent sample t-test.
c- Paired t-test.
d- Analysis of variance (ANOVA).

IV. Results of the Study

Table (1) study participants' demographic data

Demographic Data	Rating And Intervals	Groups			
		Study		Control	
		Freq.	%	Freq.	%
Gender	Male	8	40	7	35
	Female	12	60	13	65
Age /years	<= 24	4	20	4	20
	25 – 29	7	35	7	35
	30 – 34	2	10	4	20
	35 – 39	4	20	4	20
	40+	3	15	1	5
Levels of education	Secondary nursing school	16	80	14	70
	Technical institute	3	15	5	25
	College of nursing	1	5	1	5

Training enrolment	**Yes**	**11**	**55**	**9**	**45**
	No	**9**	**45**	**11**	**55**
Numbers of training sessions	**1 – 3**	**7**	**35**	**8**	**40**
	4+	**4**	**20**	**3**	**15**
Years of experience	**1-3**	**3**	**15**	**1**	**5**
	94 – 6	**8**	**40**	**10**	**50**
	7 and more	**9**	**45**	**9**	**45**

Table (1) shows the statistical analysis of demographic data of study sample was mainly females in the study group(60%) as well as in the control group (65%). In the study and control groups the most age group was (25-29) years (35%). Regarding to educational level, this work showed that most nurses in the study group were graduated from secondary nursing school (80%), but (70%) in the control group. In regard to respiratory distress syndrome training nurses were (55%) in the study group as well as (45%) in the control group. The number of training courses for nurses was (1-3) in the study group (35%), but (40%) for the control one. In both groups the number of the work and experience years were (45%).

Table (2) Overall assessment of the study participants prior to perform the education program (pre-test)

Overall assessment	**Study Group**				**Control Group**			
	Freq.	**%**	**M.S.**	**Assessment**	**Freq.**	**%**	**M.S.**	**Assessment**
Pass	**7**	**35**	**1.431**	**Fail**	**6**	**30**	**1.431**	**Fail**
Fail	**13**	**65**			**14**	**70**		
Total	**20**	**100**			**20**	**100**		

%: percentage **Freq.: Frequency**
Df: degree of freedom **M.S.: Mean of score**

Table (4.3) demonstrations overall assessment of the study participants (study and control groups) prior to perform the education program (pre-test) indicates that the investigation was frustrated in both groups (1.431) before the educational program.

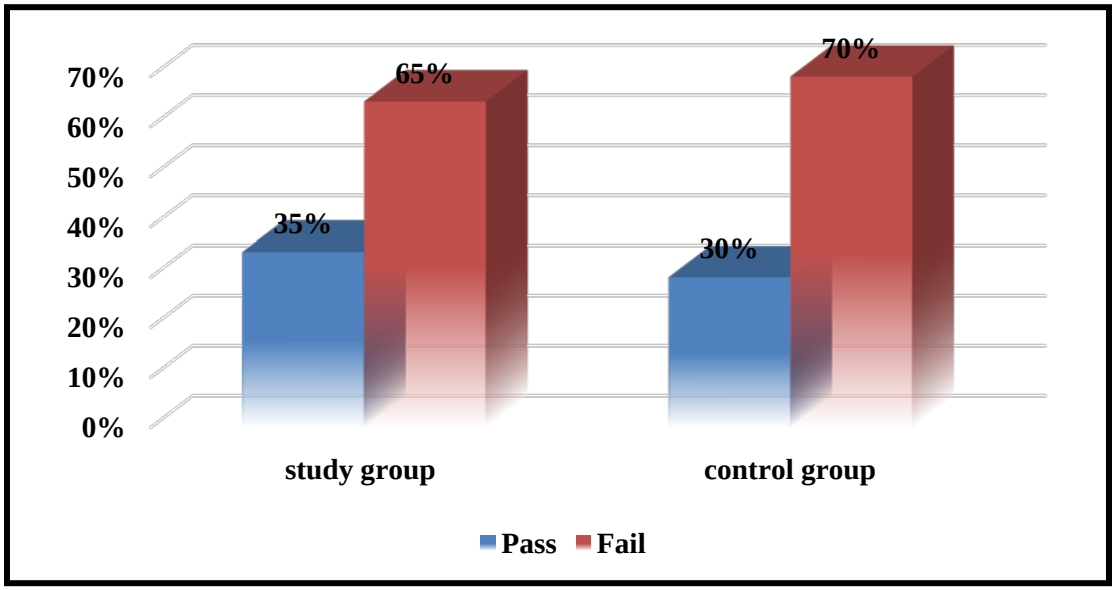

Figure (1) OVERALL assessment of the study participants (study and control groups) prior to perform the education program (pre-test)

Table (3) mean differences of knowledge prior between both groups due to perform the education program (pre-test)

Groups	Mean	Std. Deviation	T-Value	Df.	P-Value
Study Group	1.4317	0.070	0.229	37.927	0.82 NS
Control Group	1.4367	0.067			

P Value: probability value **Ms.: Mean of score**
Df: degree of freedom **T value: t-test**

Table (3): Explains the comparison of mean differences of knowledge prior between both groups so as to perform the education program(pre-test**)**. There are no significant variances in pre-test among the study and control groups (P. value = 0.82) that indicated insufficient knowledge in pre-test for both groups.

Table (4) Overall assessment of the study participants (study and control groups) after perform the education program (post-test)

Overall assessment	Study Group				Control Group			
	Freq.	%	M.S.	Assessment	Freq.	%	M.S.	Assessment
Pass	20	100	1.9	Pass	7	35	1.44	Fail
Fail	0	0			13	65		
Total	20	100			20	100		

%: percentage **Freq.: Frequency** **Ms.: Mean of score**

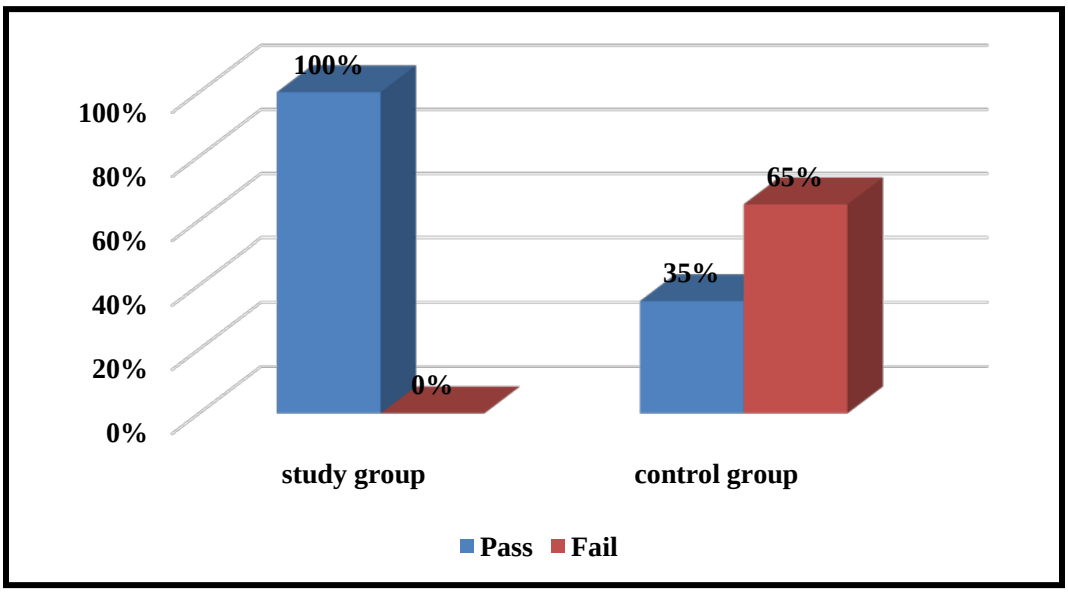

Table (4) Demonstration overall assessment of the study participants (study and control groups) after perform the education program (post-test). This table reveals that the study group participants were passed assessment (1.9) mean of score. While, the control group had failed assessment (1.44) mean of score.

Figure (2) OVERALL assessment of the study participants after perform educational program (post-test).

Table (5) mean differences between the two groups knowledge after perform the educational program (post-test)

Groups	Mean	Std. Deviation	T-Value	D.F.	P-Value
Study Group	1.900	0.054	23.005	35.535	0.001 HS
Control Group	1.442	0.071			

Freq.: Frequency MS: Mean of score T value: t-test
HS: High significant P Value: probability value Df: Degree of freedom

Table (5): Found that there was a highly significant difference (HS) with p-value (0.001) in post-test for the study group.

Table (6) mean differences between the pre and post-test scores for the two groups.

Groups	Pairs	Mean	Std. Deviation	t-value	d.f.	p-value
Study group	Pre-test	1.431	0.070	41.791	19	0.001 HS
	Post-test	1.90	0.054			
Control group	Pre-test	1.436	0.067	0.364	19	0.72 NS
	Post-test	1.441	0.070			

Freq.: Frequency Ms.: Mean of score NS: No significant
HS: High significant P Value: probability valueD.F.: degree of freedom
T value: t-test

Table (6): Demonstrates variance mean differences between the pre and post-test scores for both groups. This table appear highly significant differences between pairs groups at p-value (0.001).

Table (7) mean differences between the study group nurses' knowledge (post-test) and their gender and training sessions

Variables	Rating	N	Mean	Std. Deviation	T-Value	D.F.	P-Value
Gender	Male	8	1.9042	0.05756	0.274	18	0.787 NS
	Female	12	1.8972	0.05405			
Training sessions	Yes	11	1.903	0.06047	0.27	18	0.79 NS
	No	9	1.8963	0.04843			

Freq.: Frequency T value: t-test Ms.: Mean of score
P Value: probability value N.: Number DF: degree of freedom

Table (7): Demonstrations that there is no significant related between post-test and two variables in demographic data of the study group, while the Gender of the sample shows there are no significant association at P-value (0.787), also training sessions shows no significant association at P-value (0.79) with nurse's knowledge.

Table (8) mean differences between the study group nurses' knowledge (post-test) and their age, levels of education, number of training sessions, and years of experience

Variables	Rating	N	Mean	Std. Deviation	F	Sig.
Age / years	<= 24	4	1.91	0.07	0.311	0.866 NS
	25- 29	7	1.90	0.05		
	30- 34	2	1.90	0.09		
	35- 39	4	1.88	0.06		
	40+	3	1.92	0.05		
Levels of education	Secondary school	16	1.90	0.05	0.79	0.47 NS
	Technical institute	3	1.90	0.09		
	College of nursing	1	1.97	0.00		
Number of training sessions	No training sess.	10	1.90	0.06	0.06	0.942 NS
	1- 3	6	1.90	0.04		
	4+	4	1.91	0.07		
Years of experience	<= 3	3	1.91	0.07	0.994	0.391 NS
	4- 6	8	1.88	0.05		
	7+	9	1.91	0.05		

%: percentage N.: Number Ms.: Mean of score
HS: High significant NS: no significant F: F-test

Table (8): Shows that there is no significant association between post-test and some variables in demographic data of the study group, while the age of the sample shows there are no significant association at P-value (0.866), also levels of education shows no significant association at P-value (0.47) with nurse's knowledge. Number of training sessions of the sample shows there are no significant association at P-value (0.942). In addition, this table demonstrates no significant association among years of experience and nurse's knowledgeof study group in post-test at P-value (0.391).

V. Discussion of the Study Results

1. **Part-I: Discussion of Demographic Data of the study sample**:About the gender of the study subjects, the highest percentages were females in both groups (study and control groups) that is inconsistence with results of [8] who stated that male was a dominant gender in both (study and control groups), but consistence with the study results of Babeker and Elrufaie, 2015[11]. According to age groups, the greatest age group was (35%) within (25-29) years for the study and control groups. This result was approved by Babeker and Elrufaie, 2015[11] who stated that majority of the study subject's age were between (25-30) years old.In regard to educational level, the study group of the most nurses were finished their study from secondary nursing school (80%)and most of the control group nurses were also graduated from secondary nursing school (70%). These results were covenant with Mohamed et al. 2014[1] result who revealed that the majority of study subjects in pediatric units were proceeded secondary nursing school. This study indicated that, more than half of them (55%) did not joining any training sessions, these findings supported by Mohamed, etal,. 2014[1] who found that, the majority of nurses not joining training courses in NICU and this has the effect on the nurse's knowledge and performance.According tonumber of training sessions plays a very important role in increasing and modernizing nurses' knowledge beside improving quality of care given to neonates with RDS, regarding the nurses' attendance training courses for caring neonates in NICU. The researcher believes that

attending training sessions by nurses especially in the NICU is crucial to provide quality of nursing care. these findings supported by Mohamed, et al., 2014[1]. Regarding to the years of experience in pediatric units, the present study shows that both study and control groups have >7 years. This result approved by Said, 2012[5] who summarized that most of nurses in study and control groups had > 6 years of experience in pediatric unit.

1. **Part-II: Discussion of the Nurses' Knowledge Concerning Management of Patient with RDS:**Table (2) demonstrations overall assessment of the study participant's groups prior to perform the education program (pre-test) indicates that the investigation was frustrated in both groups (1.431) before the educational program. There was no significant difference in both groups in overall assessment. This results was supported by Mansi & Aziz 2017[6];Hammod & Mohammed 2016[3] studies. They stated that both groups had equal information on care for children who have respiratory distress syndrome before exposure to an educational program.

Table (3): Explains the comparison of mean differences between the study group and other group knowledge prior due to perform the educational program (pre-test**)**. There are no significant variances in pre-test among the study and control groups (P. value = 0.82) that indicated insufficient knowledge in pre-test for both groups. This result was well-matched with many studies such as Mansi & Aziz, 2017[6];Hammod & Mohammed, 2016[3]studies, who found that no significant differences between the mean of score of the test before the educational program.

2. **Part- III: Discussion of the Effectiveness of Educational Program on Nurses Knowledge Concerning Management of Patient with RDS for study and Control Groups:**

Table (4) Demonstration overall assessment of the study participants (study and control groups) after perform the education program (post-test). This table reveals that the study group participants were passed assessment (1.9) mean of score. While, the control group had failed assessment (1.44) mean of score. This results agree with study of Mohamed, et al. 2014[1] and Hammod & Mohammed, 2016[3]in their studies.

Table (5) Found that there was a highly significant difference (HS) with p-value (0.001) in post-test for the study group. This result was agreed with study ofMohamed, et al., 2014(1).

Table (6): Demonstrates variance mean differences between the pre-test and post-test scores for the study and control groups. This table seems highly significant differences between pairs groups at p-value (0.001). This table estimation at (0.01) level, which demonstrates the significant contrast amongst pre and post test scores. This result satisfied Mohamed et al. 2014[1]result, there was huge contrast amongst prior and then afterward mediations evaluation scores which shows that chose nursing intercessions on respiratory distress were effective.

Part-IV: Discussion of Associations between Nurses Knowledge of Study Group at Post-test and their Demographic Data:

Tables (7,8) Concerning result related to associations between posttest and demographic data. The present study reveals that there was no significant association between post-test and demographic data among the study group related to (gender, age,levels of education, years of experience, training sessions andnumber of training sessions). These results supported byMohammed 2016[2] indicated that no significant difference was there between demographic data and post-test.

Table (7) demonstrates no factual contrasts relationship between nurse's knowledge and gender orientation (p value - 0.787) this outcome strengthen by (Mohammed 2016), also training sessions shows no significant association among those who took training courses and who did not receive training at (P-value = 0.79) with nurse's knowledge.

Table (8) demonstrate that no measurable contrasts relationship between nurse's knowledge and age (p value=0.866). This outcome reinforces by Mohammed 2016[2]who demonstrated that there was no noteworthy connection between nurse's learning and age. In regarding to age/year, there is no significant association at (p-value = 0.866), This result reveals that the scientific abilities in learning capabilities, which can be affected with advanced age. When age is increased the perception and holding a knowledge may be decreased. There were no significant association between post-test nurse's knowledge and their level of education at p-value (0,47). These findings disagreed with the study of Mohamed, et al., 2014[1]. Regarding the years of experience, the present study showed that no huge relationship between years of experience and nurses knowledge at the study group (p-value 0.391). This result was agreed with Babeker and Elrufaie 2015[11].In addition, the number of training sessions of the study sample shows no significant association, (P-value = 0.942) as found by Mohamed, et al., 2014[1] that the majority are those who do not have a training sessions in the study group.

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The Impact Made By Visual Merchandising Elements on Purchase Intension: with Special Reference to Supermarket Industry in Western Province

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Abstract –In the era of crafting needs and wants rather satisfying customer needs and wants, the concept of marketing plays a vital role in differentiating their offering to the customers in order to develop a unique perception of the consumers' mind for their brands and products. In such a scenario visual merchandising can be identified as one of the emerging considerations of the retail stores especially in the supermarket stores with the purpose of attracting new customers in to the stores and promote existing customers for a more purchase. The current study has contrasted on a comparative analysis on identification of the impact made by the visual merchandising elements on the purchase intension with special reference to the supermarket industry, Western province. With the non-probability sampling technique- convenience sampling method, 150 respondents were selected. With the purpose of achieving a comparative analysis it has selected 50 respondents from each district respectively from Colombo, Gampaha and Kalutara. Both primary and the secondary data used for the study and descriptive statistics were used to analyse data. Promotional signage, Background music, Store design layout and the Store aroma have been identified as the independent variables and the purchase intension has been identified as the dependent variable. In the study, a key objective and four specific objectives were achieved and four hypotheses were developed. In the overall analysis of Western province, promotional signage and the store aroma have significant and positive influences on purchase intension while the highest impacts in Colombo, Gampaha and Kalutara districts are respectively from promotional signage and store aroma.

Keywords:*Visual Merchandising, Purchase intension, Promotional signage, Background music, Store Aroma*

I. Introduction

Many researchers have recognized the concept of marketing as the way of identification and satisfaction of customer needs and wants. But in the present, it has been revolutionized as the fashion of creating consumer needs and wants instead of identification of them. In the current competitive scenario, the companies who create needs instead of products are the companies that outperform the competition within the industry. For this, companies engage in designing a variety of modern strategies and tactics to be unique and differentiated their offerings for the target consumer by securing their positions in the market place. The current study focuses on visual merchandising which is one of the most prominent and emerging strategies used in the supermarket industry, Sri Lanka. The supermarket industry in Sri Lanka is set out for an explosive growth in the recent years and this is with the western lifestyle of modern Sri Lankans where convenience is a key benefit sought after.(Perera 2006). With limited formal retail penetration, Sri Lanka's modern supermarket-hypermarket segment is among the fastest-growing sectors, with supermarket penetration increasing from 5% in 2005 to around 8% in 2012. The dominant players in the sector include Cargills Food City, Keells Super, Laugfs Sunup, Arpico, and Lanka Sathosa. Further, the majority of supermarkets and hypermarkets are concentrated in western province.

1.1 Research Problem

"How does Visual Merchandising of supermarkets impact on purchase intention of customers in Western province?"

1.2 The main objective

To identify the impact made by Visual merchandising in supermarkets on purchase intention of customers in Western province.

Specific objectives

- To identify the impact made by Promotional Signage in supermarkets on purchase intention of customers in Western province.
- To identify the impact made by Design Layout in supermarkets on purchase intention of customers in Western province.
- To identify the impact made by Background Music in supermarkets on purchase intention of customers in Western province.
- To identify the impact made by Store Aroma in supermarkets on purchase intention of customers in Western province.

1.3 Hypotheses

H1- Promotional Signage in supermarkets impacts on purchase intention of customers in Western province.
H2- Design Layout in supermarkets impacts on purchase intention of customers in Western province.
H3- Background Music in supermarkets impacts on purchase intention of customers in Western province.
H4- Store Aroma in supermarkets impacts on purchase intention of customers in Western province.

II. LITERATURE REVIEW

Walters (1987) , define visual merchandising as the "activity which coordinates merchandise selection with effective merchandise display".(Ebster & Garaus, 2011)define visual merchandising as "the art and science of presenting products in the most visually appealing way", emphasizing on the communication with the customers through images and presentations. The utmost sense of expending a large amount of money for the concept of visual merchandising is to increase the company sales by developing a unique differentiation for the company itself to maintain a long-term customer base. An effective visual merchandising helps boosting the sales of products that will almost sell themselves. Retailers pursue through visual merchandising the basic objective of attracting customers in order to sell merchandize (Bastow, Zetocha, & Passwitz, 1991). Visual merchandising is therefore concerned with both how the product and/ or brand are visually communicated to the customer and also whether this message is decoded "appropriately" (Wanninayake & Randiwela, 2007). Visual merchandising is an important element of a store setting. It enables stores to attract and motivate customers to spend more time in the store, help them finding and selecting products they are looking for, encourage them to purchase items planned or unplanned as well as projecting a good overall image of the store (Bastow, Zetocha, & Passwitz, 1991)1; Gajanayake, Gajanayake, & Surangi, 2011). Visual merchandising enhances the attractiveness of a store and its perceived image from the viewpoint of customers. A positive mood serves as a contextual cue for evaluating the perceived quality, image of a product and store, and purchase intention (Bakamitsos & Park, 2000).

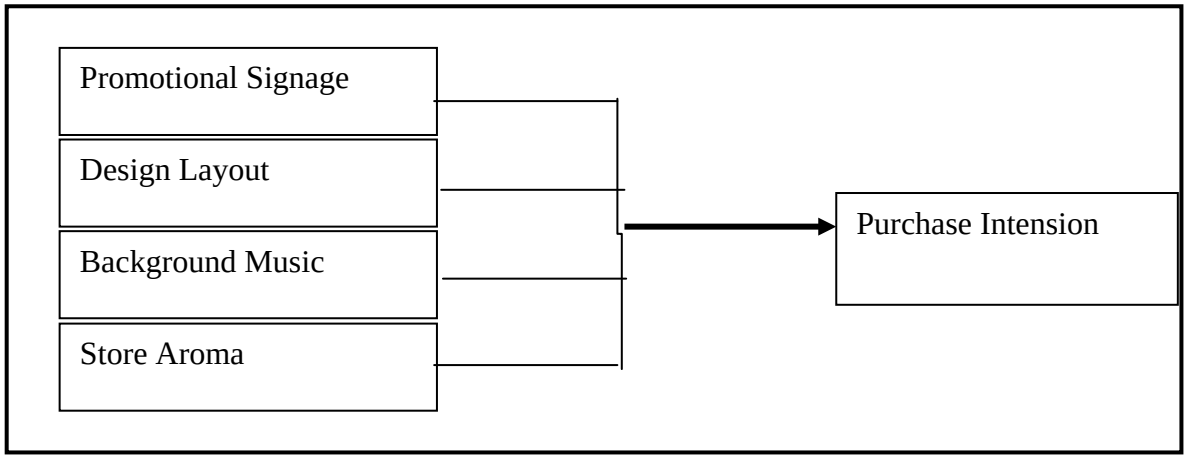
III. METHODOLOGY

The researchers recognized that there are various theories and concepts built by many researchers in the world and some researches done in Sri Lanka emphasised the recent growth in Sri Lankan supermarket industry. By referring the literature, researchers conducted a preliminary study by interviewing randomly selected 20 customers with the purpose of gaining a justifiable conclusion. The theoretical background and the preliminary study conclusions emphasised the real necessity of conducting this research.

Information about validity and reliability were necessary in order to determine whether instruments are stable, accurate and whether they truly measure what they set at to measure.(Sekaran, 2003). In order to test the model fit, reliability as well as the validity has been checked.

The questionnaire was reliable with a value of 0.838 under Cronbach Alpha test and the validity test was also accepted with a value of 0.853 according to the KMO Bartlett's test.

The research has a quantitative approach since the research includes descriptive statistics such as mean, median mode and regression analysis has been used to test the hypotheses which provide numerical values to make conclusions and to test specific hypotheses. In order to present data and the information charts and tables have been used. The research is a conclusive research design which involves measurements of clearly defined marketing phenomenon and this type of research design assists decision makers to select the best action that need to be taken. The population is the total number of people live in Colombo, Gampaha and Kalutara districts and a sample of 150 respondents were selected from western province where all the three districts comprised with equal number of customers. The sample was selected using the convenience sampling method under non probability sampling technique. When refereeing to the literature, there can be seen a plenty of models built on visual merchandising and the conceptual framework of the current research was built by the researchers based on the literature.



Source:The model developed by the researcher, 2017

IV. RESULTS & DISCUSSION

The majority (57%) of the sample is female, in the age group of 34-41 years. When it comes to the majority income group, it's about 38% in 25,000-49,999.The majority of the respondents are Advanced Level qualifiers, which is 42% and the majority of the respondents is married.
The result shows a regression coefficientof "r"= 0.853[a]or 85% that suggests a positive relationship between purchase intension and other explanatory variables. In this model, the coefficient of determination "R square" = 0.727 which shows that 73% of observed variability in customer purchase intention can be explained by the differences in the independent variables taken.

4.1 District wise Analysis

Table 1.0 : District Analysis

	Colombo		Gampaha		Kalutara	
Model	**B value**	**Sig.**	**B value**	**Sig.**	**B value**	**Sig.**
Promotional Signage	.512	.000	.449	.000	.214	.006
Design Layout	.023	.575	-.067	.198	.036	.490
Background Music	.089	.021	.009	.816	-.003	.947
Store Aroma	.442	.000	.502	.000	.534	.000

Source: Author

According to the table 1.0, promotional signage and store aroma significantly impact on purchase intension in both Colombo& Gampaha Districts, while the highest impacts are from promotional signage and store aroma respectively. Based on the above analysis, store aroma is the only visual merchandising element that makes a significant impact on the purchase intension of customers in Kalutara district.

4.2 Overall Analysis

Table 2: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.192	.214		.895	.372
	Promotional Signage	.397	.042	.478	9.391	.000
	Design Layout	.035	.025	.060	1.386	.168
	Background Music	.040	.023	.075	1.719	.088
	Store Aroma	.494	.051	.493	9.641	.000

a. Dependent Variable: Purchase Intension

According to the statistical analysis shown in the table 2.0, only promotional signage and Store aroma significantly and positively influence on the purchase intension since those two variables are showing a 0.000 significant value which is less than 0.005. Promotional signage and Store aroma show coefficient values of 0.397 and 0.494 respectively. Other than those two independent variables, Design layout and Background Music show 0.168 and 0.088 values for the significance but they cannot be accepted as significantly influencersas the values are not less than0.005.

In order to have a comparative analysis within three districts of the Western province, the sample analysis has been done separately. As per the statistical analysis, promotional signage and store aroma in the supermarket stores significantly influence on the purchase intension in both Colombo and Gampaha districts while the highest impact in Colombo and Gampaha districtsare from promotional signage and store aroma respectively. Finally, store aroma is the only factor that impacts on purchase intention in Kalutara district.

Visual merchandising reflects both interior and exterior customer seeks in a store that makes a positive influence for the consumers to make them attention, interest, desire and for the action. When it comes to the super trade industry in Sri Lanka, visual merchandising can be identified as a major clue to stimulate consumers to select the store. As revealed by the literature review so far, promotional signage, design layout, background music and store aroma are the most important visual communication elements which are highly considering in designing the strategic visual merchandising plan of the store.
Current study has been conducted to test the impact made by Visual Merchandising on Purchase Intension referencing to super market industry in western province, a comparative analyse between Colombo, Gampaha and Kalutara. It has been identified that, the weight of the impact made by the visual merchandising elements vary from one district to another although it is in the same province. Due to the demographic, psychographic, socio graphic and geographic variables, the consumer perception, attitudes and

purchasing behaviour vary from one to another. Targeting a specific homogeneous segment of consumers, the total market offered based on their expectations is the core of any business.

When it comes to Colombo District, majority of them are highly stimulated to the promotional offerings displayed at the exterior and the interior of the store. It is required to pay a considerable attention towards the promotional signage displays at the store premises. Other than the promotional signage, a sufficient attention is need to be paid for store aroma of the store, design layout and the background music in designing a strategic visual merchandising plan for the store.

In the context of Gampaha district, it reveals that store aroma is the most important element of visual merchandising in super market stores. Not only the store aroma but the promotional signage of the store also has an equal impact over the purchase intension of the consumers in Gampaha district. So it requires maintaining a strategic balance between the visual merchandising elements within the super market stores by emphasizing the store aroma along with a tuning promotional signage.The consumers in Kaluthara district are highly responsive for the store aromas which insist in the store promises.

V. CONCLUSION

The study is about the impact made by Visual Merchandising in supermarkets on Purchase Intention of customers in Western province. The analysis was done considering the Western province as a whole and as comparison of individual districts. It is proved that only promotional signage and store aroma impact on purchase intention while design layout and background music do not impact. This emphasises the importance of giving priority for promotional signage and store aromas for the supermarkets in western province while giving less priority for background music and design layout.

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Determinants of Work-Family Conflict of Dual Career Couples

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Abstract: Work-family conflict occurs when work related demands interfere with home responsibilities and Family-work conflict arises when family responsibilities impede work activities. Both types of conflict have been negatively related to employees' satisfaction. In Sri Lankan context the values and believes of family has been socially and ethically appreciated. But today the market demands of a worker and the family demands being a wife and a mother, a worker is getting the trouble of balancing the both career and the family. The consequence of work - family conflict is a deviation from the existing psychological condition of human life. Therefore, it is important to recognize the variables related to work-family conflict. The population of the study is the dual career couples of private sector garment industry in Horana area in Kalutara district and 10% of the population is taken as the sample. The principle method of the primary data collection will do through standard questionnaire; the random sampling technique will have administered for the study. The variables will have evaluated by the percentage analysis, coefficient of correlation, chi-square analysis and binary logistic regression. The study revealed that role overload, number of leaves, having children whose age less than 5 years and child care arrangements emerged as significant predictors of work-family conflict and family-work conflict of dual career couples.

Key words: Dual career couples,Employees' satisfaction, Family-work conflict, Work-family conflict

INTRODUCTION

Work-family conflict has been defined as a form of inter-role conflict in which the role pressures from work and family domains are mutually incompatible. This definition implies a bidirectional relation. Work-family conflict occurs when work related demands interfere with home responsibilities and Family-work conflict arises when family responsibilities impede work activities. Both types of conflict have been negatively related to employees' satisfaction (Neteyer et al., 1996). Life-work fit is defined as workers' perception that the job is balanced with home life they feel safe doing the work and that they have flexibility to attend to work and home duties. Work-life balance also reflects fit between personal life and work life.

The concept of work-family conflict has been explained by (Kahn et al, 1964) using the role theory framework. They proposed that the major determinant of an individual's behavior is the expectation of behavior that others have for him or her. The role theory predicts that the expectation surrounding each of these different roles a person performs can generate inter-role conflict when they involve pressure to dominate the time of the focal person to satisfy all expectations of his or her work and family roles since each role requires time, energy and commitment. Using this framework, (Kahn et al 1964) defined work family conflict as a form of inter-role conflict in which the role pressures from work and family spheres are mutually incompatible. Such incompatibility is indicated by the fact that participation in the work role is made more difficult by virtue of participation in the family role and vice versa.

The quality of fit between an individual's work and family life is a primary issue for families today and a major challenge confronting the labor market of the future (U.S. Department of Labor, 1999). Over the last 25 years, the number of dual career couples has been increasing (Boles et al, 2001). As a result, there has been an increase in the attention given to work- family conflict and family - work conflict. This increased attention, at least partially, results from a perception that work - family conflict and family-work conflict can result in undesirable work related outcomes. Work-family conflict has been conceptualized as a two-dimensional construct where work interferes with family and family interferes with work (Frone et al, 1996).

Work - family conflict can be explained as the mutual hindrance of work and family roles and organizational problems. Worker, individual always identify him with the roles he plays in each of these domains, and he is considered to be the most common and value roles. So, experience and results of work - family balance of workers. Work- family conflict is most commonly defined as a form of inter role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect. Business world is not family friendly, insufficient social security arrangements and frequent economic crises have significant negative effects on family.

PROBLEM STATEMENT

The changing scenario in business has its own impacts in human life. In Sri Lankan context the values and believes of family has been socially and ethically appreciated. But today the market demands of a worker and the family demands being a wife and a mother, a worker is getting the trouble of balancing the both career and the family. The consequence of work - family conflict is a deviation from the existing psychological condition of human life.

Therefore, the present study is a timely attempt to investigate the work-family conflict, family- work conflict, work and life satisfaction and health among the dual career couples in Sri Lankan garment industry.

OBJECTIVE OF THE STUDY

The main objective of the study is to recognize the variables related to work-family conflict and family – work conflict.

SIGNIFICANCE OF THE STUDY

Life satisfaction of the worker directly affects for the household economy. The decisions which are taken by the satisfied worker lead to increase the productivity level of the family and as well as to enhance their personal satisfaction. There by, households can perform their day today activities successfully.

Household is the smallest entity in the society. Success of a household is directly associated with the success of the entire society. Therefore, studying the variables related to work-family conflicts, family – work conflict, health and satisfaction becomes a major factor in order to achieve an economic development in any country with a social welfare.

By using the results of this study, economists can construct indices to measure the life satisfaction of workers. And also, the study data are widely useful to international agencies, researches, social workers and the general public.

Considering all above factors, this study will be very important for the economy and as well as for the entire society.

METHODOLOGY

The population of the study is the dual career couples of private sector garment industry in Horanaareain Kalutara district and 10% (210) of the population is taken as the sample. The principle method of the primary data collection will do through standard questionnaire; the random sampling technique will have administered for the study.

The variables will have evaluated by the binary logistic regression.

FINDINGS AND ANALYSIS

The model with having children whose age less than 5 years and child care arrangements has been recognized as the best logistic regression model for identifying the significant factors with the work-family conflict of dual career couples.

$$\mathbf{logit}(\boldsymbol{\pi}_i) = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_i^{\text{leaves}} + \boldsymbol{\beta}_j^{\text{role overload}} + \boldsymbol{\beta}_k^{\text{children}} + \boldsymbol{\beta}_l^{\text{child care}}$$

Table 1: Best Fitted Logistic Regression Model

Parameter	Category	β	Sig.	Expβ
Children whose age less than 5 years	have	2.96	0.00	19.48
Role overload			0.02	
	Very High	2.81	0.01	16.59
	High	2.24	0.02	9.41
	Moderate	0.84	0.45	2.32
Leaves	no	2.25	0.00	9.48
Child care arrangements			0.04	
	Good	2.76	0.44	1.93
	Neutral	3.13	0.21	2.98
	Bad	3.24	0.04	5.68
	Very Bad	2.95	0.00	9.14
	Constant	-1.47	0.21	0.23

Source: Sampling Survey, 2017

According to the results of the best fitted logistic regression model,

All estimated explanatory coefficients are greater than one and it denotes positive relationship with dependent variable.

Work family conflict is 19.48 times higher than for dual career couples havingchildren whose age less than 5 years compare to the dual career couples who have not the children whose age less than 5 years. This illustrates that probability of having work family conflict is greater than 82% fordual career couples having children whose age less than 5 years compare to the dual career couples who haven't children whose age less than 5 years.

As the role overload towards the job is very high, the work family conflictis increased by 16.59 times and work family conflictis increased by 9.418 times when they belong to the role overload towards the job is high category. This scenario further explains that when pay attention for the role overloadof the job, chance of having work family conflict is greater than 80% for group of dual career couples in very high category, 68% for high category and 35% for moderate group respectively.

Work family conflict of dual career couples is 9.489 times higher than for couples who haven't the ability to get leaves from the working place compare to the couples who do not have a chance to obtain leaves. In other words, probability of having work family conflict is greater than 69% for dual career couples without the availability of leaves compare to the couples who without the access for leaves.

Finally, considering the child care arrangements, work family conflict among the couples who categorized in to good group is increased by 1.93 times, the couples who categorized in to neutral group is increased by 2.980 times, who categorized in to bad is increased by 5.68 times and work family conflict among the couples who are belong to very bad category is raised by 9.14 times respectively relative to the very good category. This point out that chance of having work family conflict based on the child care arrangements is greater than 76% for group of employees in good category, 84% for neutral, 86% for bad and 81% for dual career couples are in very bad group.

CONCLUSIONS

Having children whose age less than 5 years and child care arrangements emerged as significant predictors of work-family conflict among dual career couples.

In the view of the dual career couples having children whose age less than 5 years, more than 80% of them are faced work family conflict.Ahmad (2007) found that operators with youngest child aged less than three years experienced more work-to-family conflict than those with youngest child aged three and above. Similarly, Lu et al. (2006) found that age of the youngest child was negatively correlated with both work-to-family conflict and family-to-work family. The findings support the contention that working mothers with younger children would experience more work-to-family conflict than those with older children. Parents of dependent young children, especially mothers, have higher family demands than those with older children. These greater, often unpredictable demands, such as childcare arrangement and care of sick child, would result in lower levels of control over the work and family interface and thus higher levels of work-family conflict. However, as the children get older the demands, especially those related to childcare, would decrease, resulting in increased levels of control and lower stress for the parents (Ahmad, 2008).

Considering the ability to get leaves from the working place, more than half of the dual career couplesare faced work family conflict due to the inability to take leaves from the job.

Among all the factors, child care arrangements have emerged as the most important factor for predicting the work family conflict. Child care arrangements have an important impact on parents' experiences of work and satisfactory provisions help protect against pressures of dual-earner lifestyles. The importance of child care in balancing professional and personal life among female gynecologic oncologists has been reported (Gardiner et al., 2000). Among married women in dual earner families, concerns about their child, including quality of child care arrangements, accounted for substantial amounts of variance in the role strain experienced by these women (Greenberger & O'Neal, 1990). A study of female production operators in manufacturing companies revealed that the operators experienced work-to-family conflict and the intensity of conflict experienced was negatively related to satisfaction with child care arrangements (Ahmad, 2007).

RECOMMENDATIONS

Work-family conflict is a serious human resources issue.Women experiences work family conflict because they have to manage both work and family roles simultaneously, whereas men can delegate their family responsibilities to their wives and concentrate fully on their career.And also selected organizations can offer courses on baby care for both spouses and fathers to be and they should be strongly encouraged to participate so that they can help with child care.

Employers have little enthusiasm for greater codification of employees' policies which restrict working time, putting emphasis on liberal doctrines of employees' choice (to work long hours) and freedom of market (Reeves, 2001). However, the government may encourage employers to offer greater flexibility to employees. In consequence, time flexible prescriptions (flexi-time; part-time working) have been offered by employers as the most common prescriptive approach to provide balance between work and life for their employees.
Practices such as parental leave, domestic leave and flexible work can be designed exclusively to make family life easier and therefore make work easier firstly through addressing family role conflicts.

Work-family conflict has become a societal issue. This issue leads to health-related problems such as over stress, mental imbalance, emotional exhaustion and life dissatisfaction. In order to reduce these health-related problems, the society needs to promote the meaning of balancing the work and family roles and emphasize the important of personal interests.

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Decoding Taj Mahal

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Abstract- Taj Mahal was completed almost 350 years back by the Mughal emperor Shah Jahan to house the remains of his cherished wife. It is one of the world's wonders and depicts India's rich history.

As per today's evaluation very little we knew about how the building was conceptualized and executed. all we know the Taj Mahal is ordered by grids and is square in plan with chamfered corners, forming an unequal octagon

Author of this research would like to present a 1 part of 3 set of papers to trace back the evolution of **Taj Mahal Built form, Complex and elevation** from an equal sided **Octagon**. This discovery would redefine the concept called as The Hasht – Bihisht of Taj Mahal.

Index Terms: Taj Mahal, architectural plan, octagon, decode, Hasht- Bihisht.

Fig 01: Taj Mahal isometric vew (source:author)

I. The Notion

The Taj Mahal was designated as a UNESCO World Heritage Site in 1983 for being “the jewel of Muslim art in India and one of the universally admired masterpieces of the world’s heritage”.

II. Existing Theories

Theory 1: 1989

The Taj complex is ordered by grids. The complex was originally surveyed by J.A. Hodgson in 1825, [01] however the first detailed scholastic examination of how the various elements of the Taj might fit into a coordinating grid was not carried out until 1989 by Begley and Desai. Numerous 17th-century accounts detail the precise measurements of the complex in terms of the gaz or *zira*, the Mughal linear yard, equivalent to approximately 80–92 cm. Begley and Desai concluded a 400-gaz grid was used and then subdivided.[02] [03]

Theory 2: 2006

Research and measurement by Koch and Richard André Barraud in 2006 suggested a more complex method of ordering that relates better to the 17th century records. Koch and Barraud explain such apparently peculiar numbers as making more sense when seen as part of Mughal geometric understanding. Octagons and triangles, which feature extensively in the Taj, have particular properties in terms of the relationships of their sides. A right-angled triangle with two sides of 12 will have a hypotenuse of approximately 17 (16.97+); similarly if it has two sides of 17 its hypotenuse will be approximately 24 (24.04+). An octagon with a width of 17 will have sides of approximately 7 (7.04+), which is the basic grid upon which the mausoleum, mosque and Mihman Khana are planned.[02]

Discrepancies remain in Koch and Barraud's work which they attribute to numbers being rounded fractions, inaccuracies of reporting from third persons and errors in workmanship (most notable in the caravanserais areas further from the tomb itself).[02]

Theory 3: 2009

A 2009 paper by Prof R. Balasubramaniam of the Indian Institute of Technology found Barraud's explanation of the dimensional errors and the transition between the 23 and 17 gaz grid at the great gate unconvincing. Balasubramaniam conducted dimensional analysis of the complex based on Barraud's surveys. He concluded that the Taj was constructed using the ancient Aṅgula as the basic unit rather than the Mughal 'gaz', noted in the contemporary accounts. The Aṅgula, which equates to 1.763 cm and the Vistasti (12 Angulams) were first mentioned in the Arthashastra in c. 300 BC and may have been derived from the earlier Indus Valley Civilization. In this analysis the forecourt and caravanserai areas were set out with a 60 Vistasti grid, and the riverfront and garden sections with a 90-vistari grid. The transition between the grids is more easily accommodated, 90 being easily divisible by 60. The research suggests that older, pre-Mughal methods of proportion were employed as ordering principles in the Taj.[04]

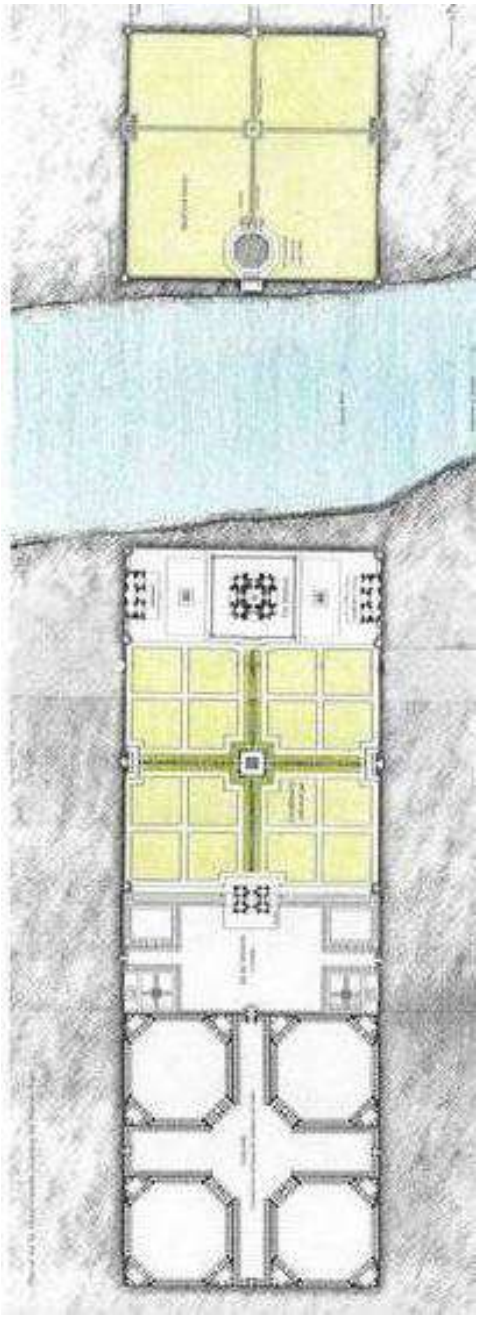

Fig 02: Taj Mahal complex site plan (source: http://www.the-south-asian.com/Jan2001/taj_complex.jpg)

III. The Enquiry

The preceding theories give rise to an enquiry into "what is the correct dimensional organization of Taj Mahal and evolution of architectural concept.

The Sacred

The concept of after life is among the fundamental tenets of Islam. The Paradise (Jannah) and Hell (Jahannum) are significantly described in the Holy Quran and Hadiths (saying or traditions of Prophet Mohammad-pubh) [05].

It is mentioned that there are Seven Levels of paradise. The more good deeds one has performed the higher the level of paradise one is directed to, it has been said that the lowest level of paradise is one-hundred times better than the greatest life on earth. The highest level is the seventh called *jannat ul firdous*, in which God can be seen and where anything is possible). [06]

The Metaphor

The belief of afterlife or paradise in Islam is represented by the symbol *"Hasht- Bihisht"* is a Persian term literal for eight paradises. The symbolic representation of *Hasht – Bihisht* is derived by intersecting two square kept diagonally over one another resulting in the geometry of eight pointed star. [07]

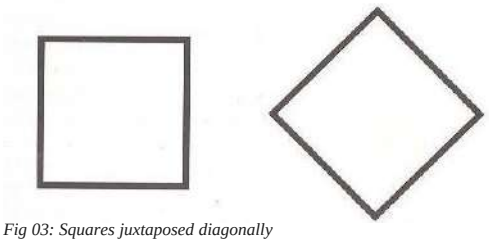

Fig 03: Squares juxtaposed diagonally

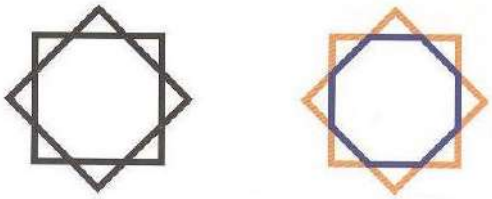

Fig 04: Intersection of Squares

This symbol of *Hasht- Bihisht* is deducted into two variations by the process of de-laminating the external and internal enclosures from the vertices; first is the eight pointed star also known as nine fold plan and as Al Quds star, second being the abstract version represented by the geometrical shape of a regular octagon. [08]

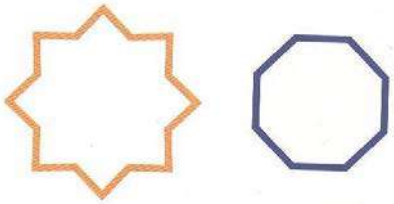

Fig 05: The variation of eight pointed star and the octagon

The geometry of the two variant is then assembled into numerous geometric patterns. These patterns extensively employed in the buildings as lattice screens, inlay work, landscaping patterns etc. [09]

The Significance of number 12

Starting out life as an immensely useful number for counting and dividing things, the number 12 became a number revered by mathematicians and early astronomers. So the skies were divided into 12 portions as were the months of year, reflecting the annual movement of heavenly bodies. Superstitions and religion beliefs were piled on top of respect for the number 12 and were adopted by multiple early civilisations.

The number 12 is a highly respected and practical number. It has many factors for such a low number, so it is one of the lowest easily-divisible numbers. Number 12, however, divides into 6, 4, 3 and 2, giving it a large number of practical uses where things have to be divided up into whole numbers, from calendars to clocks. As a result of all these factors, mathematicians get excited about the number 12 and apparently, they *always* have done! For example, Pythagoras, the classical mathematics genius, teacher, and leader of a pagan religious movement, taught that the number 12 had divine, profound mystical meaning. [10]

IV. The Analogy

While inquiring into the layout and building plans of Taj Mahal and correlating it with the existing theories and dimensional survey conducted, the author came across the mention of *"Hasht-Bihisht* and rectangular grid used in the construction of Taj Mahal.

Author would like to impart a new correlation with the eight sides of symbol of the *Hasht-Bihisht*, number 12 and Taj Mahal complex to decode the concept and evolution of building plans and elevations.

V. Basis of Study

Research and measurement by Koch and Richard André Barraud in 2006 concluded the mausoleum is set at the northern end of the main axis of a vast oblong walled-in complex that measures 896.10 x 300.84 m (fig. 5), which works out to 1112.5 x 374 Shahjahani *gaz*. Of this complex, the
Tomb garden and its forecourt are fully preserved; we measured it as 561.20 x 300.84 (300) m, that is, 696 x 374 (373) *gaz* (fig. 6). The Shahjahani linear yard, called *gaz* or *zir*, {, corresponds to about 81–82cm, or 32 inches; our field studies have shown that it was not an exact unit but a relative, proportionally used one, the length of which could vary slightly, even within one and the same building complex. For the overall length of the Taj complex, the average *gaz* figure comes to 80.55 cm. [11]

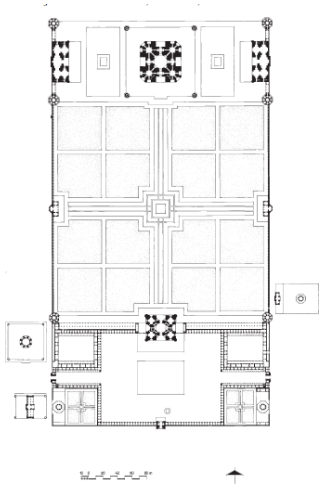

Fig 06: Plan of preserved Taj Mahal complex (Drawing Richard A Barraud and Ebba Koch)

ELEMENT	METRES			GAZ		
	Length	Breadth	Height	Length	Breadth	Height
Overall Complex	**896.10**	**300.84**		**112.50**	**374**	
Overall preserved Complex	**561.20**	**300.84**		**696**	**374**	
Taj Ganji	**334.90**	**300.84**		**416.50**	**374**	
Jilaukhana	**165.1 – 165.23**	**123.51**		**204**	**153**	
Great Gate	**41.20**	**34**	**23.07**	**51**	**42**	**28.5**
Charbagh	**296.31**	**296.31**		**368**	**368**	
Riverfront Terrace	**300**	**111.89**	**8.7**	**373**	**138**	
Maosoleum	**56.90**	**56.90**	**67.97**	**70**	**70**	**84**
Minarets	**5.65**		**43.02**	**7**		**53.5**
Mosque	**56.60**	**23.38**	**20.30**	**70**	**29**	**25-29**

Fig 07: All dimensions from Koch, p. 258-259 credited to Richard André

VI. The Solution

Analyzing these dimensions which were based upon the measure drawings by Indian architect Richard Andre Barraud, a co author with Ebba Koch, high resolution images and model by the Google Earth and personal site visit to complex.

I started my study by focusing on the Taj mahal and its dimension, as this look like the starting point of whole complex. The measured dimension previously done by researchers suggest it to perfect chamfered square of side 56.90 m which converts to 70 gaz as approved upon.

56.90m = 70 gaz

1m = 70/56.90 = 1.23 gaz

1m = 1.23 gaz or

1gaz = 0.812 m**12 gaz = 9.75 m**

Closely analyzing the building plan of Taj Mahal one could see the underlay of octagon embedded in the composition which could be the starting point of the design. So our assumption made as believe to start with the octagon as the basis of design evolution. The pattern which evolved is very typical of Mughal architecture in India.

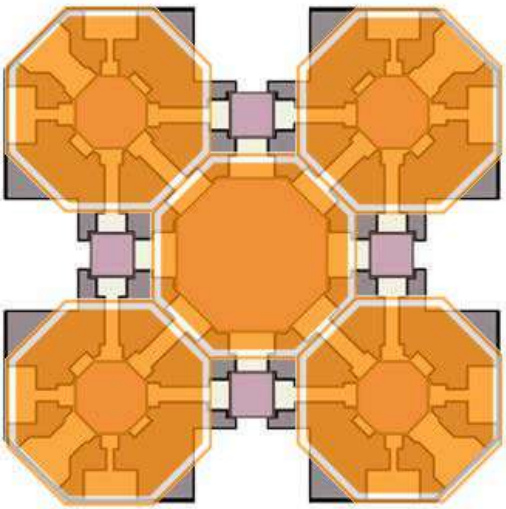

Fig 08:Ooverlaping of octagon on Taj mahal plan

I believe this plan is evolved out of sacred octagonal geometry of *Hasht-Bihisht,* which is repeated all over in Taj Mahal complex.

Many Islamic designs are built on squares and circles, typically repeated, overlapped and interlaced to form intricate and complex patterns. A recurring motif is the 8-pointed star, often seen in Islamic tile work; it is made of two squares, one rotated 45 degrees with respect to the other. The fourth basic shape is the polygon, including pentagons and octagons. All of these can be combined and reworked to form complicated patterns with a variety of symmetries including reflections and rotations. Such patterns can be seen as mathematical tessellations, which can extend indefinitely and thus suggest infinity. They are constructed on grids that require only ruler and compass to draw.

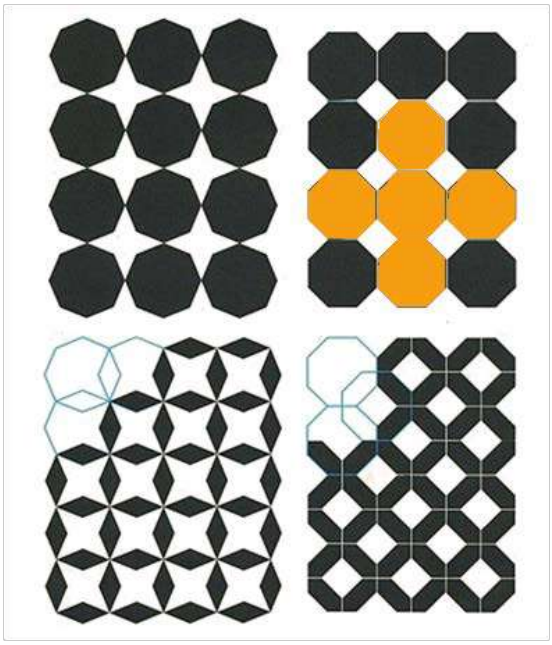

Fig 09: Various octagonal patterns in mughal architecture

We would be recreating the evolution process statring from a single octagon to generate the plan of Taj Mahal and challenge the existing theories

VII. The Study

Step 01

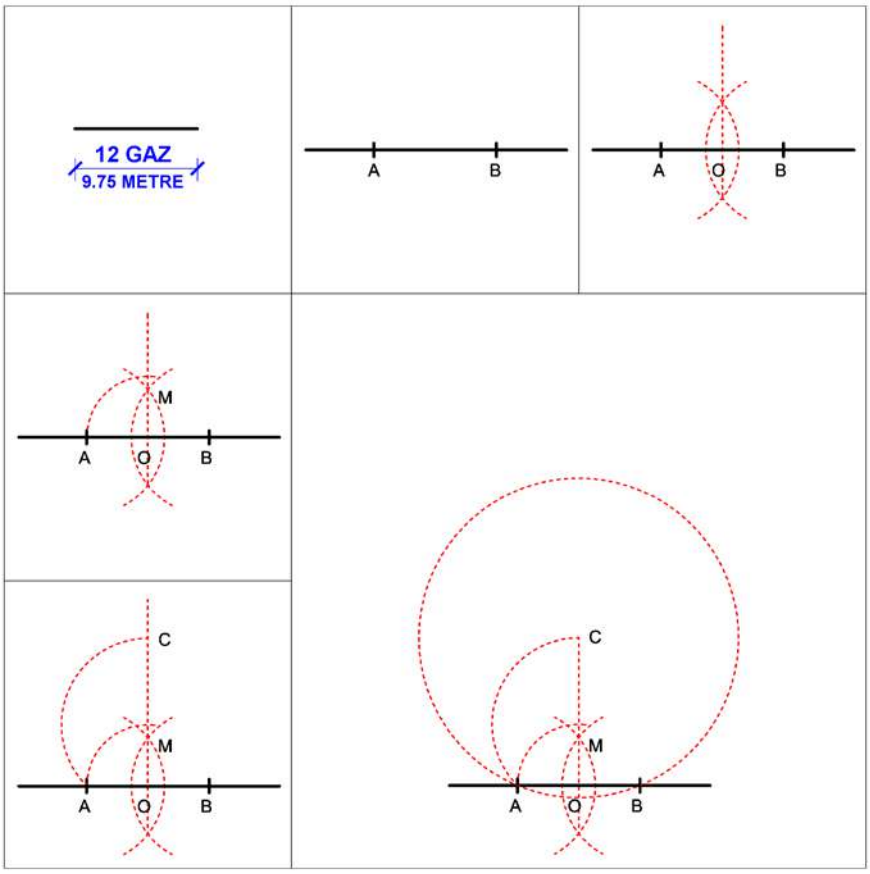

Fig 10: Source Author

First step is to draw a horizontal straight line as shown in the diagram. On this line we will mark a point A which would be the first vertex of octagon. Now we will transport the given length (L = 12 gaz) onto our previously drawn horizontal line with a compass set on point A where it cuts the line we will call it vertex **B** of the octagon.

Next is to draw the perpendicular bisector of the line **AB,** to do this draw 2 arcs of same radius from vertex **A** and **B** these radiuses must be longer than half of line **AB**. Perpendicular bisector is the line that passes through these intersection of arcs and cut the line segment **AB** which will be called as **O.**

With the compass centred at **O** and radii **OA** draw an arc until it cut the perpendicular bisector at point **M.** Now with the compass centred at point **M** and radii **AM** draw an arc until it cut the perpendicular bisector at point **C.**

Point **C** is the centre of circle which will inscribe an octagon as it will be passing through the point **A** and **B.**

Step 02

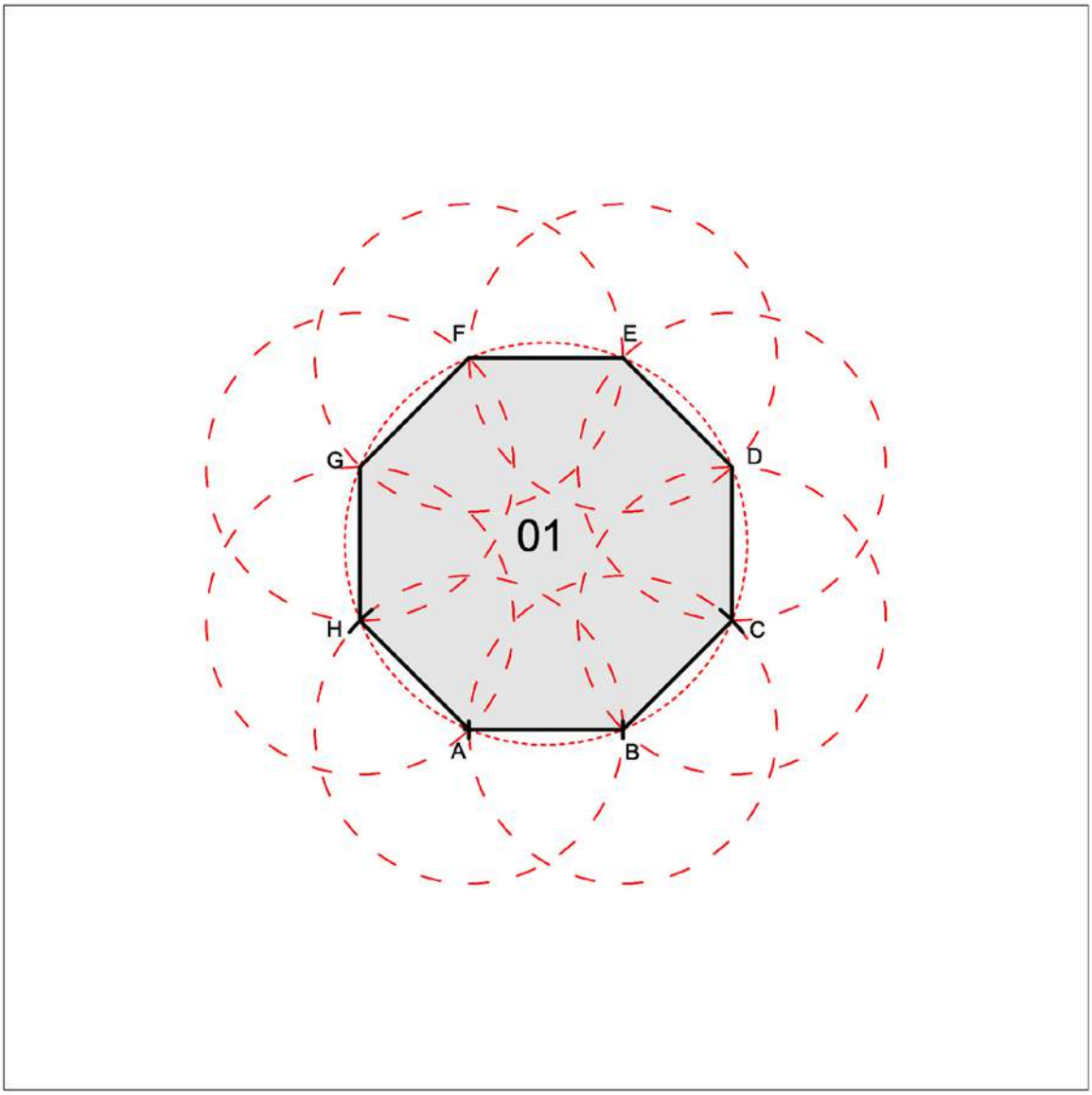

Fig 11: Source Author

On the given circle with the compass centred at vertex A and radii AB draw a circle which will intersect at point H on the circle. Draw a line connecting from point A to H which will be the next side of the octagon.

Repeat this step with vertex H as centre and radii HA to get point G on the circle and on until it will finish at the vertex B on the circle.

Connecting all the point as shown in the figure will give you an octagon 01 (A,B,C,D,E,F,G,H)

Step 03

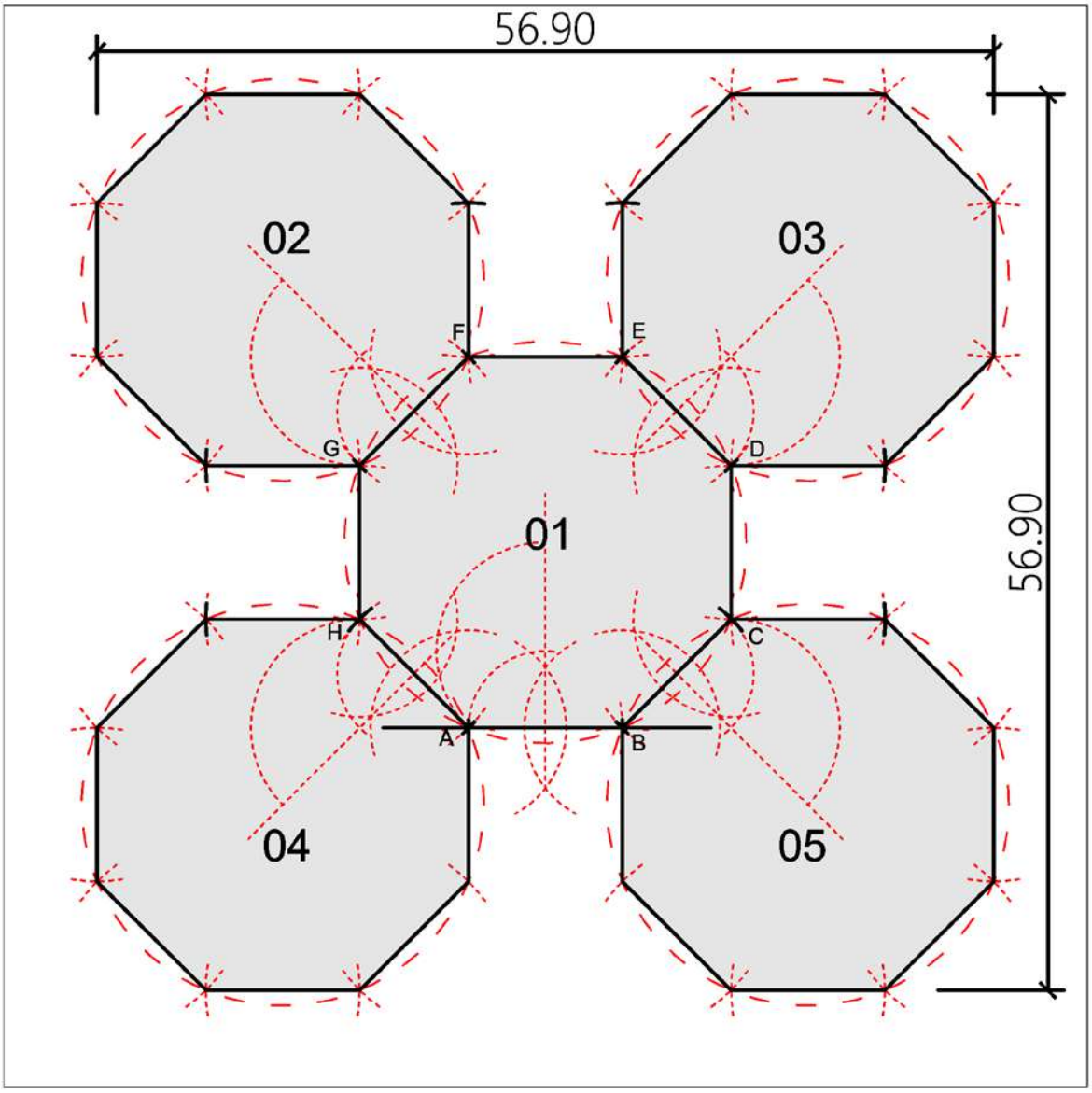

Fig 12: Source Author

Now with octagon 01 in place whole process can be repeated again with segment AH, GF, ED, and CB as base line thus resulting a 4 octagons surrounding the central octagon. This is the basic grid upon which whole configuration of building will be followed upon.

Proposed octagonal configuration corresponds to the measured dimension of Taj Mahal (56.90 x 56.90) as per the previous researches.

Step 04

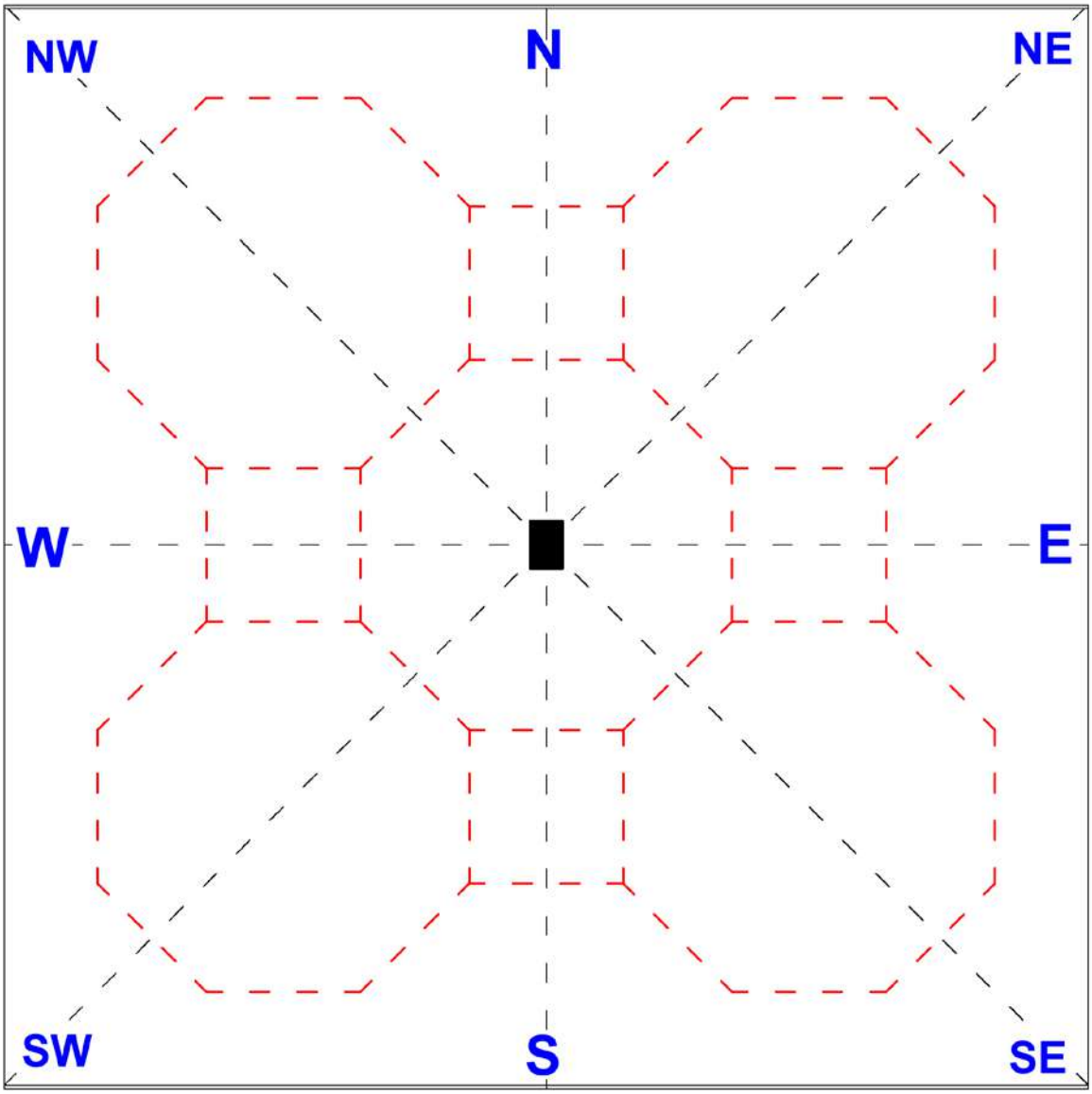

Fig 13: Source Author

Proposed geometry is now aligned to the 8 cardinal directions with centre of the geometry corresponding to the centre of all directions. This centre would be the place to house sarcophagi of Mumtaz Mahal which will at the centre of universe philosophically.

Important point to be noted is there are 4 octagons and 4 small squares to the composition with their centre corresponding to the 8 cardinal directions.

Step 05

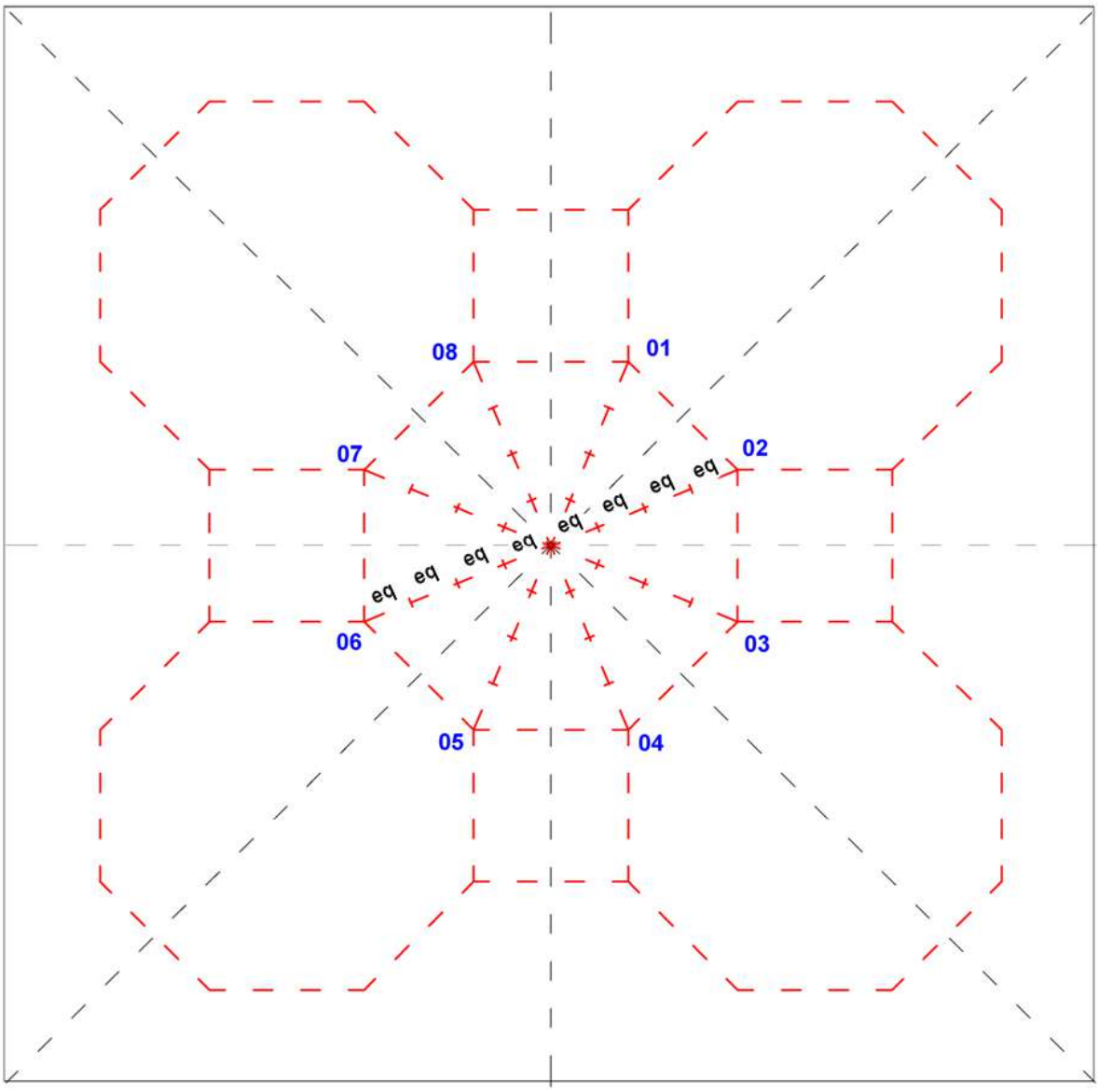

Fig 14: Source Author

Working from the central octagon one need to connect the two opposite vertexes to generate Line segment (01, 05), (02, 06), (03, 07), (04, 08). These line segment need to be further divided into 8 equal segments of length 1.5 gaz.

Step 06

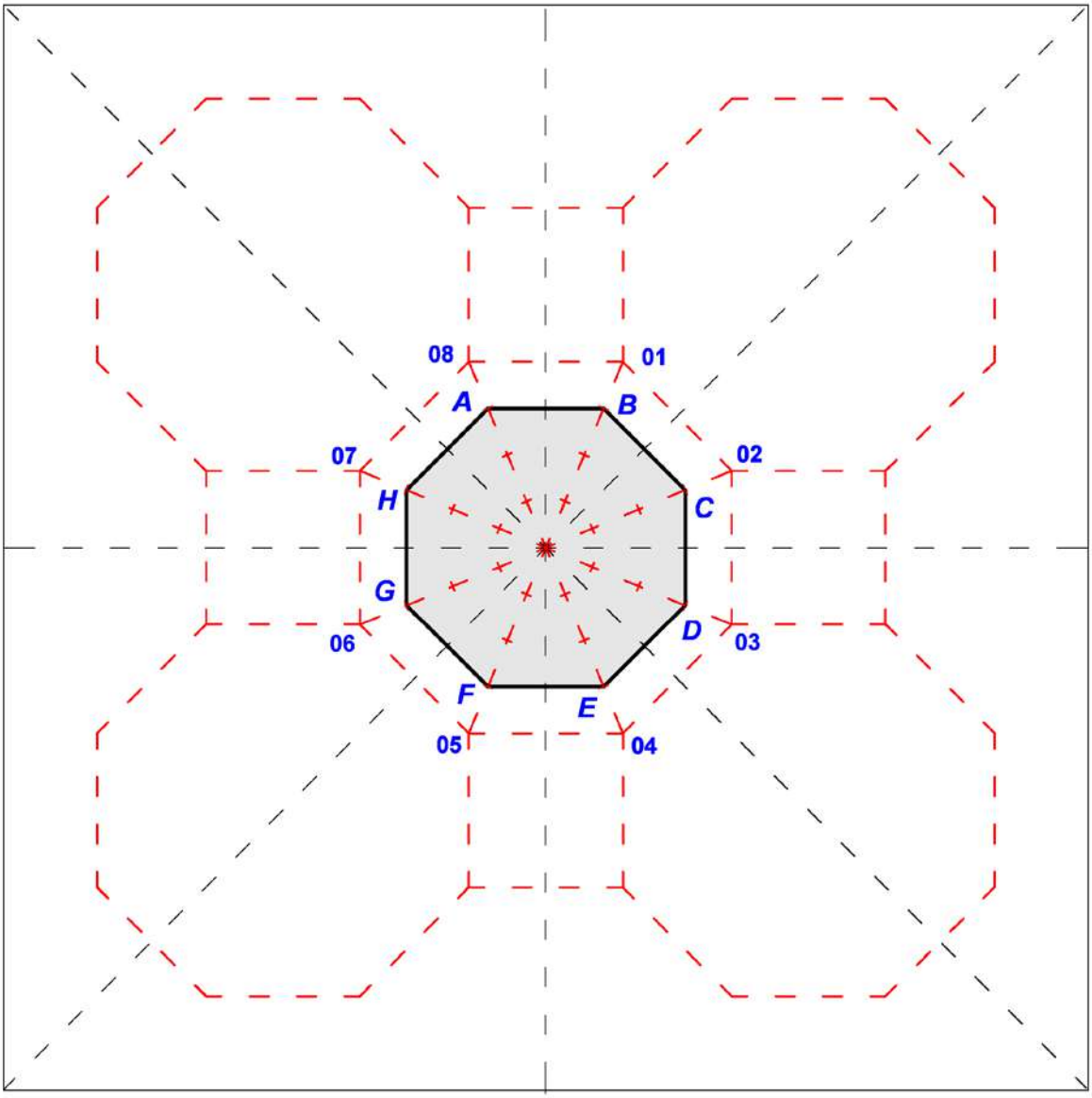

Fig 15: Source Author

Octagon ***(A, B, C, D, E, F, G, H)*** generated is the central octagonal room with each side measuring 24 feet corresponding to the measured dimension. (*The central hall has the form of an octagon, 24 feet to a side, with two tiers of eight radiating niches.)* [12]

Measured length of Octagon (A,B,C,D,E,F,G,H) **= 7.32 m = 24 feet = 9 gaz**

Step 07

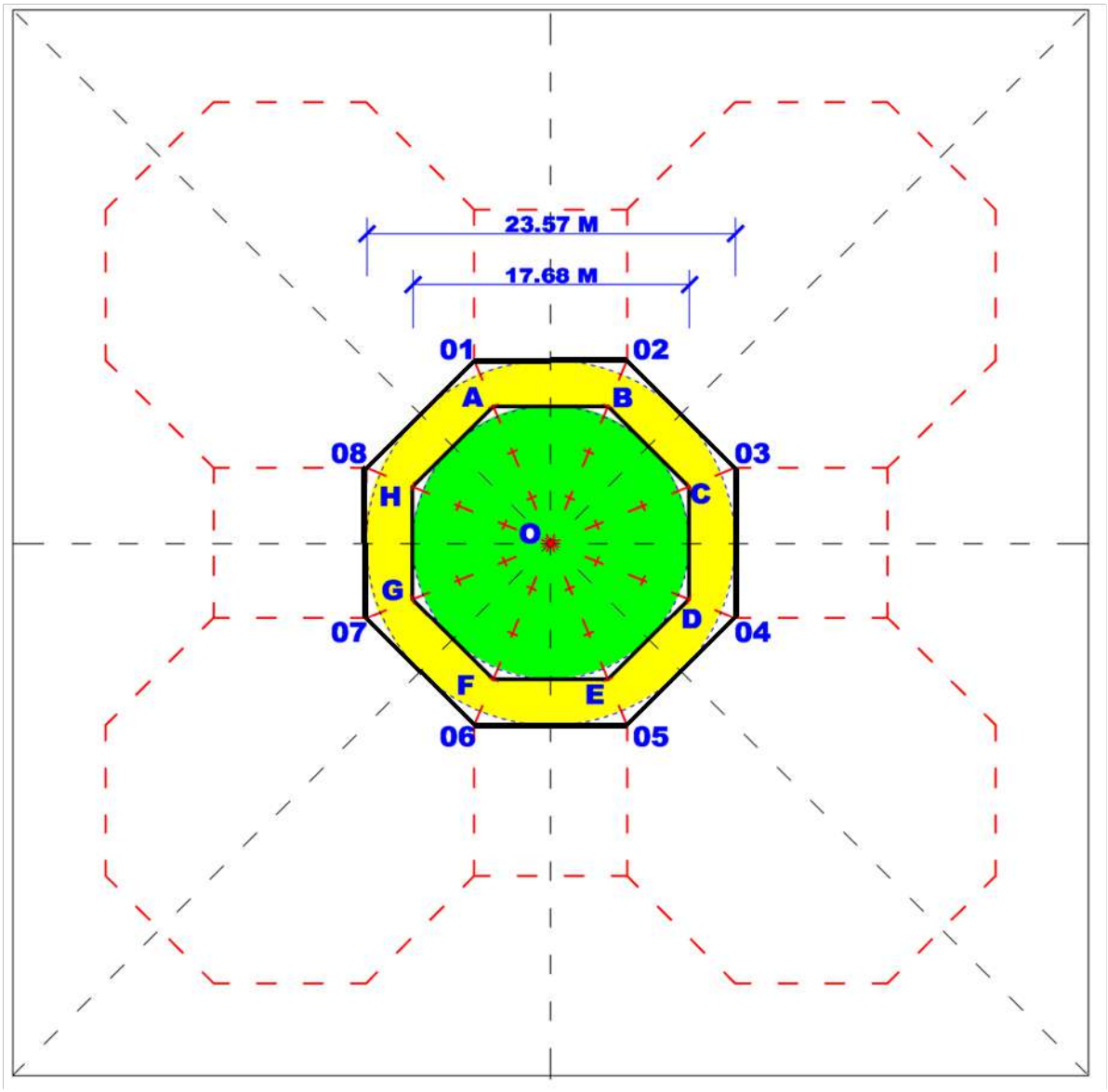

Fig 15: Source Author

A circle(green) inscribing an octagon (A,B,C,D,E,F,G,H) with diameter of 17.68 m (58 feet) would be the inner dome of the chamber, whereas circle(yellow) inscribed in outer octagon would form the outer shell of the dome.(diameter = 23.57 m)

Both the dimensions correspond to the measured dimension as quoted. An octagon with 24 feet side will give us an inscribed circle of 58 feet.

Inner Dome	**= 17.68 m (dia)**	**= 58 ft**	**= 21.75 gaz**
Outer Dome	**= 23.57 m (dia)**	**= 73.32 ft**	**= 29.00 g**

Step 08

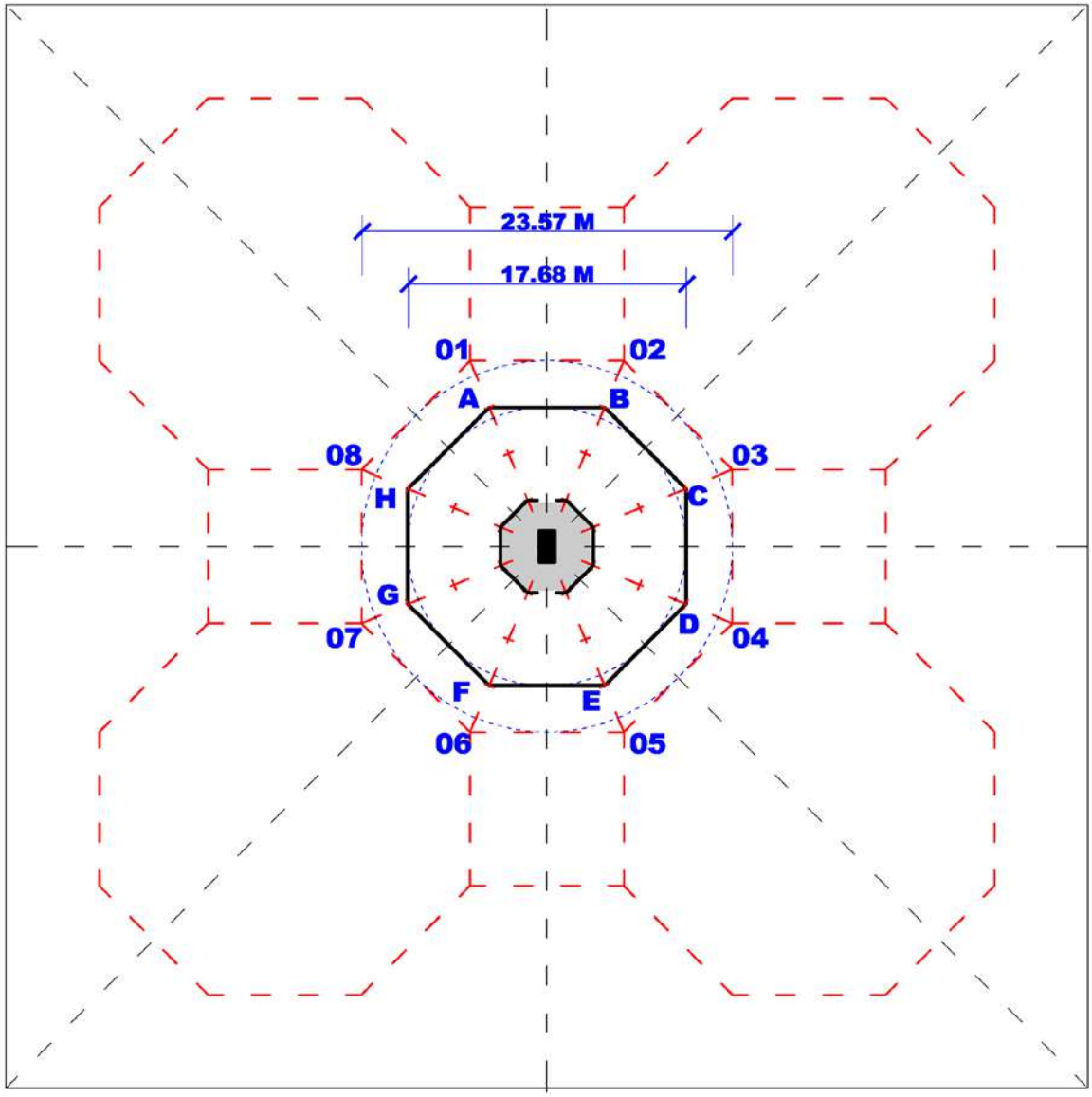

Fig 16: Source Author

Innermost Smallest octagon of equal division thus generated is the perforated marble screen a more private space surrounding the sarcophagi of Mumtaj Mahal. This octagonal screen will have two entrances corresponding to the North and South directions. An octagonal screen with in the central octagon chamber surrounded by the octagonal outer chambers intensifying the paradisiacal symbolism of number 8.

Length of inner Octagon = 2.44m = 8 feet = 3 gaj (panels 3 equal part @ 1gaz)

Each side of the octagon is divided into 3 by marble frames. The corners are fortified by posts ending in kalasha finials the frames are filled with jails. [13]

Step 09

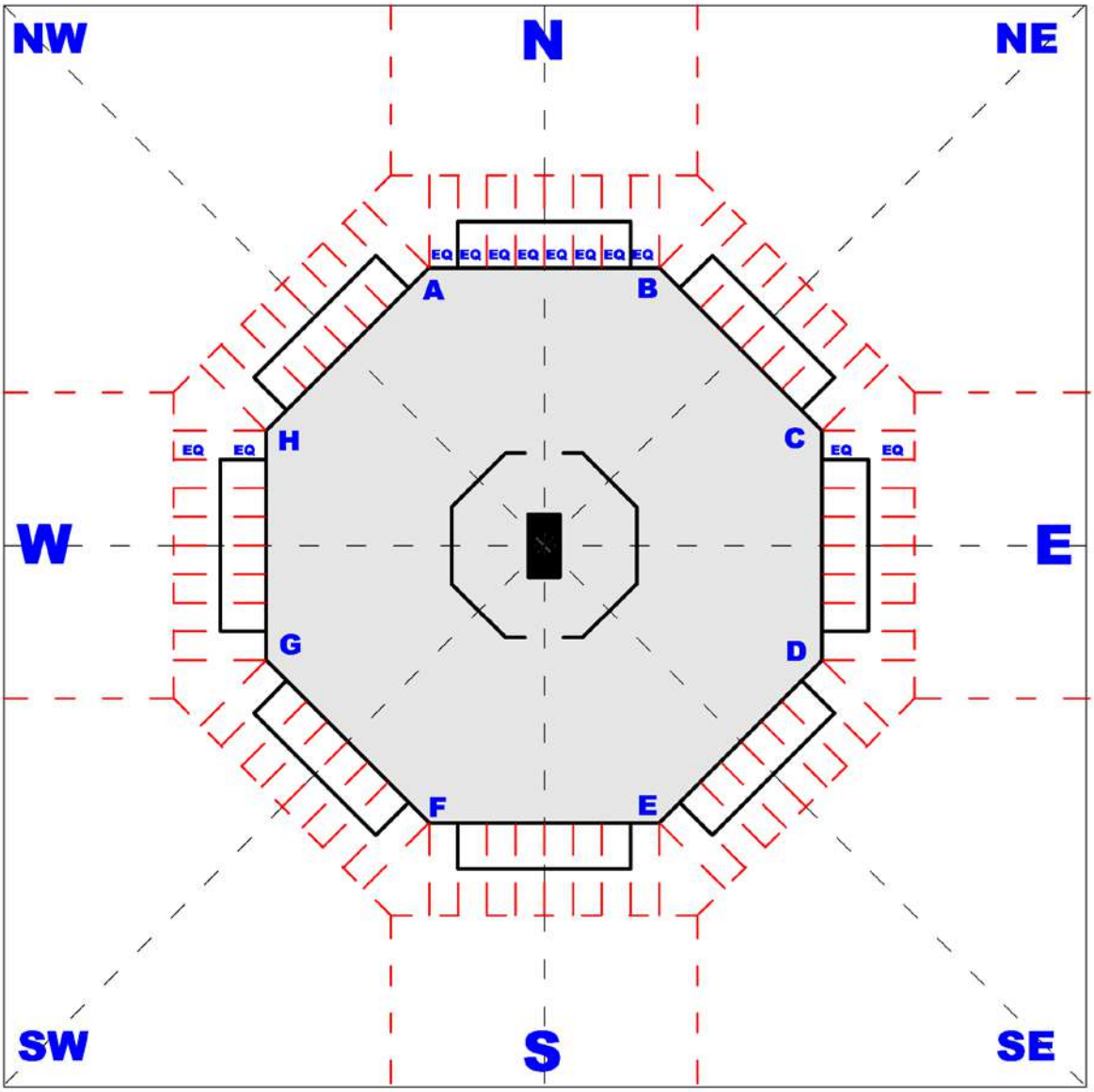

Fig 17: Source Author

Eight sides of the central octagonal will have two tiers of 8 radiating niches termed as "**nashiman".** These can be formed simply by dividing the sides of octagon into 8 equal parts, the depth of niches is half of distance between the inner and outer octagon as shown in the fig. Those on the main cardinal axis are open and fitted with screens which transmit daylight into the central octagonal chamber. Niches dimension

length = 5.49 m = 18 feet = 6.75 gaz

Depth = 1.47 m = 4.82 feet = 1.81 gaz

Step 10

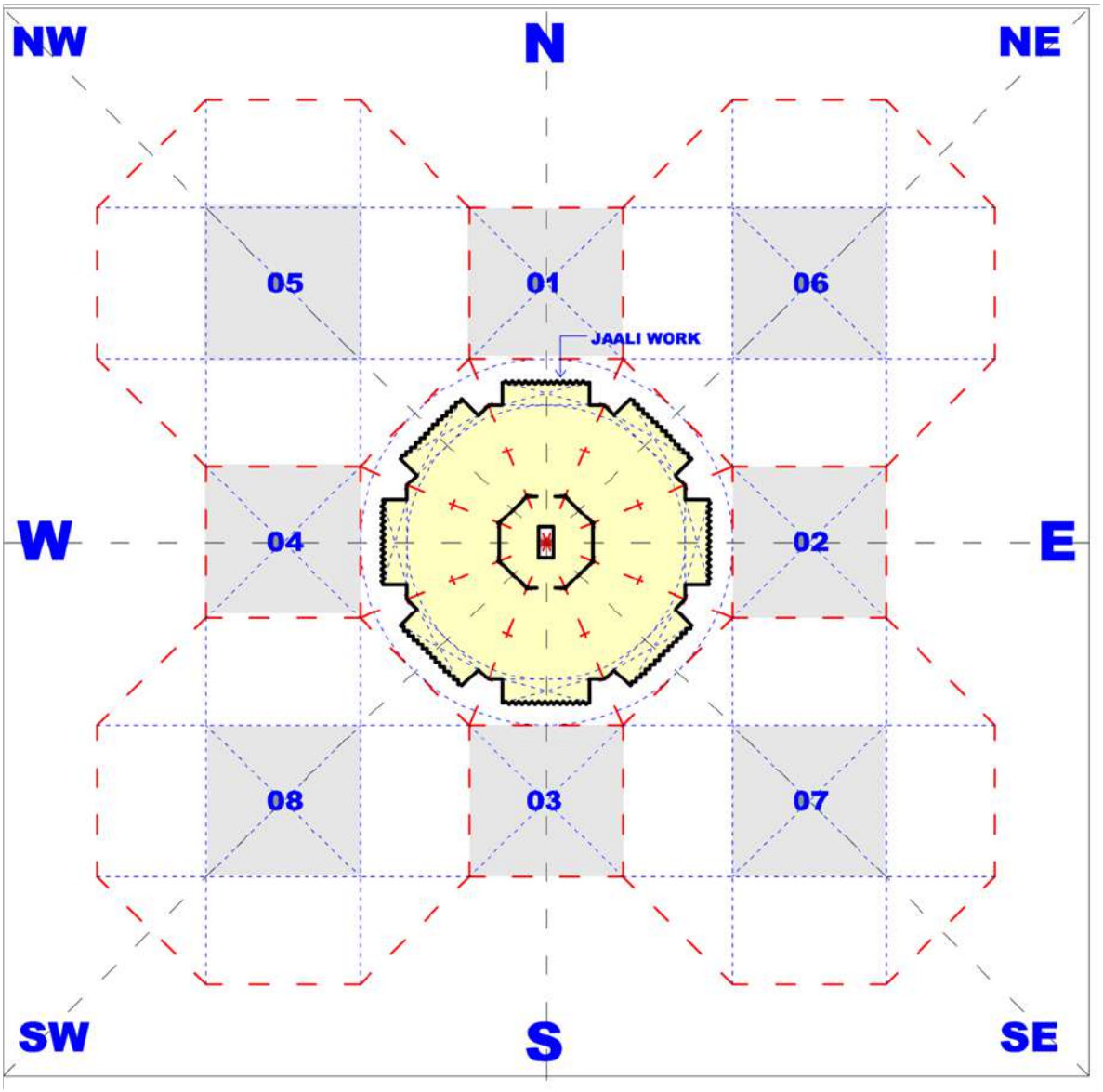

Fig 18: Source Author

Once the central chamber is completed focus now shifted to the outer octagons of the composition. Presence of square along with octagon adds different dimension to the composition. Taking the projection lines as shown in the fig one can generate 8 equal squares corresponding to the 8 cardinal directions.

These would be the 8 main chambers surrounding the central chamber of Taj Mahal. All the sides of squares and octagons thus formed are equal in size.

Step 11

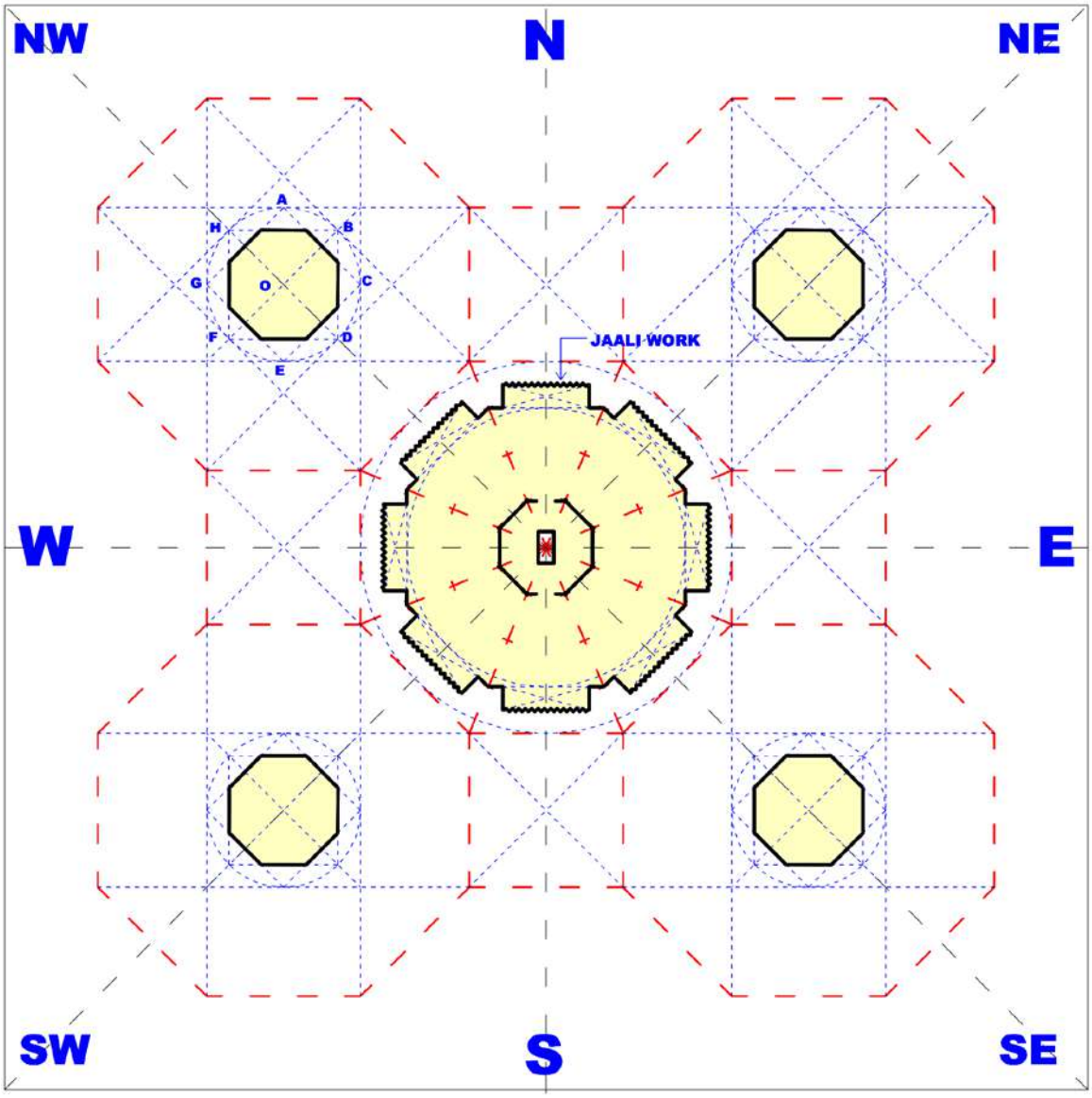

Fig 19: Source Author

A circle is drawn from the midpoint of given square as shown in the fig. This circle when get overlaid with cardinal direction will give 8 point (a,b,c,d,e,f,g,h). Joining main cardinal points(a,c,e,g) and secondary cardinal points (b,d,f,h) will generate 2 overlapping square thus forming the sacred **"Hisht- Bihisht"** symbol.

As studied before This symbol of ***Hasht- Bihisht*** can deducted into geometrical shape of a regular octagon by the process of delaminating internal enclosures.

Repeat this process at 3 other places to generate 4 octagonal chambers

Step 12

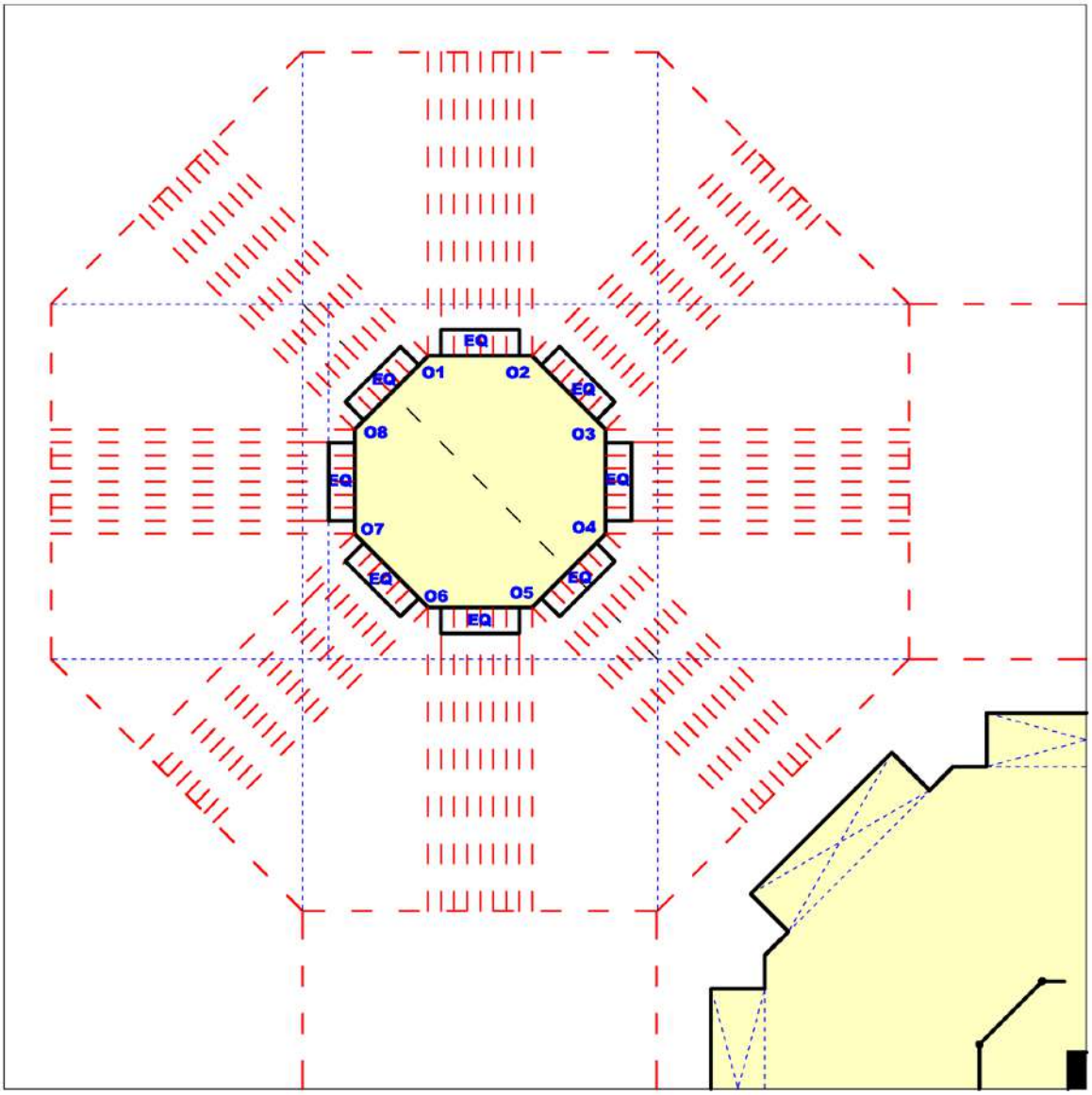

Fig 20: Source Author

Eight sides of the outer octagonal will have two floor of circumambulatory rooms with 8 radiating niches termed as "**nashiman".** These can be formed simply by dividing the sides of octagon into 8 equal parts, the depth of niches is again ½ the distance between central octagon and square grid as shown in the fig.

Niches dimension

length = 2.86 m = 9.3 feet = 3.5 gaz

Depth = 0.71 m = 2.32 feet = 0.87gaz

Step 13

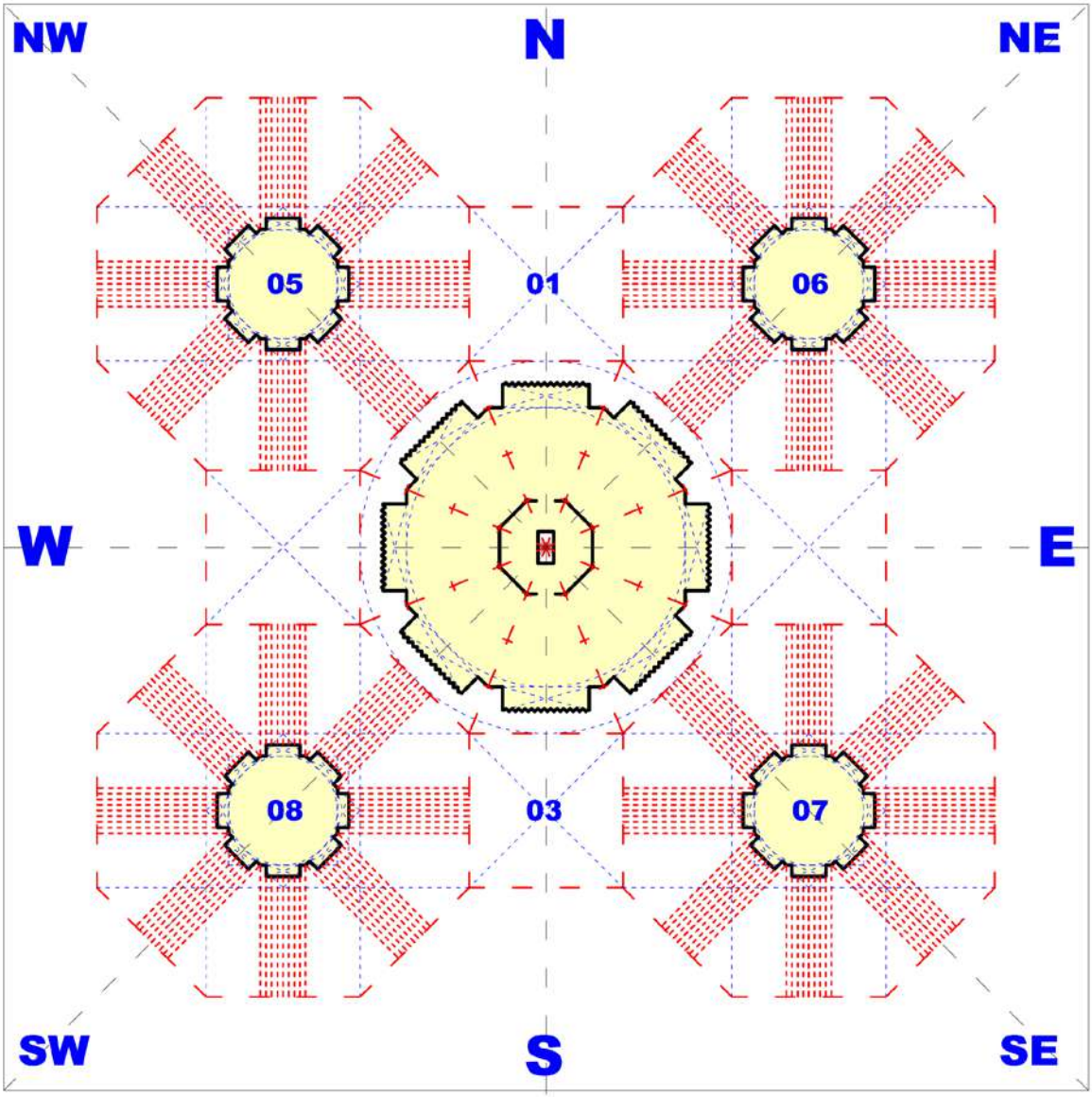

Fig 21: Source Author

The rooms thus generated are on the secondary cardinal grids to central octagonal chamber. These chambers are octagonal in shape thus intensifying the sacred dimension of the structures. The process of tessellation is underway in which unit item (octagon) is getting repeated again and again.

Step 14

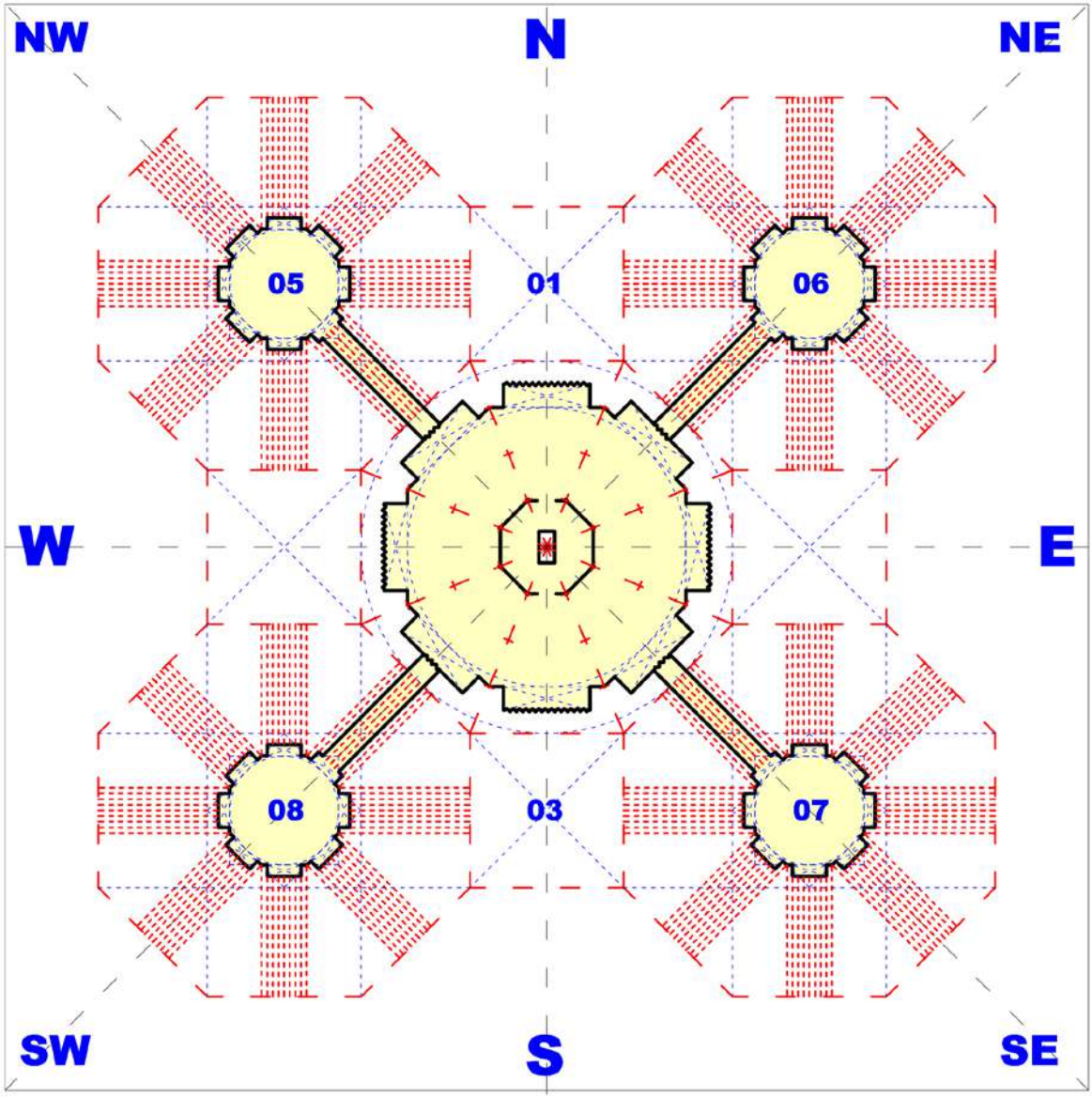

Fig 22: Source Author

Four octagonal outer chamber thus generated are connected to central chamber via connecting passages. These passages width corresponds to the 8 equal division grids as shown in the fiq.

Connecting passage width = 1.43 m = 4.69 feet = 1.76 gaz

Step 15

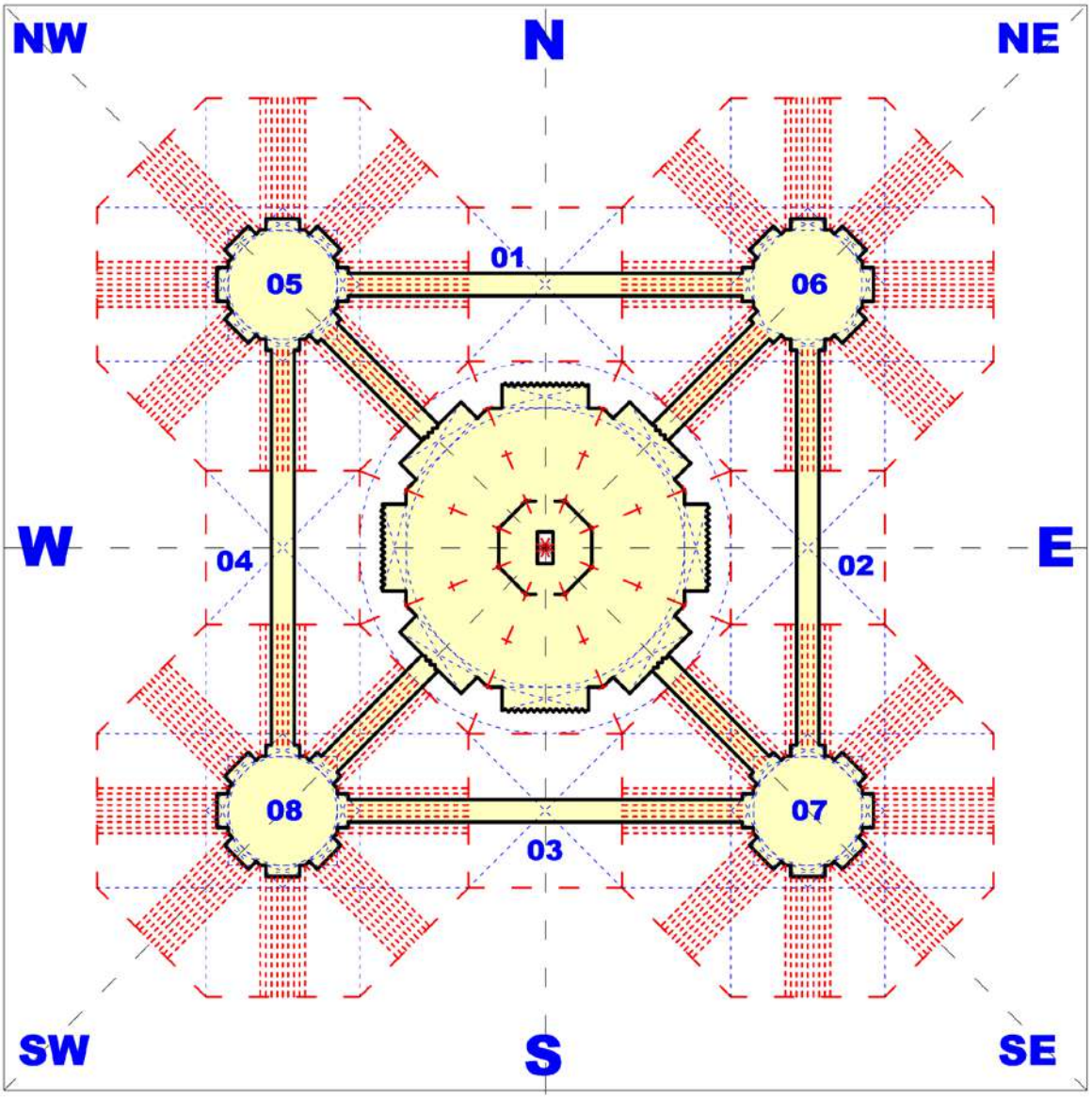

Fig 23: Source Author

Interconnecting the outer octagonal chamber with the same passage width will generate a circumambulatory passage to the central chamber. These rooms were originally used to chant the Koran and the visitor can circumambulate on each floor since they are interconnected.

Step 16

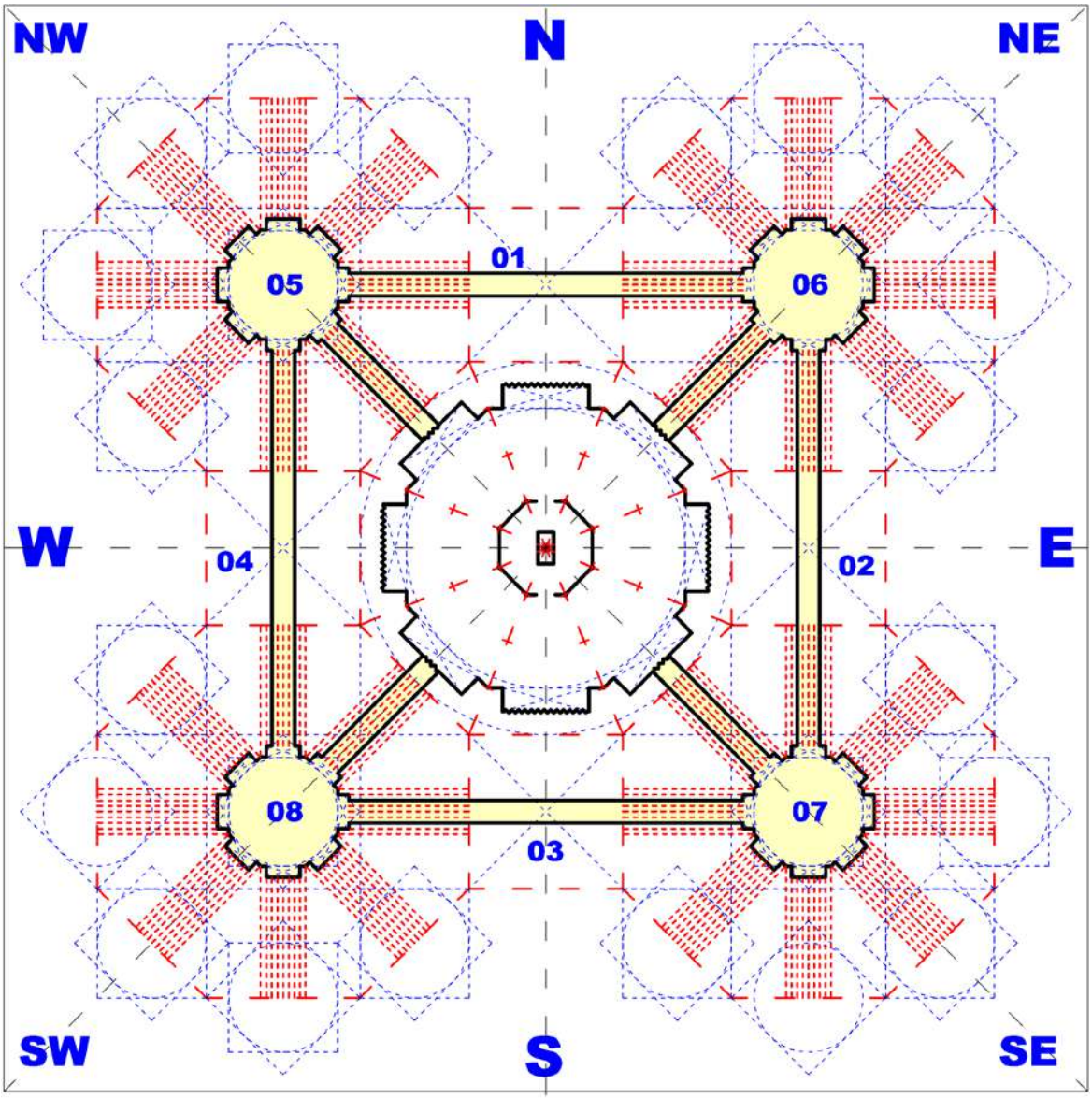

Fig 24: Source Author

The central outer octagonal grid "Hasht- Bihist" generated previously will be tessellated again on the sides of the octagon. This grid will generate the outer profile of the building as shown in the fig.
Chamber no. 01,02,03 & 04 will be the grand entrance portal corresponding to the cardinal directions.

Step 17

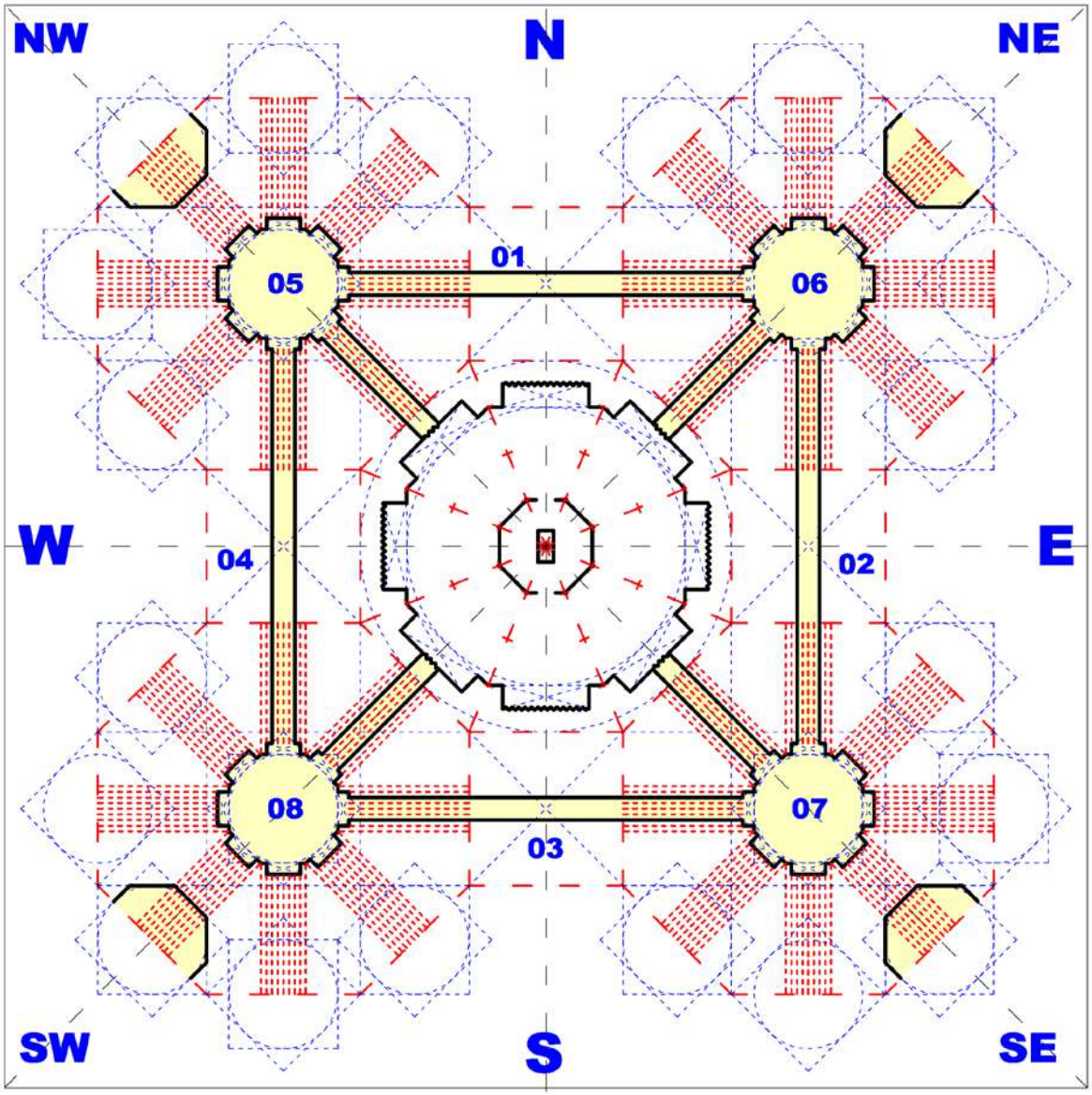

Fig 25: Source Author

A very important observation to note at this point is octagonal geometry are corresponding to secondary cardinal directions only , keeping or rather accentuating the process we can generate an outer ½ octagonal chamber on the external facade which would form the chamfered corner of the square building.

Divisional grid (red) generated previously when intersect with Hasht- Bihist grid (blue) generate an ½ octagon thus evolved.

Step 18

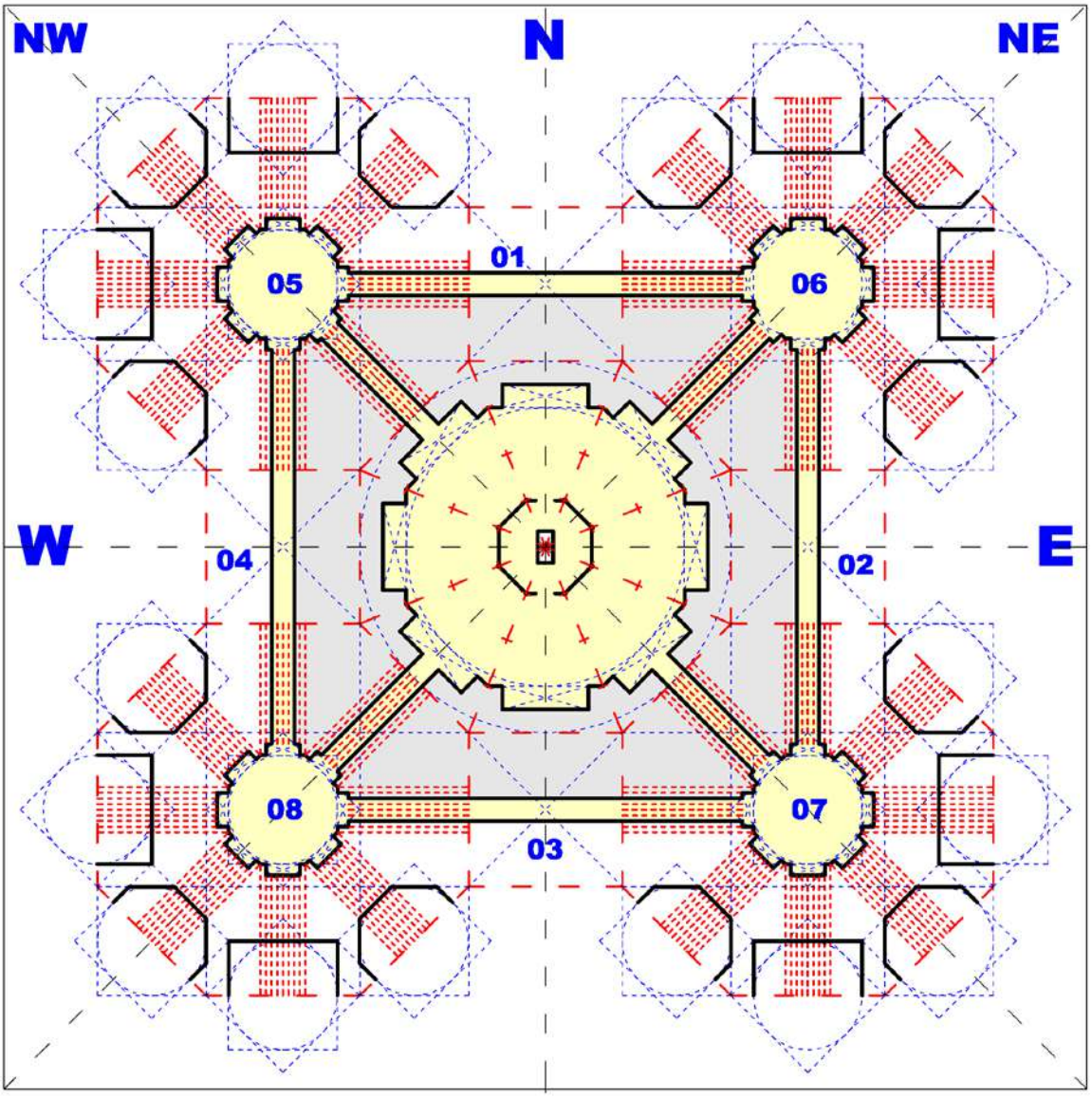

Fig 26: Source Author

Chambers thus formed corresponds to the cardinal directions. One on the main axis (N,S,E,W) will be rectangular in shape and others on secondary axis(NE,NW,SE,SW) will be semi octagonal.

Step 19

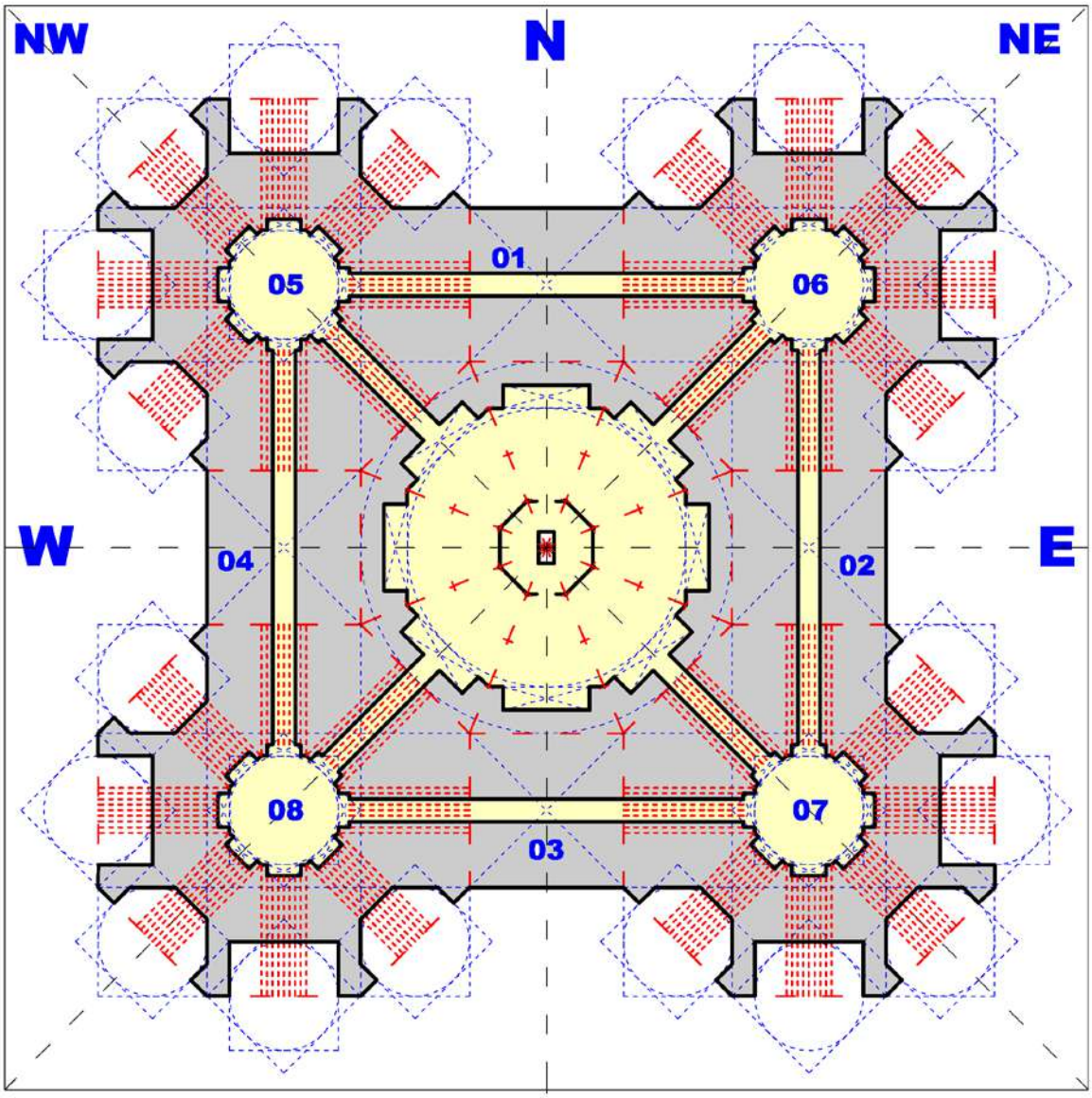

Fig 27: Source Author

One can start getting the feeling of the dejavu as the plan closely resembles the plan of Taj Mahal. What's missing are the grand Pishtaq, or vaulted archway on the main cardinal axis and square chambers.

Step 20

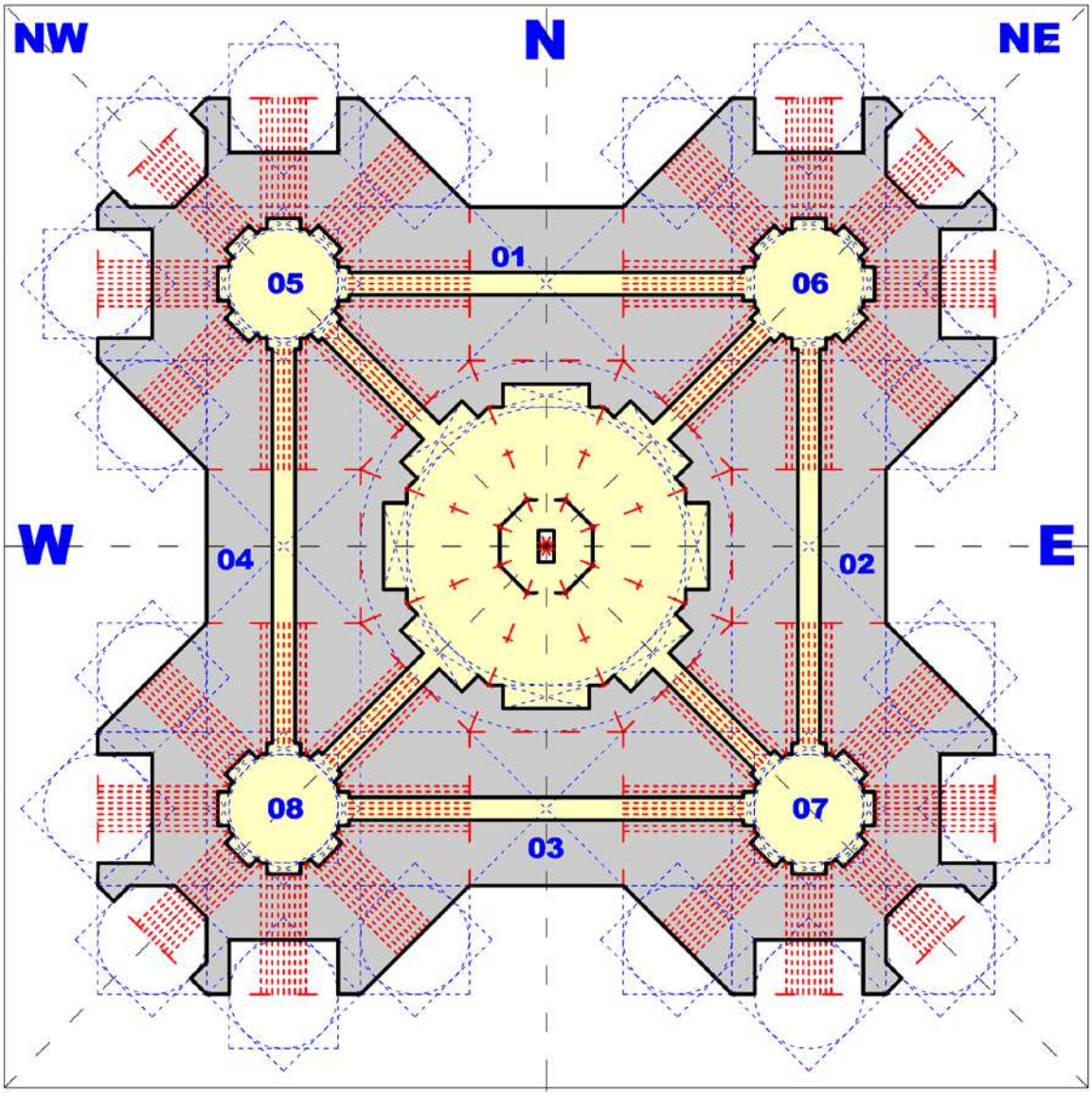

Fig 28: Source Author

A massive Pishatq thus proposed form's the main design element and needed large length and height. To accommodate semi octagonal chambers on the either sides of main cardinal axis are deleted as shown in the fig.

Step 21

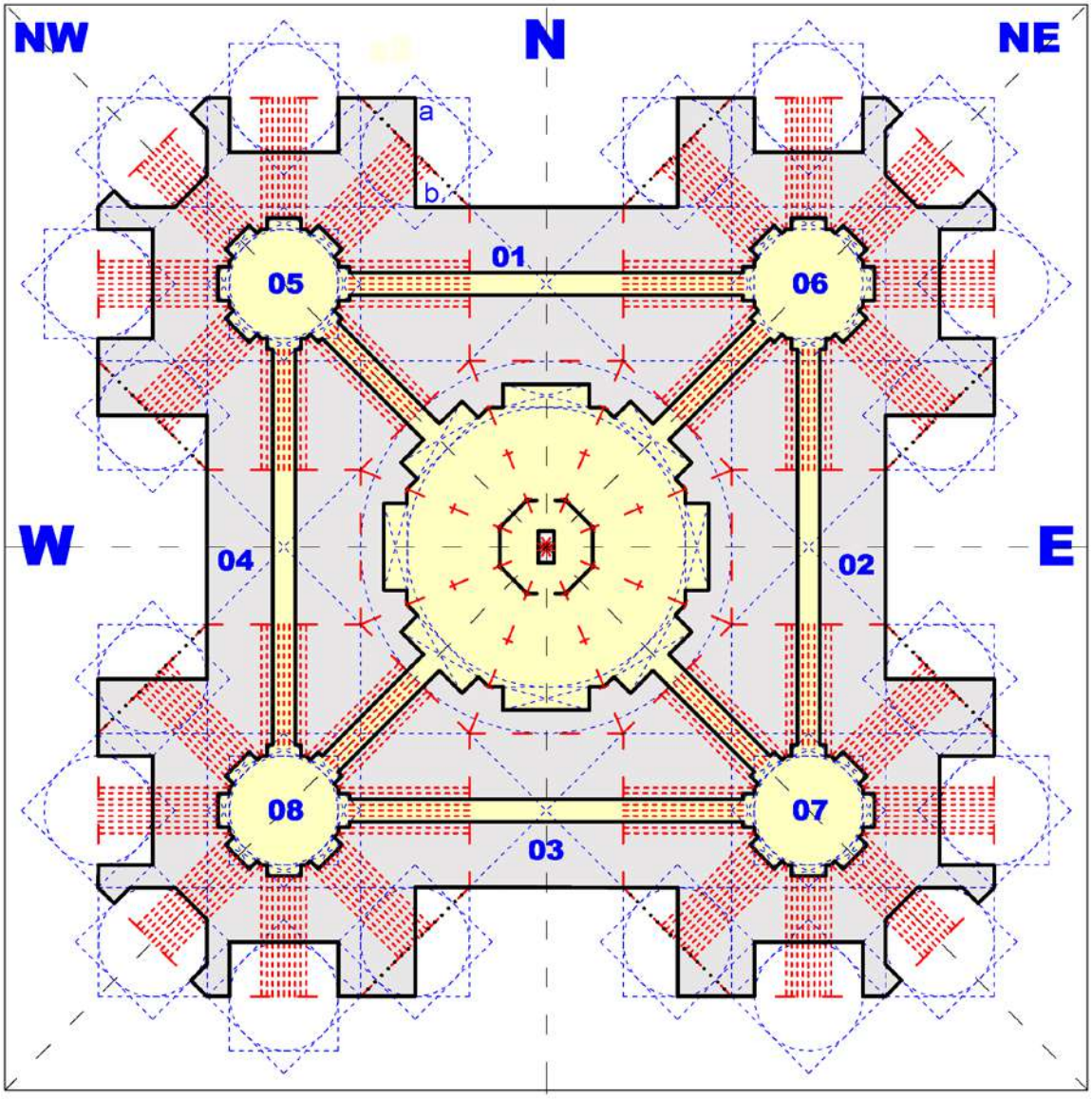

Fig 29: Source Author

A line segment AB from the centre of Hasht-Bihist grid when intersected with proposed profile will generate a large rectangular entrance portal to the composition on main cardinal axis

This process is repeated on the all 4 major axis, portal thus generated would be rectangular in profile.

Step 22

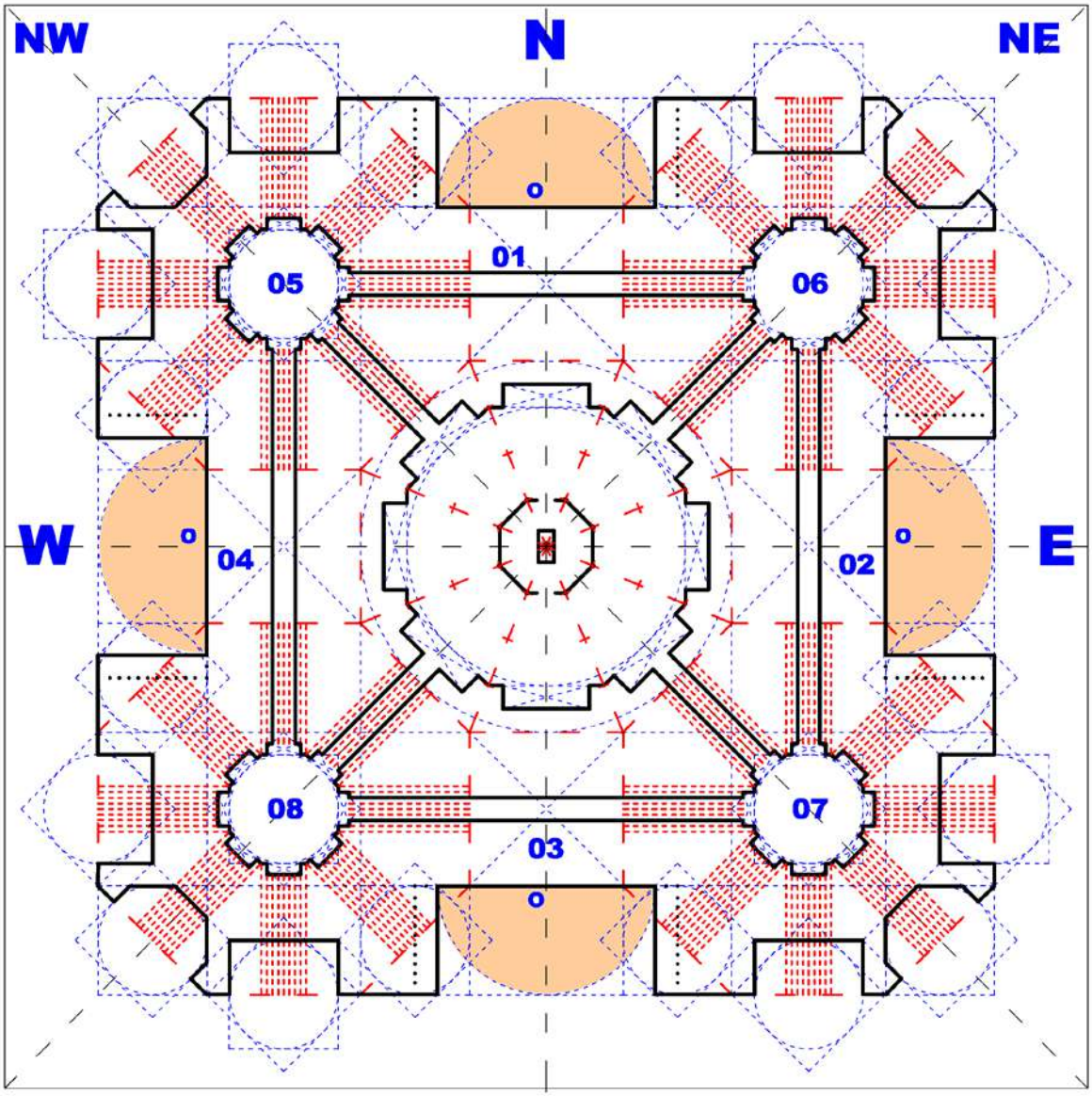

Fig 30: Source Author

The entrance portal generated currently cannot be used as arched gateway. If we draw a semicircle with centre O (mid point) and radii as depth of portal one gets a semicircle corresponding to the intersection of two square of Hasht- Bihist. Thus the line AB generated had to be moved to the intersection point as shown in the fig.

Entrance portal **length = 13.80 m**
Depth = 6.90 m A perfect semicrle.

Step 23

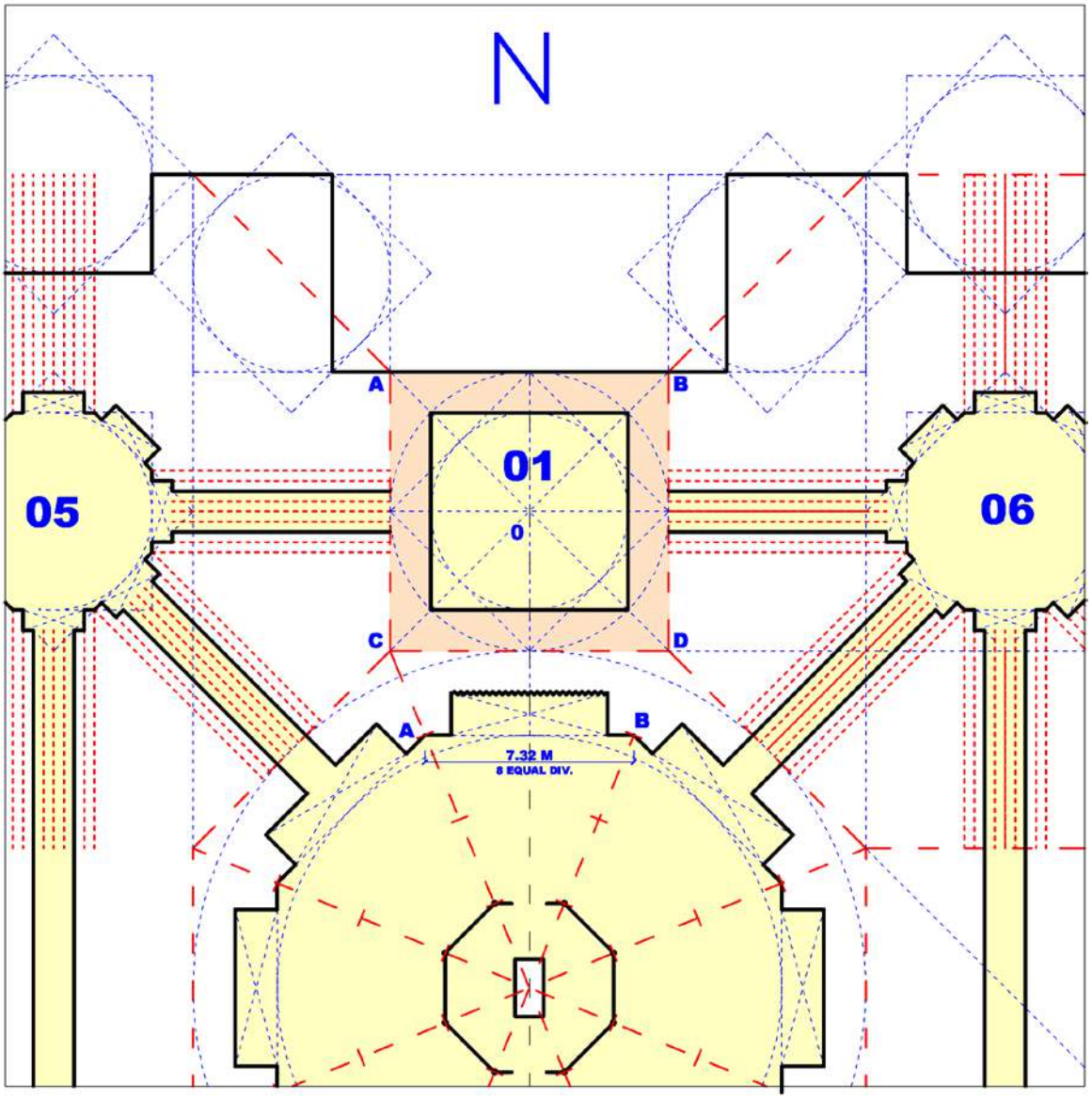

Fig 31: Source Author

Now to generate the 4 square chambers on main cardinal direction all you have to do is repeat the step 11 on square (A,B,C,D) to generate Hasht- Bihist grid. One of the two overlapping square generated corresponding to main cardinal direction is the entrance chamber.

Repeat the steps on other 3 entrance portal to generate the chambers.

Entrance square chamber	**length = 11.04 m**	**= 36.22 feet**	**= 13.58 guz**
Entrance passage width	**width = 03.68 m**	**= 12.07 feet**	**= 4.53 guz**

Step 24

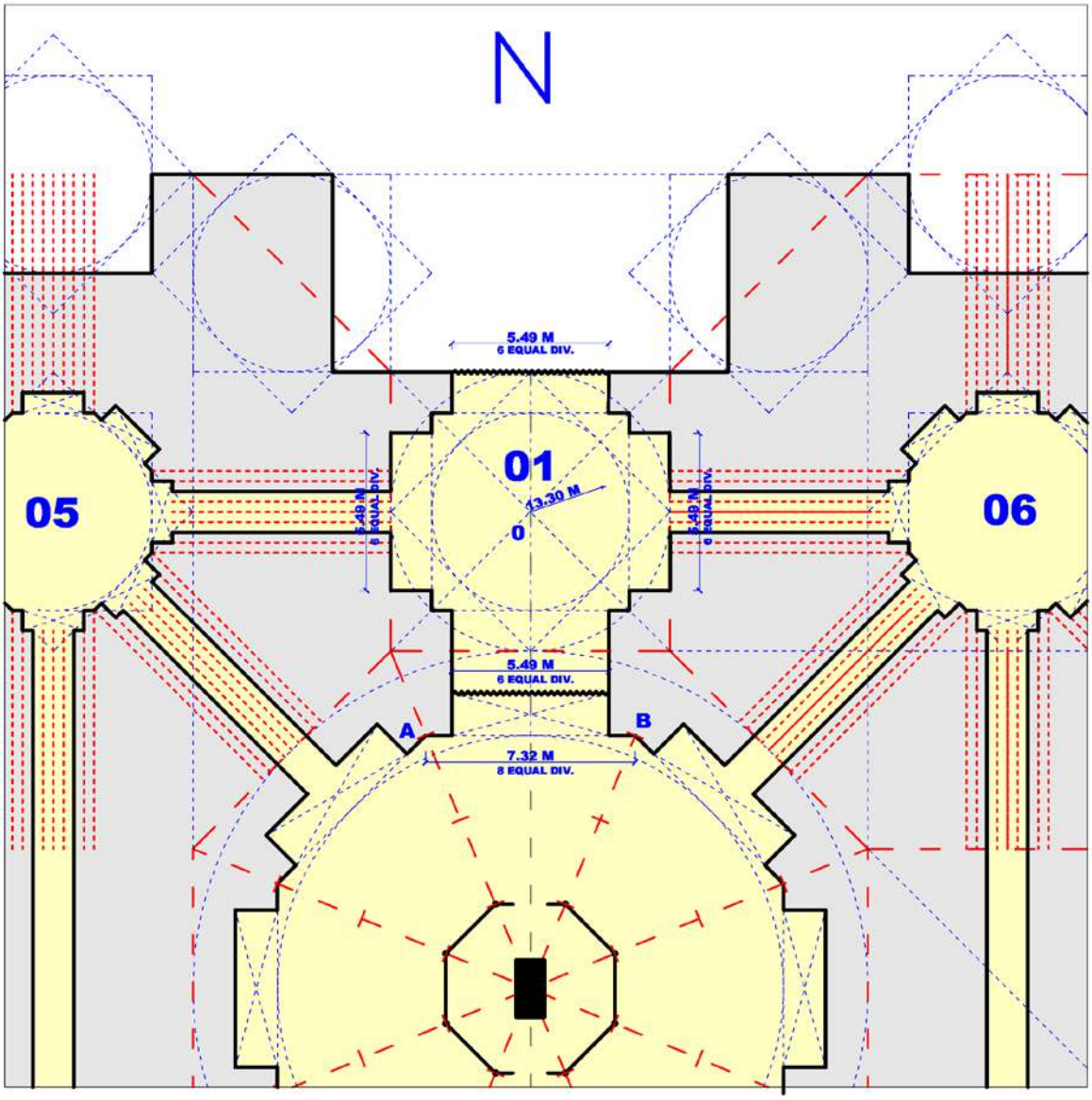

Fig 32: Source Author

Extending the internal octagonal chamber passage to the square chamber although way to the entrance portal, will generate a connection of outside world to the internal chamber.
Going by the symmetry repeating this process will also generate a symmetrical connection of 2 corridors as shown in the fig.

Repeat the steps on other 3 entrance portal to generate the chambers an its connections.

Step 25

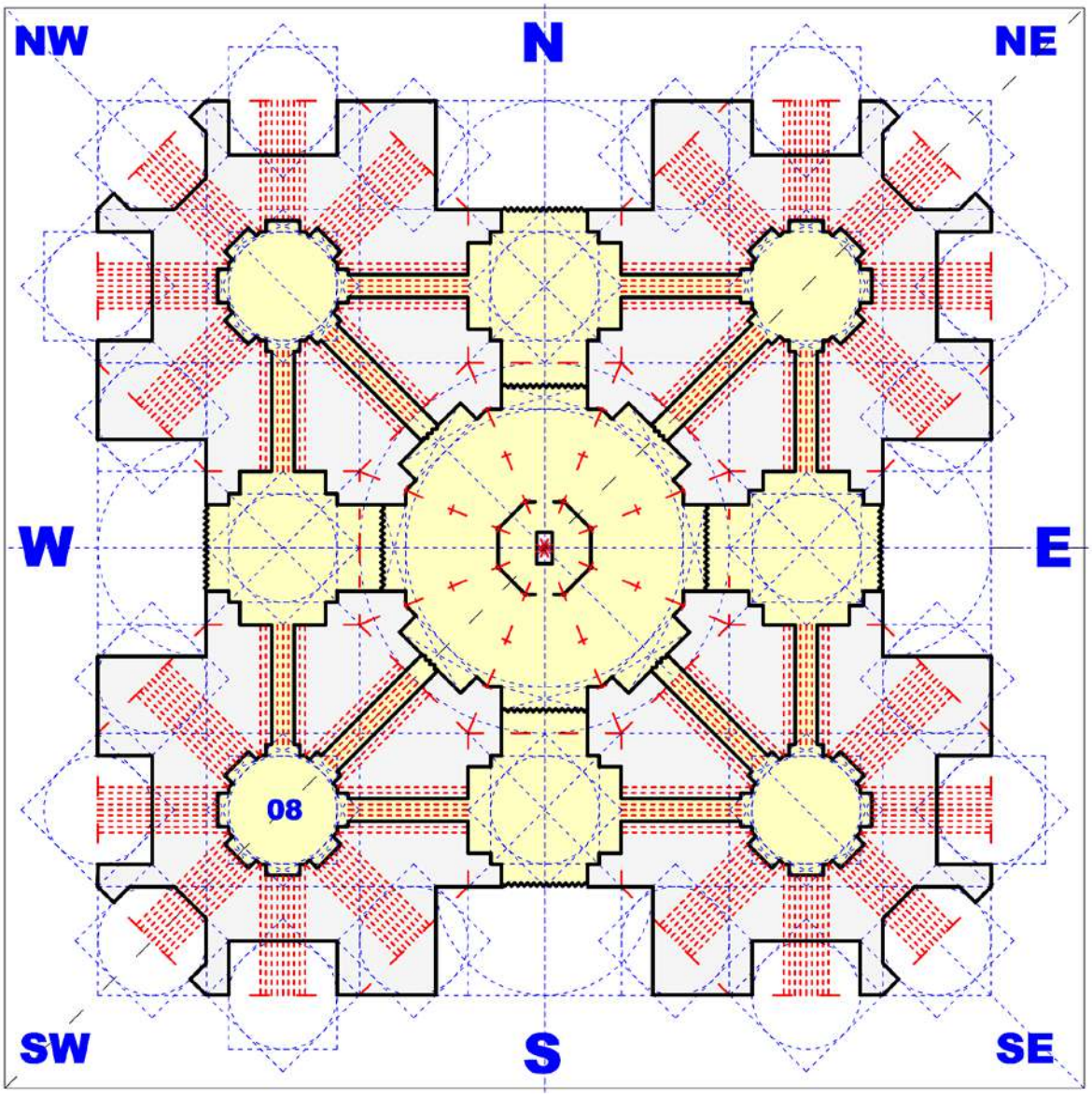

Fig 33: Source Author

This is the **Taj Mahal** floor plan generated purely out of geometry, except the connecting passage needs to be extended to the outer profile of the building.

Step 26

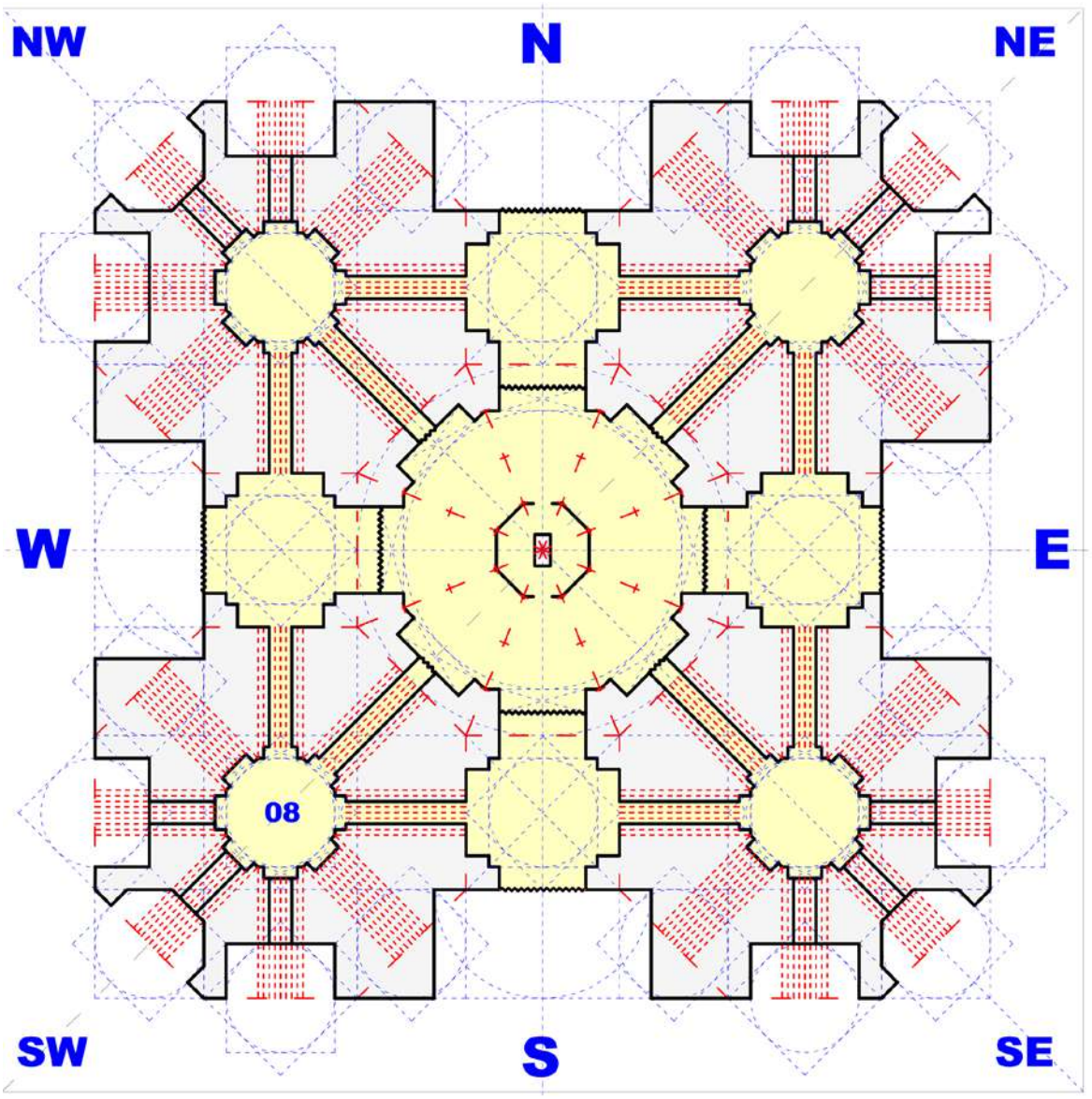

Fig 34: Source Author

Awesome would be the right word to describe the process of generating this plan. Finally we can say ***"This is the how the building plan of Taj Mahal is evolved from the single octagon."***

Step 27

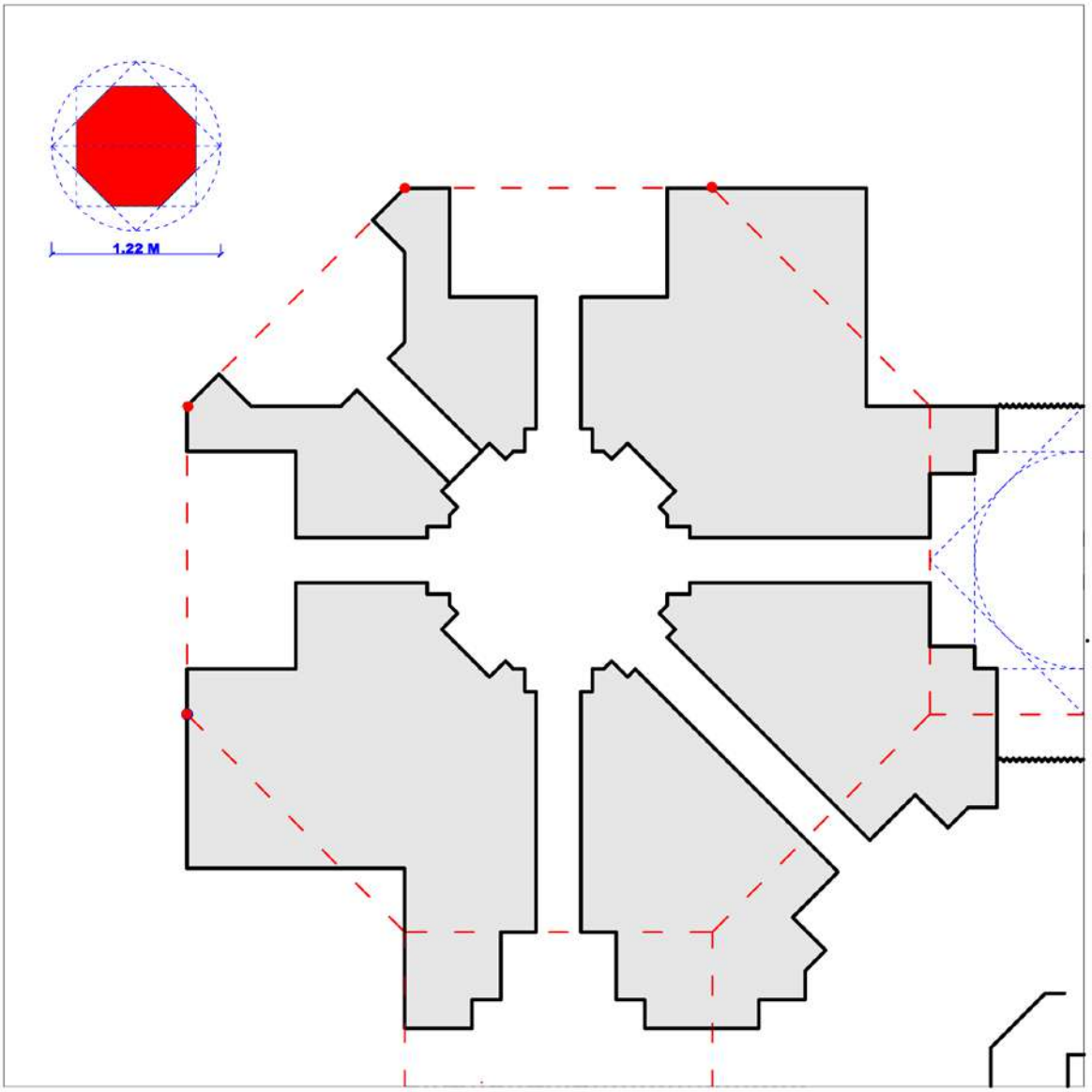

Fig 35: Source Author

Idea of decoding this whole plan came from the hint depicted on the building elevation in the form of a "Guldasta" the tall decorative spire. Location of this spire corresponds to the intersection of the octagon sides as shown in the fiq.

Although no dimensional figure recorded so far my logical reasoning are as follow:
Central octagonal room length is divided into 8 equal parts and called as divisional grid.
Length of central octagon = 9.756 = 8 equal division of = 1.22 m
A octagon inscribed in the dia of 1.22m = Guldasta octagon

Step 28

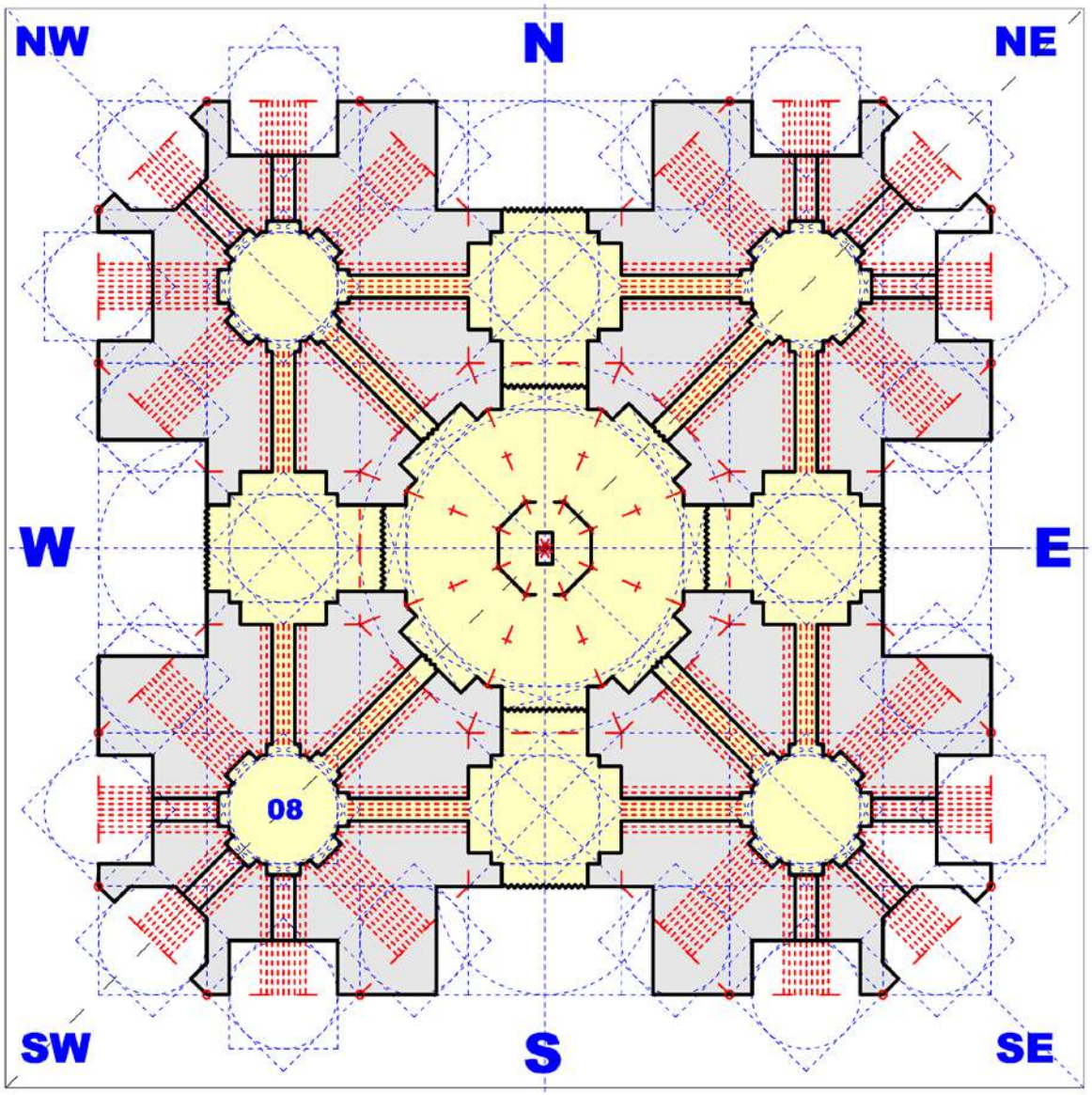

Fig 36: Source Author

The smallest octagon in the design called as “Guldasta” are repeated on all four sides of the plan corresponding to their respective octagons as shown in the fig.

The “Guldasta” (smallest octagon) also hold the key to elevation grids thus playing a very important role both in terms of decorative pier and grid system.

In next step we would be generating the location and size of minarets to complete the plan.

Step 29

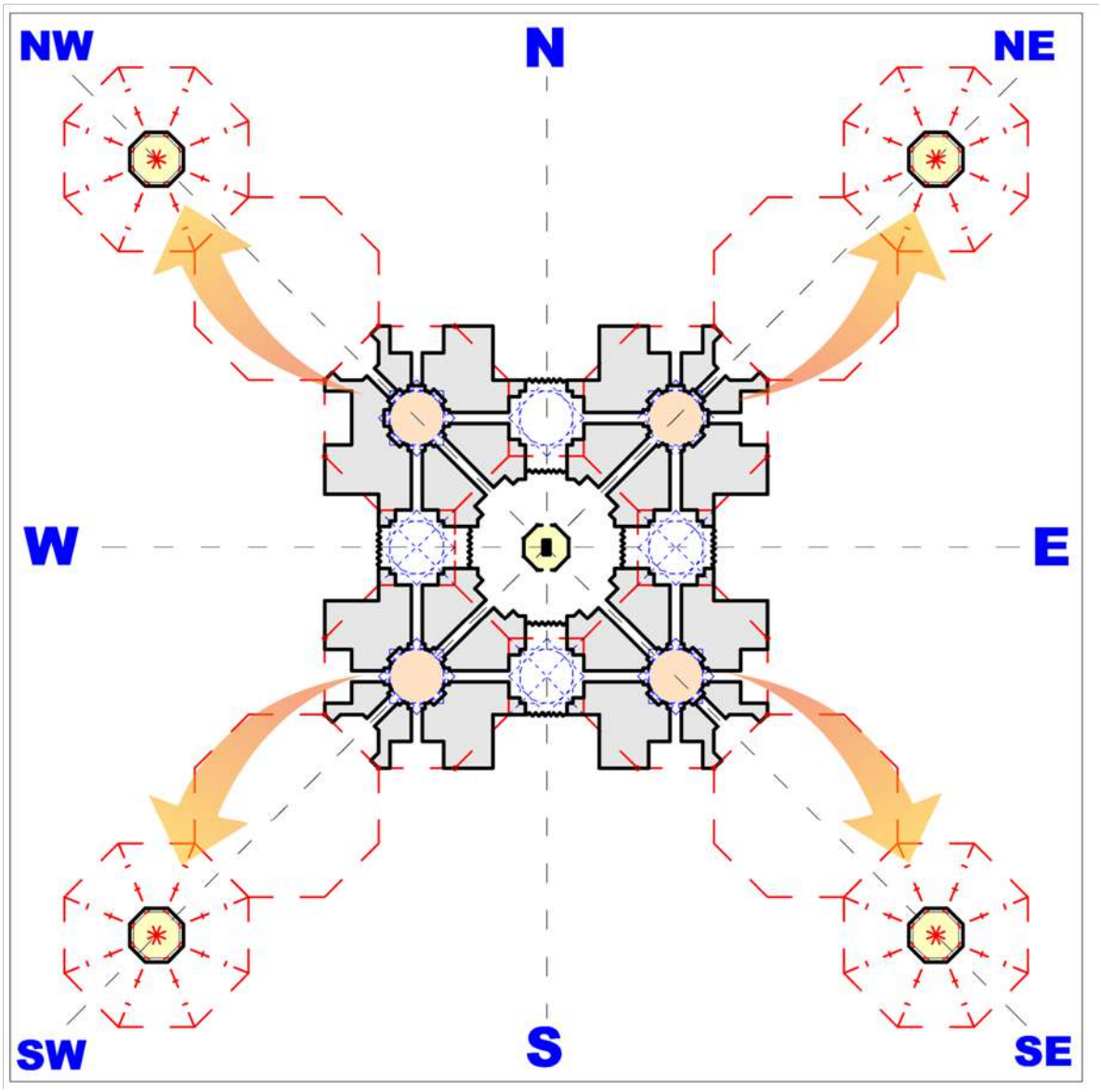

Fig 37: Source Author

In order to generate the plinth on which Taj Mahal sits, add 2 more main octagonal grids in the corresponding cardinal directions as shown. The small octagonal room generated previously will be repeated again and this would be the dimension of chamfered corners of the plinth.

This corner octagon holds a minaret in the centre whose dimensions corresponds to the innermost octagon of the central chamber. A circle inscribe in this octagon in the base dimensions of circular minarets

The base dimension of generated inscribe circle die = 5.90 m – decorative = 5.65 m
Measured dimension of the circle die = 5.65 m

Step 30

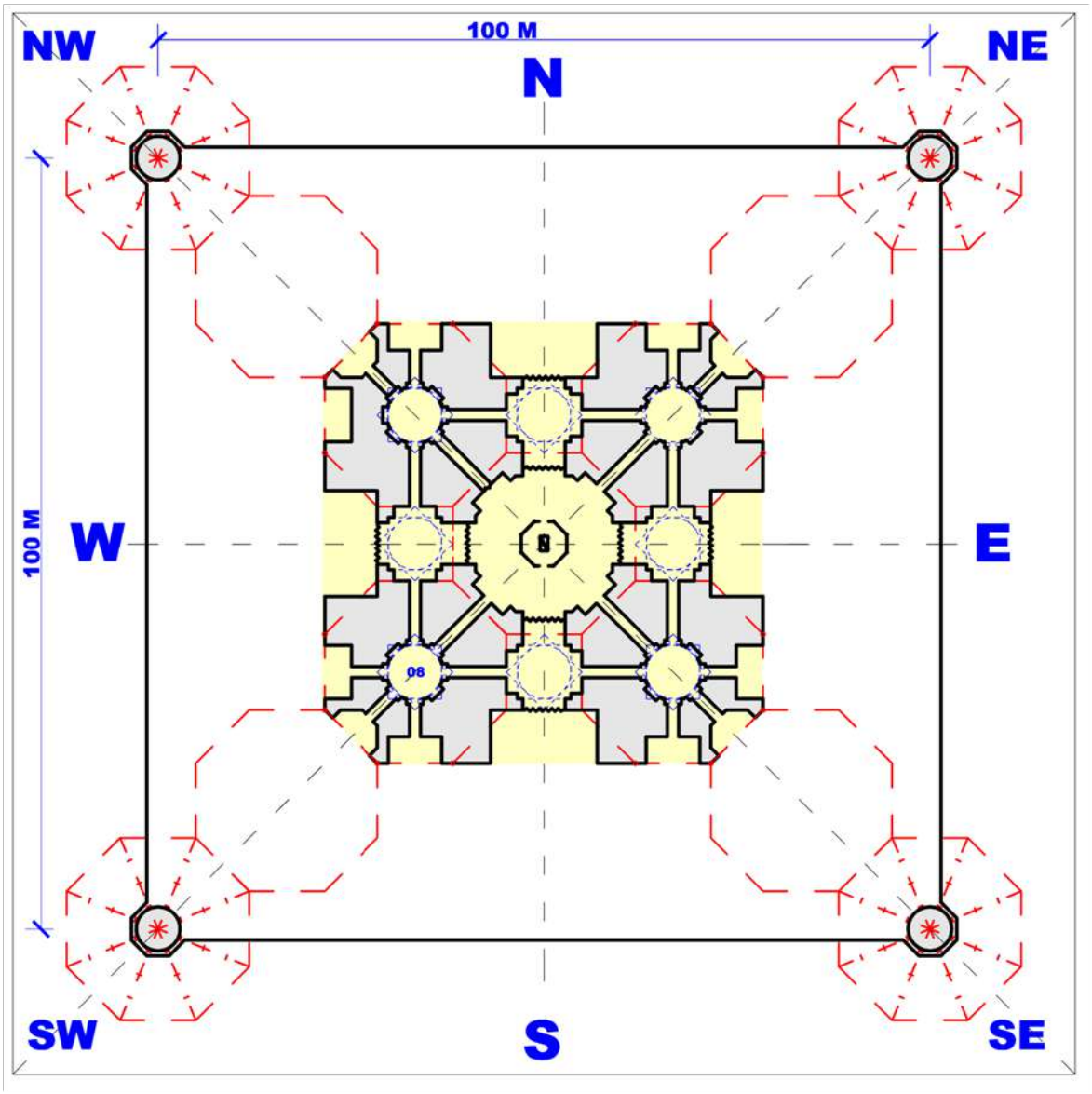

Fig 38: Source Author

As we complete the layout plan of the Taj Mahal it gives a new grid of 100M x 100 M which would be used for laying down the Taj Mahal complex.

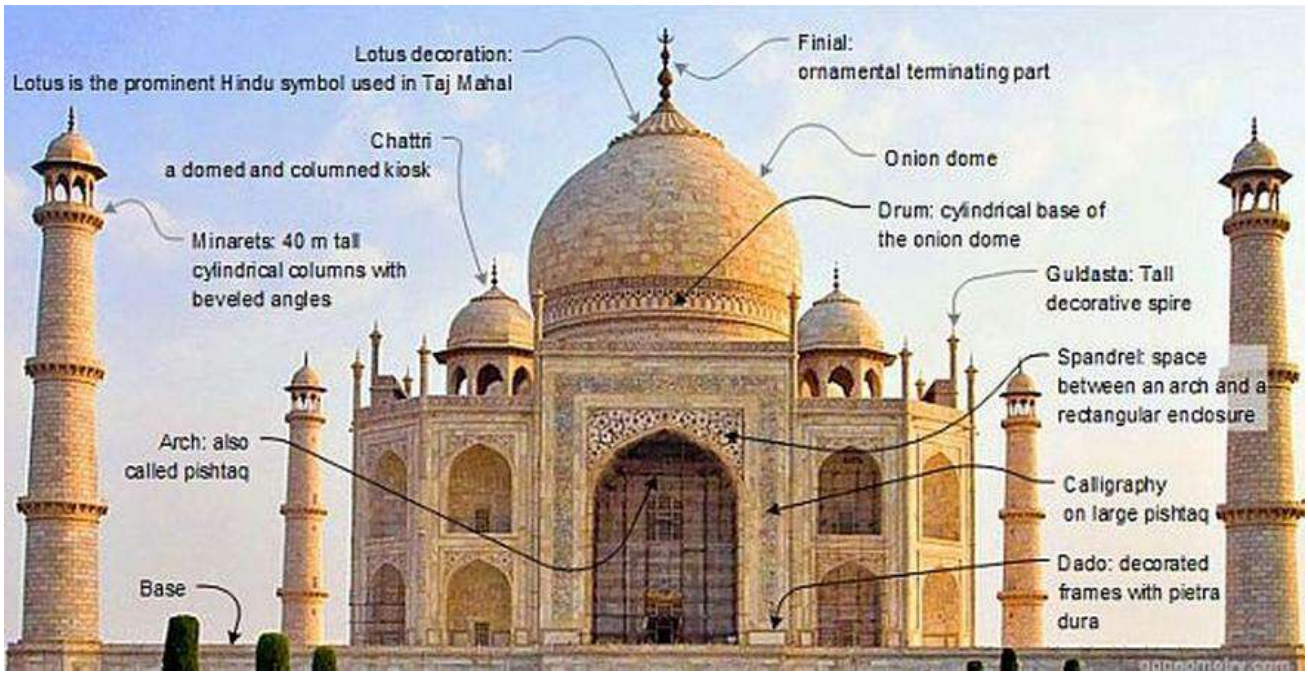

Fig 39: Structral detail of Taj Mahal (Image source: http://planetden.com?architecture?taj-mahal-structural-wonder)

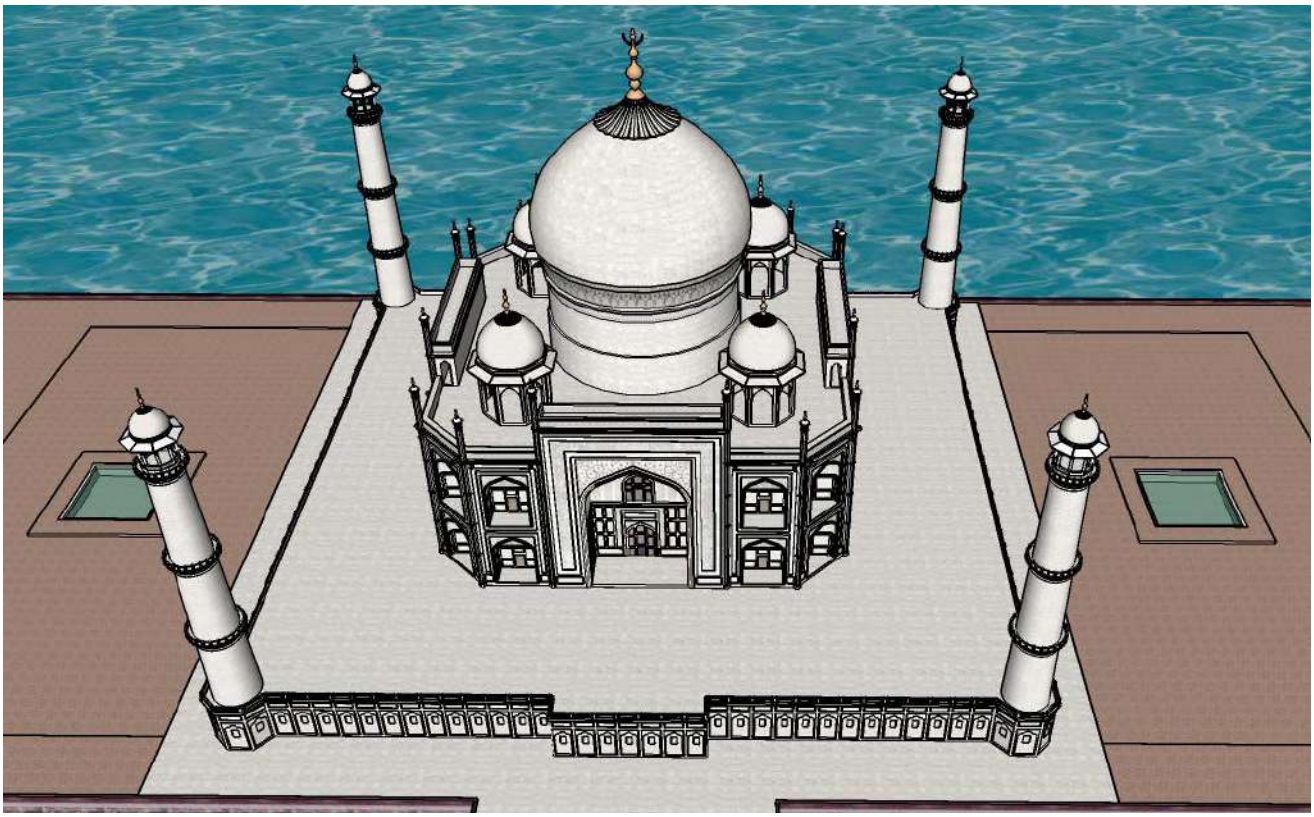

Fig 40: Taj Mahal isometric view (Image source: author)

VIII. CONCLUSION

Taj Mahal complex, built during the mid- 16th century in Agra, had great significance in the history of Mughal architecture and landscape design. Previous research has focused on its antecedents, architecture, visual power and its location near the river Yamuna. None of them could conclude the dimensional organization.

The source of Mughal mausoleums' evolution of built forms are derivatives of octagonal geometry which can be classified as new discovery of **Hasht- Bihist Architecture**. This style of architecture can be used to decipher the evolution of other mausoleums' plans.

This unique derivation of building plan from sacred geometry of *Hasht- Bihisht* is very unique and witnessed only once in the history of Mughal architecture in India. This could be one of the reasons why Shah Jahan cut hands of the people who designed and built it?

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Different Mentoring Styles of the Supervisors for Final Year M. Ed Students: Students' Perspectives

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Abstract- In the journey of writing a dissertation or a thesis, the supervisor of a student plays an important role in guiding and helping the student to complete his or her work. The mentoring style of a supervisor might affect a student's progress either directly or indirectly in completing the paper. This study aims to investigate the supervisors' styles in mentoring the students from the perspectives of the students themselves. A qualitative method was conducted by interviewing two postgraduate students regarding their supervisors' mentoring styles. The results of the study showed that both supervisors use different styles when mentoring their students. The discussions with the supervisors are very important to the students, as well as the supervisors' understanding towards their ideas and work. The mentoring styles of the supervisors affect the students' work as well as their personal growth.

Index Terms- Mentoring styles, supervisors, dissertation, thesis, postgraduate

I. Introduction

Writing a thesis or a dissertation, as a requirement of the program or university, is one of the most challenging tasks for post-graduate students. Most of the time postgraduate students feel a lot of pressure to complete their dissertation within the particular timeframes. Other than time constraints, problems such as family concerns, career, financial status, and etc. also add to this pressure (Abiddin& Ismail, 2011). Therefore, many cases indicate that a high percentage of postgraduate students are not able to complete the program on time due to such pressures. According to (Abiddin, 2007; Abiddin & Ismail, 2011; Cullen et. Al. 1994), most of the time, scarcity of satisfactory mentoring from the supervisors to the postgraduate student, is another factor that leads to the intensification of the problem. They add that if postgraduate students are provided with sufficient mentoring, it will result in the success of the students.

Chiappetta-Swanson & Watt, (2011) define mentoring of supervisors as "an activity undertaken by someone occupying a formal role within an organization that has (more or less) explicit expectations and accountabilities to both the person being supervised, and the organization which provides the context for the supervisory relationship." (p. 2).

Abiddin& Ismail (2011) add that the absence of student-supervisor bond result in the students not being able to complete their research on time, which ultimately contributes to the lowquality of research, is well. Without effective mentoring from a supervisor, problematic situations will arise which can affect the progress of students in writing their dissertation (Abiddin and West, 2007, p. 370). According to Azman, Nor, Nor, & Aghwela (2014), the feedback provided by the supervisor in writing a postgraduate thesis and its improvement are what principally terms the goals of supervisory practices. However, as Marcos &Tillema (2006) utter, the feedback provided by the supervisor depends on how the supervisor himself and the supervisee see the feedback and the mentoring. When a student is assigned a supervisor, the mentoring style and approach of the supervisor play a significant role in the completion of their thesis or dissertation (Tahir, Ghani, Atek, & Manaf, 2012).

According to Spencer (1996), the supervisors practice different mentoring approaches such as:

1. Letting go style where the supervisor and supervisee get into conversation and time is given to let things develop, waiting for things to happen in a natural way, avoiding rush and pressure.
2. Active listening style where the supervisor asks questions during the conversation with the supervisee, and the supervisee is summarizing thing and explains his/her progress.
3. Advisory stylewhere the supervisor and supervisee get into a conversation and the supervisor provides the supervisee with suggestions for problem-solving and alternatives to improve the paper.
4. Prescribing style, where the supervisor takes the responsibility via providing specific instruction to the supervisee for how to deal with problems that have risen and requiring improvements.
5. Cooperative style where the supervisor involves the supervisees in problem solving, allows the supervisees to share their opinions freely and is being focused on cooperation.

As said earlier, the progress of students' research is greatly affected by the approaches utilized by the supervisors. Therefore, this study aims to carry out a small case study, investigating the methods and styles the supervisors utilize from the perspective of the postgraduate students, studying in their final year in UiTM. The objectives of the study are as follows:

1) To investigate the supervisory styles or approaches of the supervisors for the Master of Education (M.Ed) final year students from the perspectives of the students;

2) To investigate the perceptions of Master of Education (M.Ed) final year students toward the supervisory styles or approaches of the supervisors;

II. REVIEW OF RELATED LITERATURE

Mentor and mentoring and mentorship can be traced back in the ancient Greek mythology—*The Odyssey.* (Ismail et al., 2015; Grogan, Eviner, and Hobbie, 2012; Malloy, n. d.; Clutterback, 1991, cited in Zainal Abiddin, 2006). As explained, mentor was the name of mythological character in the Greek mythology—The Odyssey—and who was is trusted by Odysseus to look after his son Telemachus' education and training before the *Trojan War*. Indeed, the mentor once changed into a "vehicle of the goddess" Athena so that she can appear physically on earth to train and guide Telemachus—Odysseus's Son. Looking back at the history of *mentor*, it can surely be concluded that mentor is someone who provides guidance to less a knowledgeable person. According to Research Council (2016), "mentoring is defined as a close relationship between a graduate student and a faculty member who provides guidance, support and research advice in an individualized manner" (p. 1).

There are a numerous studies on different aspects of mentors, mentee and mentorship—ranging from qualities and effects to students' and mentors perception mentorship; the most most studies this type in the realm of higher education include Korver and Tillema (2014), Ismail et al. (2015), Sidhu et al. (2013), Azure (2016).

Korvor and Tillema (2014) conducted their study on 37 teacher assistants and 31 teacher education students in higher education to find out mentoring approaches and how it affects perception of feedback provision. From the three types mentoring approaches—prescriptive, situational and initiator—the study found out that two approaches (prescription and initiator approaches) were dominantly used. In fact, the majority of the supervisors used prescriptive method of providing guidance. In this study, the role of the supervisor as an *encourager* was reported absent. The study also found out that supervisors had different views on feedback provision—mentors "overrated" their feedback while students saw it negative.

Sidhu et al. (2013) conducted a study on 66 postgraduate students in two Malaysian public universities to explore the students' experience of being a supervisee during their research. The result of this study showed that the supervisees were "moderately" pleased with the quality of supervision provided by their supervision. In addition, the study found the most important qualities of a good supervisor, from the students' perspective, were motivator and "confidence booster", be good research role models, knowledgeable in research methodology, good communicators and "constructive feedback provider". Finally, the finding of this research study showed that the supervisors enthusiasm for supervision was at its peak at the beginning of the research process and steadily decreased toward the final stages of research, where, as reported, students faced numerous challenges. A similar study by Azure (2016) on Ghanaian graduate students found out "three most important attributes of supervisors as perceived by graduate students were: supervisors should be friendly, approachable and flexible; knowledgeable and resourceful; and encourage students to work and plan independently" (p. 1). Finally, Azure's study revealed that successful and help supervision means that supervisors are capable of establishing noble and professional relationships with supervisees; provide assistance and guidance; and gives constant motivation and encouragement.

The effect and importance of communication and support and assistance (which was indicated in Azure's study) on supervisees' self-confidence was studied by Ismail et al. (2015). The researchers' study on 150 research students in Malaysia showed that effective communication and support from the supervisor's side had a direct effect on supervisees' self-confidence. That is to say, good communication between the mentor and mentee and the support received from the mentor, boosted supervisees self-confidence.

These studies have paved a good foreground for the present small-scale in-depth case study. In the present study, we are going to find out the approaches which supervisors use while providing feedback and students' perception of supervision, in general, and of approaches, in particular. The framework of this study is the MERID (Mentor roles in dialogue) model, which was developed by Hennisen et al (2008, cited in Crasborn et al, 2011). In this model, there are four roles or styles of mentoring which are initiator, imperator, encourager and advisor. Based on this model, the study would figure out which of these roles fit the mentoring styles that the supervisors of this study have.

III. RESEARCH METHODOLOGY

In the present study, the researchers employed a case study method in order to extract an in-depth understanding of the issue. A case study according to Richards (2011) can be referred to as a detailed study of an individual, a small group, an organization, community, or even a country. The sample/participants of the study were two postgraduate final year M.A TESL students, studying in UiTM. Furthermore, semi-structured interviews were used as the main instrument to collect data for the study. Berg (1989) utters that semi-structured interview is conducted in "a systematic and consistent order, but it allows the interviewers sufficient freedom to digress; that is, the interviewers are permitted to inquire far beyond the answers to their prepared and standardized questions" (p. 17).

In addition, the two respondents interviewed for this case study were both final year students of Master's in Education (M.Ed), in UniversitiTeknologi MARA (UiTM). Respondent 1 was a final year M.Ed student of Education Management and Leadership course, while Respondent 2 was a final year M.Ed student of Teaching English as Second Language (TESL) course. The interview sessions were conducted in two sessions, each session

with one respondent which took about 20 to 45 minutes. The interview consisted of two sections: the first section inquired about the mentoring styles of their supervisors, and the second section inquired their perceptions toward the styles and approaches used by the supervisors.

IV. DATA ANALYSIS

In this section, the findings of the data will be presented according to the two objectives stated for this case study which are; 1) investigating the mentoring styles of the supervisor, and 2) investigating the students' attitudes towards the mentoring styles. For the data analysis of this study, the researchers first transcribed the interview transcripts from both respondents, and then used the thematic coding to categorize the findings based on the themes that emerged from the transcribed interview.

Objective 1: The mentoring styles of the supervisors

"Letting go style"

The first mentoring style identified by the researchers is the letting go style. The first respondent's supervisor popularly used the method. The quotations from the first respondent are as below:

"Whenever I have something to refer or to discuss, only then I would contact her and arrange a meeting…but…but…ermm…throughout the research period, we would contact each other through emails and whatsapps." (R2, lines 21-24).

"I think she's flexible because I have no idea. She's very cool because she's very friendly, very motherly. She's more of a 'let go' type of mentor." (R2, lines 41-43)

"…you get very comfortable to share your thoughts even though some of your thoughts might be too much or too ambitious but she's a mother kind of figure, you can like share everything." (R2, lines 49-52)

"I feel okay, I feel flexible, I don't really feel pressured." (R2, lines 152).

"Active listening style"

The next mentoring style that could be found from the interviews is the active listening style. Throughout the interviews of both respondents, it was found out that both supervisors have active listening style when supervising and mentoring the respondents. The quotations from both respondents are as below:

"…but when I went to see her, she would read or she…if she didn't understand, she would keep on asking questions." (R1, lines 168 – 169).

"…she's not someone who just briefly go through, but she will be like, emm…trying to understand what we are…I'm trying to…say...trying to show…" (R1, lines 27 – 29).

"…she will like throw a few questions, like, 'You really wanna do this? …Sometimes it's good for you to think negatively, you will think of the issues that will come up.' She kinda do that, even though she's kinda very supportive at the same time." (R2, lines 107 – 111).

"…I told her this is how they do things, it's very different and very e-conventional and she likes it and she's like you should do this. If you are very into it, do it!" (R2, lines 78 – 81).

Advisory style

Finally, the last mentoring style that could be found in the data is the advisory mentoring style. The advisory mentoring style in this study applies to the supervisor for the first respondent only. As compared to the supervisor for the second respondent, the first respondent explained that her supervisor did provide her some directive advices whenever the supervisor felt necessary. Below are the quotations from the first respondent:

"…sometimes, yes, but then, she would give you…a few…aaaa…options on how you could improve it. How you could improvise it" (R1, lines 181 – 182).

"…sometimes she accepts it, sometimes if the thing is not strong enough, she would accept but aaa…she would ask me to find for something that will make it…to strengthen my justification…" (R1, lines 295 – 297).

"Yeah, she allowed me to defend, but if let's say, it's still em…if she still think that my point is invalid or whatever, she will just say 'I think you do not need to put that in, just omit it" (R1, lines 329 – 331).

Objective 2: The students' perspectives towards the mentoring style

Valued discussions with supervisors

The first theme for the second objective is the respondents valued discussions with their supervisors. When interviewing the respondents, they agreed that during the discussion or meeting, they would prefer if that time was fully used to discuss about their dissertation only and not interrupted with other activities. They valued the inputs from the discussions that they had with their supervisors as per reported below:

"…if she reads it beforehand, at least she just highlighted what she didn't understand and then we can discuss later on, because if I had to wait for her reading, it will be like, okay, just finished chapter 1, chapter 2 (laughed). Sometimes I wanted to ask her something that I want to discuss longer with her…" (R1, lines 244 – 248).

"Sometimes she reads beforehand, so it's easier, it's just, emm…focused on what she wanted to ask me and then I can straight away discuss with her what I wanted to ask her. That one is more effective" (R1, lines 260 – 263).

"I feel like we talked forever but it was only 45 minutes. But there was a lot of input even though we chit chat a bit around stuff, yeah" (R2, lines 87 – 89).

"We always go straight to the point …only after do we chat about life" (R2, lines 92 – 94).

Appreciate understanding from supervisors

The second theme that emerged under this objective is the respondents appreciated understanding from their supervisors. From the interviews with the respondents, they remarked several times that they were grateful to have supervisors who understood what they wanted to do for their dissertations. They mentioned that some of their classmates had supervisors who would ask them to change some big parts of their dissertations, but they experienced none of the issues with their supervisors as they tried to understand the intentions of the respondents.

"She would just like guide me and ask me what I'm comfortable with and then just…go with it" (R2, lines 107- 109).

"Yeah, she would usually lay things out 'like now you pick, you know your cards better, you know what could happen so pick your card" (R2, lines 131 – 134).

"…it's not that I need to do major amendments, it's like, okay, she's trying to understand what I wanna do…" (R1, lines 228 – 230).

"And then, em…she…she's not someone who just briefly go through, but she will be like, emm…trying to understand what we are…I'm…" (R1, lines 27 – 29).

Welcome independent problem solving

The third theme emerged for the second objective is, the respondents welcomed independent problem solving. According to the respondents, they would have discussions with their supervisors, but their supervisors let them to solve their problems the way they wanted to solve them. The discussions with their supervisors would help them to see perspectives from different angles as well as a few choices, therefore they had the convenience of solving the problems their own ways. The quotations are as below:

"So you have to find your own way on how you want to…what does it mean by thorough discussion, how would you arrange your own chapter…" (R1, lines 210 – 212).

"She doesn't hold my hand all the time, but I could still walk on my own" (R2, lines 112- 113).

V. DISCUSSION

Objective 1: The supervisors' mentoring styles

One of the first theme to have emerged from the data analysis of the transcripts was the 'letting go' style of mentoring. According to MinT Mentoring Styles Questionnaire (2014), the 'letting go' style consists of several attributes such as allowing things to occur naturally, allocating large amount of time for things to develop. Furthermore, the supervisors avoid an over-emotional approach and prefer not to pressure the supervisee. Its closest counterpart in the MERID model is called the 'Initiator'. According to Crasborn (2011), the 'Initiator' is a supervisor or mentor who would usually introduce the topic to the supervisee or mentee with the intention to help them 'start off' their research; this due to the initiator belief that the supervisee's knowledge and skills could be influenced by their event-structured, context-based and practice-oriented discussions. The initiator would induce or introduce the topic of the research to the supervisee to get them to explore the topic more through non-directive supervisor skills, which include summarizing of content and feeling, and asking open questions. The non-directive supervisory skills would encourage the supervisee to reflect on more on the topic.

The second theme to have emerged was the advisory style of mentoring. The advisory style consists of several actions that include solving problems by giving suggestions and advising as an objective outsider. Furthermore, this kind of supervisor prefers to lay out alternatives that the supervisee is free to choose and the advice given are usually expertise based. The closest counterpart in the MERID model is a combination of both the 'Imperator' and the 'Advisor'. According to Crasborn (2011), the 'Imperator' and the 'Advisor' are supervisors who prefer to use directive supervisory skills in aiding their supervisee. Those directive supervisory skills include giving direct advice and honest opinion about the topic at hand and the supervisee's progress on the topic. However, the imperator and the advisor have a singular difference; the imperator would introduce the topics in a research while the advisor would not. The imperator would get to the supervisee; their strengths, their weaknesses, their research preferences and their interest and would act accordingly by pointing them to the appropriate topics that could entice the supervisee's researching interest. On the other hand, the advisor would gradually get to know the supervisee without directly pointing them to the topics that they think would interest the supervisee. Crasborn (2011) indirectly stated that both types of supervisors generally would know their supervisee on a deeper level than most.

The last theme to have emerged from the data analysis of the transcripts was the 'letting go' style of mentoring. Based on the descriptions given by the MinT Mentoring Styles Questionnaire (2014), the letting go style of mentoring consisted of acts such as allowing things to develop naturally, the supervisors prefer to avoid an over-emotional approach and would allow the supervisee to set their own pace. Generally, the supervisors would let the supervisee have freer rein than any other supervisors. The closest counterpart from the MERID model is the 'Encourager'. According to Crasborn (2011), the 'Encourager' is a supervisor would usually react to the topics; they allow the supervisee to introduce the topic of the research. The encourager would react by employing probing questioning methods and exploration.

Objective 2: The students' perspectives

The first theme for this objective is that the respondents valued the discussions with their supervisors. According to the respondents, the discussions that they had with their supervisors helped them a lot in developing their ideas and the progress of their dissertations. Therefore, they preferred if the discussion time was fully utilized for discussions only and not to be interrupted with other activities. They regarded the discussions as important as they needed the feedback and information not only to improve their dissertation, but as opportunities to learn. Jones & Jowett (1997, cited in McKimm, Jollie, & Hatter, 2007) stated some benefits that could arise from the mentoring relationship and the discussion including the opportunities to close the learning gaps among each other, to be able to criticize and accept the critics given as well as for the mentee (or in this case study, the supervisee) to develop their knowledge, critical thinking and reflective skills. From this, we could see that not only the supervisees will learn from the supervisors through the discussions, the supervisors will also be able to learn something from the supervisee. When this happens (learning from each other) it is called a mutual practise(Woodd, 1997).

The discussions between the supervisor and supervisee also would enable the supervisee to learn when the supervisor deliberately ask stimulating and perceptive questions to the supervisee as well as let the supervisee to reflect deeply throughout the process (Woodd, 1997). This statement is proven when the first respondent of this study mentioned a few times in her interview that her supervisor would continuously asked questions regarding her work until she herself figured out that what she had written needed to be justified and supported more. Through the process of questioning by her supervisor, the first respondent was able to figure out that there were some things in her work that needed more research and revisions. This kind of discussions, even though the supervisor only asked questions instead of providing feedback allowed the respondents to think more and deeply regarding her work and this was the process that the respondents valued so much. The same applied to the second respondent, where his supervisor also did the same, asking questions not to seek for answers, but to get the respondent to think more and reflect upon their work.

The second theme to be discussed is the respondents' appreciation of understanding from their supervisors. Throughout the interviews with the respondents, they showed their gratitude towards their supervisors' understanding of their ideas and also their work. A study conducted by Bailey et al, (2016) on what are the ideal mentor prototype according to the mentees' perspectives showed that the students' ideal mentor prototype would be those who guide, understand and model ethical values throughout the mentoring relationship. This study showed that understanding is a characteristic that is valued in a mentor, and it will help the mentee to further put their trust in the mentor to help them to go through their ventures, no matter in what situations. The understanding of the supervisors are also needed in order to comprehend what the students are trying to achieve (Abiddin, 2006). Without understanding, the supervisors will not be able to see what the intentions of the students are, and this may hinder the students' progress from being further developed.

Finally, the respondents welcomed independent problem solving instead of being provided direct solution on what to do to solve their problem. During the interview with the respondents, they mentioned that their supervisors let them to solve their own problems. However, the supervisors will first let them see their problems in several angles before they let the respondents to decide on their own. The way the supervisors let the respondents to deal with their own problems matched a model developed by Badley, (1989) which eventually helps the mentee to solve and manage their own problems. In his model, the mentees take part in solving the problems and finally able to be independent and not rely on their mentors as much. In this case study, both respondents have the opportunities to solve problems by themselves with guidance from their supervisors. As previously mentioned, the supervisors did not directly provide them solutions, but helped them to see their difficulties and complications in various perspectives so that the respondents would have clear perspectives before acting on their own. As McKimm, Jollie and Hatter (2007) stated, the mentoring should finally lead to the students' ability to be independent and autonomous, instead of being dependent on their mentors.

VI. DISCUSSION

To conclude this case study, the mentoring styles of a supervisor will have effects towards the supervisee either in the supervisee's work or his or her own personal growth. The mentoring styles would either assist or hinder the supervisee's progress and this is among the issues that a supervisor needs to consistently monitor throughout the process. It is imperative for a supervisor to know what are the needs of the supervisee so that the supervisor would be able to develop the needs as they go along. While supervising a student, a supervisor also needs to know the importance of knowing which roles to play at different times.

Therefore, it could be said that a supervisor might play different roles in several occasions while mentoring and supervising the student. It is not definite that a supervisor should stay with one mentoring style at one time. Beside that, in a mentoring relationship between a supervisor and a supervisee, it is vital that both parties communicate each others' expectations in the process. Expectations need to be expressed by both parties so that the needs of both supervisor and supervisee will be able to be addressed and fulfilled. This is to ensure balance to exist within the process it will eventually contribute to the feelings of contentment and satisfaction in both parties.

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Environmental Implications of Climate Change on the Coastal Areas of the Niger Delta

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Abstract- This paper presents the environmental implications of climate change on the coastal areas of the Niger delta located in the southern part of Nigeria. It gives a general overview of global climate change and predicts its consequences and examines how it has made the coastal areas of the Niger delta vulnerable to natural disasters such as flooding and others. The build-up of greenhouse gases in the atmosphere has led to an enhancement of the natural greenhouse effect. It is however deduced that human-induced enhancement of the greenhouse effect is of concern because ongoing emissions of greenhouse gases have the potential to warm the planet to levels that have never been experienced in the history of human civilization. Such climate change could have far-reaching and/or unpredictable environmental, social, and economic consequences. The Global warming has the tendency of establishing favorable atmospheric conditions for disease carrying vectors and making it possible for these organisms to spread diseases that are realized more harmful to beings.

Index Terms- Climate, climate change, environmental implications of climate change, coastal areas of Niger delta

I. Introduction

Climate is the average weather conditions of a place or region including typical weather patterns, the frequency and intensity of storms, cold spells and hot weather. Weather on its part is the daily fluctuating state of the atmosphere around us, characterized by the temperature, wind, precipitation (rainfall), clouds and other weather elements. The type of climate found in the southern part of Nigeria is the tropical monsoon climate which is influenced by the monsoons originating from the South Atlantic Ocean brought about by the warm moist maritime tropical air mass.

Climate Change according to the Intergovernmental Panel on Climate Change (IPCC), means any change in climate over time, whether due to natural variability or as a result of intense human activities in the environment. In 1988, the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in Villach created the IPCC to bring together leading scientists and other experts involved in the study of climate change, its effect and the necessary responses. The panel (IPCC) has done an assessment of climate for the past 1,000 years in relation to the present and provides estimates of its projected future evolution and their uncertainties. The IPCC in its report released in 2007 linked the primary cause of global warming to human activities.

Climate change is a long-term shift in weather conditions identified by changes in temperature, precipitation, winds, and other indicators. Climate change is largely due to anthropogenic activities of man and it poses an existential threat to our nations and way of life. The major activities of man that brings about climate change are gas flaring, industrial emissions and deforestation. It should be noted that if the environmental laws in Nigeria could be implemented especially the laws on gas flaring and deforestation, carbon emissions into the atmosphere would be minimal and this would in turn have little effect on the climate.

Having reviewed the global position of climate change and its predictable consequences, it is now safe to examine specifically how vulnerable the Niger delta is, with regard to flooding in the coastal areas. Some of the factors that render the Niger delta prone to flooding as identified are soil type, vegetation depletion or overgrazing and climatic factors like rainfall. Annual rainfall in the Niger delta varies from 2000 to 5000 mm. The delta has such high rainfall levels because it is so near to the Atlantic Ocean which is the source of the moisture. Bonny town found in the coastal area of the Niger delta in southern Nigeria for instance receives well over 4000mm (157.5in) of rainfall annually. Others are Forcados (4870mm); Calabar (3070mm); Warri (2730mm); Port Harcourt (2400mm); etc.

II. Factors Responsible for Change in Climate

Climate change can involve both changes in average conditions and changes in variability, including for example, extreme events. The earth's climate is naturally variable on all time scales. However, its long-term state and average temperature are regulated by the balance between incoming and outgoing energy, which determines the Earth's energy balance. Any factor that causes a sustained change to the amount of incoming energy or the amount of outgoing energy can lead to climate change. As these factors are external to the climate system, they are referred to as 'climate forcers', invoking the idea that they force or push the climate towards a new long-term state, either warmer or cooler depending on the cause of change. Different factors operate on different time scales, and not all of those factors that have been responsible for changes in earth's climate in the distant past are relevant to contemporary climate change.

Factors that cause climate change can be divided into two categories - those related to natural processes and those related to human activities. In addition to natural causes of climate change, changes internal to the climate system, such as variations in ocean currents or atmospheric circulation, can also influence the climate for short periods of time. This natural internal climate variability is superimposed on the long-term forced climate change.

Green house effect

The earth's climate is greatly affected by green house effect. This is a phenomenon whereby the temperature of the earth's surface is gradually increased. This happens when the concentration of carbon (iv) oxide (CO_2) released into the atmosphere from the burning of fossil fuels rises and thus makes the atmosphere to become transparent to short wave radiation from the sun and opaque to long wave radiation (or heat), which is trapped near the earth's surface. Apart from carbon (iv) oxide, other green house gases or causes of green house effect are: chlorofluorocarbons (CFCs) used in large scale in refrigeration and air-conditioning industries, as well as aerosol sprays and foams; nitrous oxide (N_2O) released from nitrogenous fertilizers, deforestation and biomas burning; and methane (CH_4) from rice fields, cattle, landfills and fossil fuel production.

In addition to climate change, green house effect also exposes the earth's surface to ultra-violet radiation which is highly injurious to the human and biological life; reduces rainfall and therefore leads to a decrease in the availability of irrigation water, hydroelectric power generation and water for industrial uses; causes a rise in sea level due to melting ice and subsequently flooding and loss of farmlands; reduces agricultural production of crops such as corn, wheat etc.

Solar output

Majority of the energy that causes the climate of the surface of the earth to change comes from the sun. The strength of the sun or solar energy output absorbed by the atmosphere is constantly changing and this have an impact on the climate of the earth. Changes in solar irradiance have contributed to climate change over the past century.

Earth's orbit

The orbit of the earth round the sun is elliptical (not circular) and as such at some particular times the earth maintains an approximately constant distance away from the sun, but at other times when the ellipse is more pronounced, the earth either moves closer to the sun moves further away from it as it navigates around its orbit. When the earth moves closer to the sun, our climate becomes warmer and then colder when it moves away from the sun. Hence the orbit of the earth round the sun results to a change in climate

Orientation of the earth's axis

The earth is known to rotate around an axis (an imaginary line connecting the north and south poles) that is tilted at an angle. When this angle changes by either increasing or decreasing it causes the seasons to change (summer for instance becomes warmer and winters become colder).

Human activities

Respected scientific organizations such as the National Academy of Science, the Intergovernmental Panel on Climate Change (IPCC) and World Meteorological Association (WMO) have all identified climate change as an urgent threat caused by humans that must be addressed. Human activities such as the burning of fossil fuels and the conversion of land for forestry and agriculture have the greatest impact on the atmosphere than any other single human activity. Since the beginning of the Industrial Revolution, these human influences on the climate system have increased substantially. In addition to other environmental impacts, these activities change the land surface and emit various substances to the atmosphere. These in turn can influence both the amount of incoming energy and the amount of outgoing energy and can have both warming and cooling effects on the climate. The dominant product of fossil fuel combustion is carbon dioxide, a greenhouse gas. The overall effect of human activities since the Industrial Revolution has been a warming effect, driven primarily by emissions of carbon dioxide and enhanced by emissions of other greenhouse gases.

The build-up of greenhouse gases in the atmosphere has led to an enhancement of the natural greenhouse effect. It is this human-induced enhancement of the greenhouse effect that is of concern because ongoing emissions of greenhouse gases have the potential to warm the planet to levels that have never been experienced in the history of human civilization. Such climate change could have far-reaching and/or unpredictable environmental, social, and economic consequences.

Deforestation

The earth is protected by forests by helping to absorb the massive amounts of carbon dioxide (CO_2) which is the most abundant type of pollution that causes climate change. Forests are currently being destroyed at an alarming rate through logging and clearing of land for agricultural and livestock uses. These activities releases huge amounts of carbon dioxide and other harmful greenhouse gases into the atmosphere, and also reduces the region's ability to absorb carbon pollution.

Other factors

Carbon dioxide is the main cause of human-induced climate change. It has been emitted in vast quantities from the burning of fossil fuels and it is a very long-lived gas, which means it continues to affect the climate system during its long residence time in the atmosphere. However, fossil fuel combustion, industrial processes, agriculture, and forestry-related activities emit other substances that also contribute to climate change. Some, such as nitrous oxide, are long-lived greenhouse gases like carbon dioxide, and so contribute to long-term climate change. Other substances have shorter atmospheric lifetimes because they are removed fairly quickly from the atmosphere. Therefore, their effect on the climate system is similarly short-lived. Together, these short-lived climate forcers are responsible for a significant amount of current climate forcing from anthropogenic substances. Some short-lived climate forcers have a climate warming effect (positive climate forcers) while others have a cooling effect (negative climate forcers).

If atmospheric levels of short-lived climate forcers are continually replenished by ongoing emissions, these continue to exert a climate forcing. However, reducing emissions will quite quickly lead to reduced atmospheric levels of such substances. A number of short-lived climate forcers have climate warming effects and together are the most important contributors to the human enhancement of the greenhouse effect after carbon dioxide. This includes methane and tropospheric ozone; both greenhouse gases and black carbon, a small solid particle formed from the incomplete combustion of carbon-based fuels (coal, oil and wood for example).

Other short-lived climate forcers have climate cooling effects, most notably sulphate aerosols. Fossil fuel combustion emits sulphur dioxide into the atmosphere (in addition to carbon dioxide) which then combines with water vapour to form tiny droplets (aerosols) which reflect sunlight. Sulphate aerosols remain in the atmosphere for only a few days (washing out in what is referred to as acid rain), and so do not have the same long-term effect as greenhouse gases. The cooling from sulphate aerosols in the atmosphere has, however, offset some of the warming from other substances. That is, the warming we have experienced to date would have been even larger had it not been for elevated levels of sulphate aerosols in the atmosphere.

III. Implications of Climate Change on the Coastal Areas of the Niger Delta

Global warming of coastal areas

Observations over the years has shown an increased global mean temperature, commonly referred to as global warming, and this already has significant impacts on environmental and human life. Studies by the IPCC Fourth Assessment show that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human greenhouse gas concentrations, which if not checked on time could cause further severe damage to the ecosystem which have already been destabilized. The greenhouse gases attack the ozone layer which now allows ultra violet rays which ordinarily would not adversely affect the earth now directly hit the earth's surface causing the ambient temperature to be astronomically high. The increase in global temperature is significantly altering the climate of the earth, resulting in more extreme and unpredictable weather as evidenced by the frequent occurrence of heat waves and record droughts followed by intense rainfalls.

Erosion of coastal areas

Some parts of the Niger Delta are usually subjected to seasonal flooding when rivers overflow their banks. Given the scientific prediction of sea level rise that would be occasioned by climate change, it means that, the lowlands of the Niger Delta shall be exposed to higher risks with increasing change in climate. This paper discusses the relationship between climate change and riverine/coastal flooding. It also gives background information and situates the vulnerable nature of the Niger Delta within the context of global atmospheric warming.

The Intergovernmental Panel on Climate Change has linked the rise in sea level to climate change. Between 1960 and 1970, a mean sea level rise of 462mm was recorded along the Nigerian coastal waters. Flooding of low-lying areas in the Niger Delta region has been observed. Settlements in the coastal region have been uprooted by coastal erosion. In some places, especially in Forcados, some oil wells have been lost to the ocean due to erosion. The overflow arising from the rise in sea level will increase problems of floods, intrusion of sea-water into fresh water sources and ecosystems, destroying such stabilizing systems as mangroves, and affecting agriculture, fisheries and general livelihoods. Coastal vegetation, especially the mangroves, has been lost to coastal erosion. The Niger Delta could lose over 15,000 square kilometers of land by the year 2100 with a 1000mm rise in sea level. Moreover, it is predicted that Nigeria will lose a huge amount of money as a result of the sea level rise while majority of the people of the Niger Delta will be displaced due to the low level of the region.

Flooding of coastal areas

Climate change leads to flooding in the southern part of Nigeria, especially in the coastal regions of the Niger Delta. In many communities in the Niger Delta region, several houses have been abandoned by the owners due to floods resulting from heavy and brief rainfall, and many more areas in the region are vulnerable to floods. Owners of the affected houses did not anticipate the problem they now find themselves when their houses were being built. Occupants of some of the affected houses, who are unable to relocate for financial reasons, will have to cope with the situation. This makes them vulnerable to different kinds of water-related disease such as malaria, dysentery, cholera, and diarrhea. Trauma resulting from the problem can lead to non-pathogenic diseases such as hypertension and diabetes. In some other instances, some areas are cut off from other parts of the community as a result of flood.

Change in the pattern of rainfall

Meteorological data have shown that rainfall pattern in Nigeria has changed in the past decades. The decline in rainfall in Nigeria started at the beginning of the 1960s when a decade of relatively wet years ended. The persistent decline in the last two decades in Nigeria is an indication of an abrupt change in climate. Moreover, there is change in the timing of rainfall and farmers can no longer predict the rain and know precisely when to plant their crops. This is already having an impact on food security, especially in the Niger Delta where rain-fed agriculture is practiced. Farmers in the region begin cultivation at the end of the dry season, when the rain begins to fall. They plant their crops after the first or second rain in the month of March, and sometime in April. After the first rain, the rain falls periodically until the months of June/July (the peak of the rainy season). The amount of rainfall within the period before the peak is needed for the optimum performance of many crops. Because of the change in rainfall pattern, farmers who plant after the first or second rain run into huge losses when the rains are delayed beyond the usual due to climatic changes. The crops are scorched causing huge economic loss.

Outbreak of diseases and famine

Global warming has the tendency of establishing favorable atmospheric conditions for disease carrying vectors and making it possible for these organisms to spread diseases. What this means is that in developing countries, this will lead to higher

incidences of disease outbreak while the developed countries where diseases have been controlled would spend more money keeping out these disease bearing insects. Some species of fish and vegetation can no longer be found in some Niger Delta communities as there is massive migration of fishes while their structures suffer adverse degradation within few years of erecting them.

Change of habitat

Climatic change also affects the flora and fauna in the Niger delta by changing their life cycles and causing increased migration to more conducive areas for the organisms.

Acid rain

Another effect of climate change in the coastal areas of the Niger delta is acid rain. This result when sulphur (iv) oxide (SO_2) released into the atmosphere through the burning of fossil fuels gets oxidized to sulphur trioxide (SO_3) by a process known as photochemical oxidation. The SO_3 formed further combines gradually with with atmospheric water to form tetraoxosulphate (vi) acid (H_2SO_4) which falls back as rain (acid droplets). Acid rain has the potential of virtually destroying everything it comes in contact with and has also has the tendency of polluting groundwater through seepage. It results in the death of fishes prevents their eggs from fertilizing and producing more fishes; it reduces the fertility of the soil and crop yield; it is responsible for the dissolution of metals (such as mercury, lead in the earth's crust) which then enters into the body fishes and later on humans; and also lead to the damage of monuments and buildings.

IV. Coping with Climate Change in the Coastal Areas of the Niger Delta

Source of livelihood

Many people in the Niger delta whose source of livelihood once depended on natural sectors such as farming and fishing had to change their means of livelihood. Because of the degradation of their environment, they can no longer engage in farming and fishing. For this reason, many are now traders, dealing on different kind of goods. Few persons work in the civil service, still fewer ones are employed by the multinational oil companies operating in the area. Many engage in multiple activities in other to increase their income. Change in means of livelihood has led to the rate of rural-urban migration; it has also affected the workforce in the rural communities and subsequently affecting agricultural production.

Floods

To cope with the persistent flooding in the region, the use of pedestrian bridge has been developed locally so that the affected areas can have access to other parts of the community to enable them carry out their daily activities. The pedestrian bridge are made of wood, in some other cases they are constructed with earth materials such as sand, pieces of broken building blocks or granite stones. The bridges are constructed on community efforts and initiative, usually after waiting for the government for a long time without results. The bridges constructed with wood have one disadvantage; wood is biodegradable and thus have short life span. Those constructed by heaping sand are soon eroded by water.

Rainfall pattern

Because of the uncertainties in predicting the rain, farmers now delay their time of planting. After the first or second rain, they watch the rain for some time to ensure that the rain fall regularly enough before planting. They do this to prevent their crops from being killed when rain is delayed. Another way farmers in the region are overcoming this problem is by the use of fast-maturing varieties. Fast-maturing varieties of maize with high yields have been introduced and are being used by farmers. The risk involved in this strategy is that local species are being displaced by these species, though some farmers still cultivate the local ones. In future, new species may completely displace local species; this may lead to the extinction of local ones. It is important that the right mechanisms are put in place to protect local species from extinction.

V. Conclusion

When we refer to climate change in the coastal areas of the Niger delta, the first thing that comes to mind is gas flaring, the next is deforestation, which is massively going on in the area covered by this paper. The reason is because the factors mentioned above contribute enormously to the carbon levels in the atmosphere. Deforestation in particular poses a lot of danger in the sense that the forest acts as a carbon sink, when the forest is destroyed; the carbon in there is released into the atmosphere. Deforestation and gas flaring are the major contributors to carbon emissions in the coastal areas of the Niger delta.

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Computer Aided Off-Grid Solar PV System Design

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Abstract- This paper is concerned with the design of a computer-aided off-grid solar photovoltaic system which involves a dynamic computation using visual basic 6.0 programming tool. The components of the design interface of the visual basic programming solution involves calculating the load, solar panel sizing and specification, battery selection and size specification, charge controller sizing and inverter specification. So many household occupants the world over do not have access to an electrical energy supply. Majority of these buildings are in remote areas and are not connected to the national grid due probably to the high capital expenditure costs involved in expanding the national grid as well as low electricity demand from the inhabitants of these areas. Off-grid solar systems which are autonomous electricity grids that are fed with energy from photovoltaic solar power systems therefore provide a viable alternative. A photovoltaic power system can be used to provide alternative source of electrical power to homes in order to meet their daily energy requirement through the direct conversion of solar irradiance into electricity. The process of acquiring off-grid solar PV system involves the design, selection and determination of the parameters of the different components employed in the system. The success of this process is based on factors such as geographical location of the off-grid solar system, weather condition, solar irradiance, and load requirement. This paper outlines the detailed procedures adopted in the specification of each component of the off-grid solar system and as a case study; a residence in Sapele town (Nigeria) with specific energy consumption was selected.

Index Terms- Off-grid PV system, load calculator, solar system components, visual basic programming.

I. Introduction

Solar energy refers to the energy provided by the sun which is the most important source of energy for life forms. It is radiant light and heat from the Sun that is harnessed using a wide range of technologies one of which is the photovoltaic (PV) cells technology. Solar energy has so many benefits; it is environmentally friendly, durable, noise free, electricity produced can be stored for later use, etc.

II. Off-grid PV solar system components

An off-grid photovoltaic solar power system consists of four major components which are inter-connected together to produce electricity, they are: solar PV array, charge controller, battery and inverter. Other minor components are cables and protection devices such as fuses, bus bars, lighting protection system, etc. Figure 1 below shows a schematic diagram of interconnected components of a typical off-grid photovoltaic solar power system.

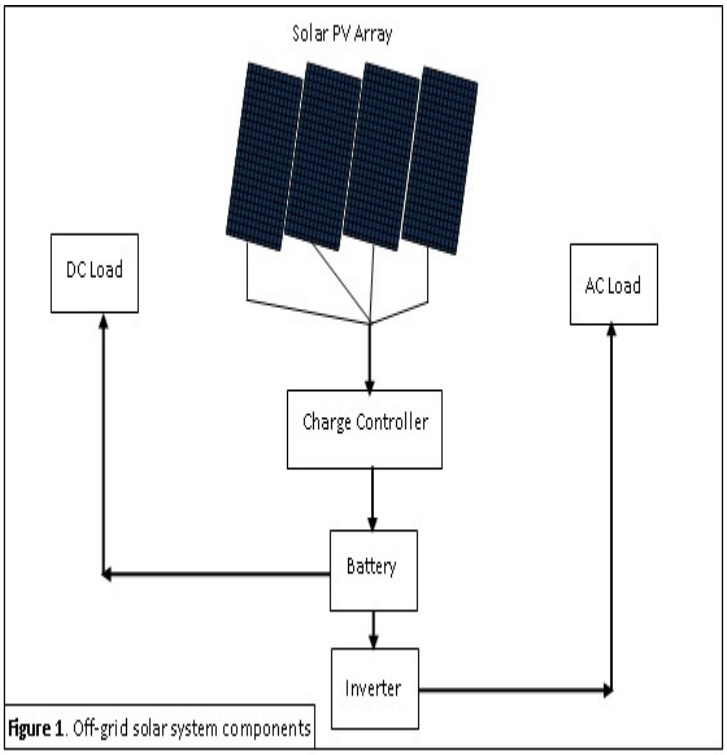

Figure 1. Off-grid solar system components

A solar PV array is a collection of several panels (or modules), which are made up of several solar cells that are responsible for generating current and voltage from the sun. Solar charge controllers are placed between the solar panel and battery storage in order to regulate the voltage and current coming from the solar panels and maintain the proper charging voltage on the batteries. Storage batteries are used to store energy during sunshine hours while being charged by the PV array and delivers current to load during non sunshine hours. Deep cycle Lead Acid batteries are recommended for off-grid solar power systems because of their high performance. The Inverter plays the role of converting DC power (coming from solar panel and batteries) to AC power.

III. Design Methodology

The design of the off-grid solar system is based on a dynamic computation approach using visual basic programming techniques. A user is allowed access into the program by providing a correct username and password in the Login page and clicking Ok as shown in Figure 2 below. When the user enters the wrong username and/or password, he is prompted to enter the correct username and/or password to successfully login to the household load calculator form.

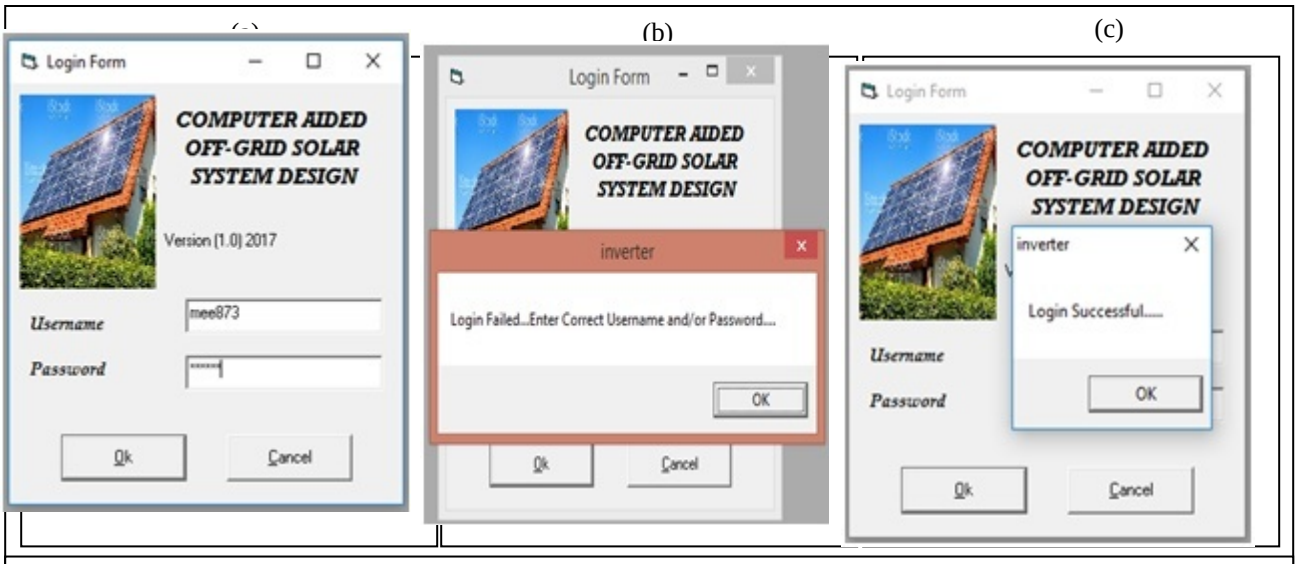

Figure 2. Off-grid PV solar system title screen and login form; (a) during login attempt, (b) during failed login (user enters incorrect username and/or password), and (c) after successful login

A household building in Sapele town is considered as case study for this paper. Sapele town is located in the south-south part of Nigeria at a latitude and longitude of 5.8751°N (5°55'0") and 5.6931°E (5°42'0") with an average solar radiation of 5.25 kilo-watt-hour per square meter per day and mean temperature of about 33°C.

The building of concern is a 2-bedroom bungalow apartment where the following appliances are needed to be powered: fan, light (Compact Fluorescent Lamp), television and satellite receiver. Table 1 below shows the list of appliances, their quantities, rated power and the number of hours to be put to use per day.

Table 1. List of appliances and their rated power

Serial	List of Appliances	Quantity	Rated Power (Watts	Resistive Loads	Inductive Loads	Hours/Day
1	Fan	1	100	-	✓	4
2	Light (CFL)	2	15	✓	-	6
3	TV	1	100	✓	-	2
4	Satellite receiver	1	18	✓	-	2

After successful login, the designer is directed to the first form of the program environment (household load calculator) where he is required to input the data shown in Table 1 and then the rated power output, energy used per day, and daily average energy demand are computed and results displayed accordingly (Figure 3) upon clicking on the Compute button.

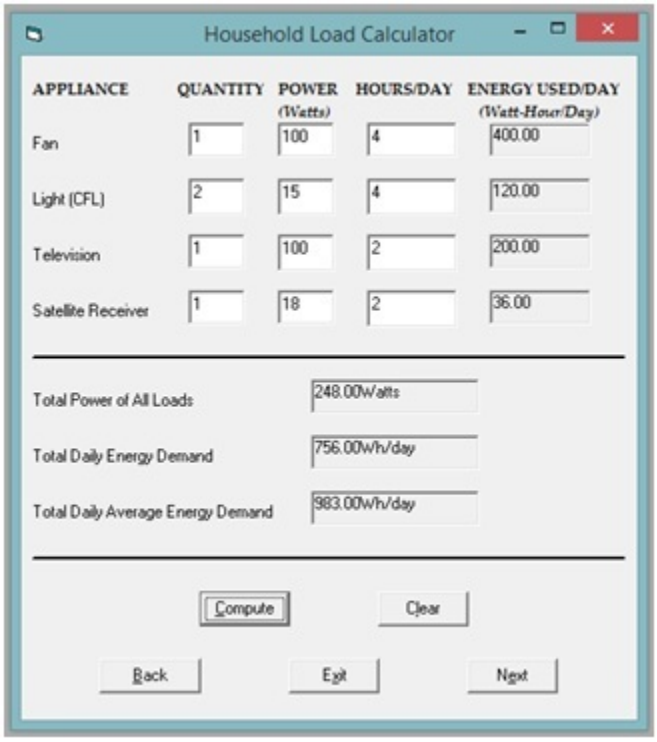

Figure 3. Off-grid solar PV system household load

The user is then required to click the 'Next' button to move to the solar PV array and charge controller specifications form (Figure 4) where he can input values for rated voltage and current of the module, average sun hours per day, DC voltage of system and charge controller factor of safety using Tables 2 and 3 as references.

Table 2. Summary of solar PV array specification

Solar module specification			
Trina Solar TSM-310PD14 (310W)		**Technology**: Polycrystalline Silicon	
Rated voltage of module (V_{mp}) = 37V;		Average sun hours available per day (H_S)= 6	
Rated current of module (I_{mp}) = 8.38A;		DC Voltage of system (V_{dc}) = 24V;	
Short circuit current of module = 8.85A;		Open circuit voltage of the module = 45.5V	
Total daily energy demand (ΣE) = 756.0Wh/day (from Figure3)			
Serial	**Parameter**	**Formula**	**Equation number**
1	*Daily average energy demand*	$E_{avg} = 1.3\ x\ \Sigma E$	(1)
2	*Average maximum power*	$P_{max} = \frac{E_{avg}}{H_s}$	(2)
3	*DC current of the system*	$I_{dc} = \frac{P_{max}}{V_{dc}}$	(3)
4	*Number of module strings in series*	$M_s = \frac{V_{dc}}{V_{mp}}$	(4)
5	*Number of module strings in parallel*	$M_p = \frac{I_{dc}}{I_{mp}}$	(5)
6	*Total number of modules (or array size)*	$M_T = M_s\ x\ M_p$	(6)

Table 3. Summary of charge controller specification

Charge controller specification Factor of safety (F_S) = 1.24; Charge controller voltage (V_{dc})= 24V			
Serial	**Parameter**	**Formula**	**Equation number**
1	*Charge controller current*	$I_{cc} = \frac{P_{max}}{V_{dc}} \; x \; F_s$	(7)

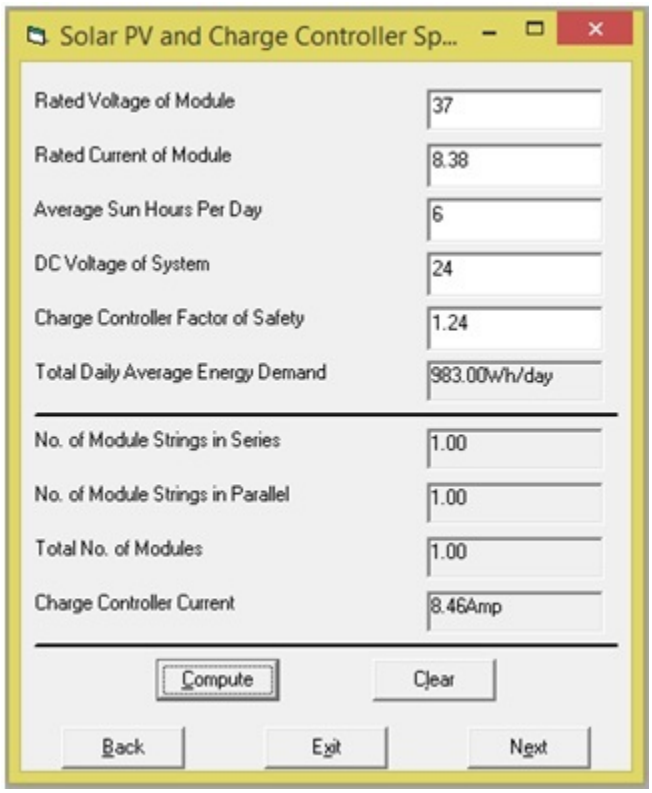

Figure 4. Solar PV array and charge controller specifications

The user then clicks on the 'Compute' button to display required results, followed by the 'Next' button to continue to the battery storage specification form shown in Figure 5 to input values for number of days of autonomy and maximum allowable depth of discharge from Table 4.

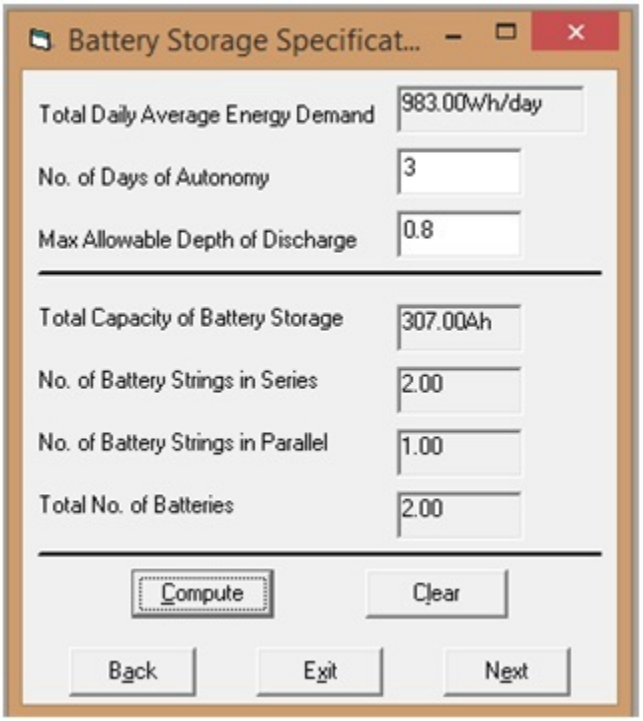

Figure 5. Battery storage specification

Table 4. Summary of battery storage specification

Battery storage specification No. of days of autonomy (A_d) = 3; Max allowable depth of discharge (D_d) = 80% Rated DC voltage of one battery (V_i) = 12V; Capacity of battery (B_C) = 400Ah			
Serial	**Parameter**	**Formula**	**Equation number**
1	*Estimated energy storage*	$E_{est} = E_{avg}\ x\ A_d$	(8)
2	*Safe energy storage*	$E_s = \frac{E_{est}}{D_d}$	(9)
3	*Total capacity of battery storage*	$B_{TC} = \frac{E_s}{V_i}$	(10)
4	*Number of battery strings in series*	$B_S = \frac{V_{dc}}{V_i}$	(11)
5	*Number of battery strings in parallel*	$B_P = \frac{B_{TC}}{B_C\ x\ B_S}$	(12)
6	*Total number of batteries*	$B_{TN} = B_P\ x\ B_S$	(13)

Upon clicking on the compute button, the total numbers of batteries as well as other values are computed based on the formulas given in Table 4 and the results displayed.

Again, the user clicks on Next to navigate to the inverter specification form, and from Table 5 he then enters values for inverter efficiency and power factor in the spaces provided on the form.

Table 5. Summary of inverter specification

Inverter specification Efficiency of inverter (η_{IV}) = 90%; Input DC Voltage (V_{dc}) = 24V; Power Factor (PF) = 0.8; Lowest voltage of battery (V_B) = 10V

Serial	Parameter	Formula	Equation number
1	*Inductive loads*	P_I	(14)
2	*Resistive loads*	P_r	(15)
3	*Total power of all loads*	$P_T = P_r + P_I$	(16)
4	*Continuous power load to the inverter*	$P_{T1} = \frac{P_T}{\eta_{IV}}$	(17)
5	*Power to be delivered by inverter*	$P_{IV} = 1.25(P_T + 3.5\ x\ P_I)$	(18)
6	*Rated output power of inverter*	$P_{KVA} = \frac{P_{IV}}{PF}$	(19)
7	*Daily input energy to the inverter*	$E_{IV} = \frac{E_{avg}}{\eta_{IV}}$	(20)

By clicking on the compute button, the program calculates the daily input energy to the inverter and rated power output including other parameters of the inverter and displays the results in appropriate labels (see Figure 6).

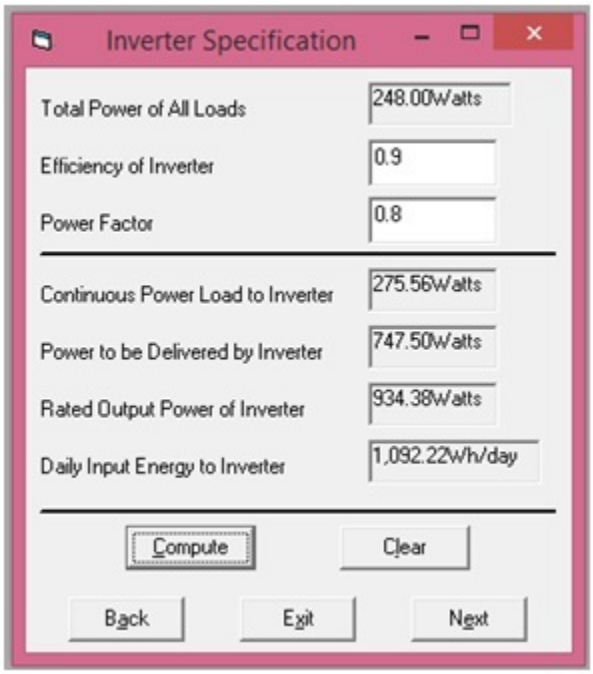

Figure 6. Inverter specification

The user then clicks on the Next button to navigate to the summary form shown in Figure 7.

IV. Results

A summary of results for components specifications is displayed when the user clicks on the 'Display Result' button on the summary form.

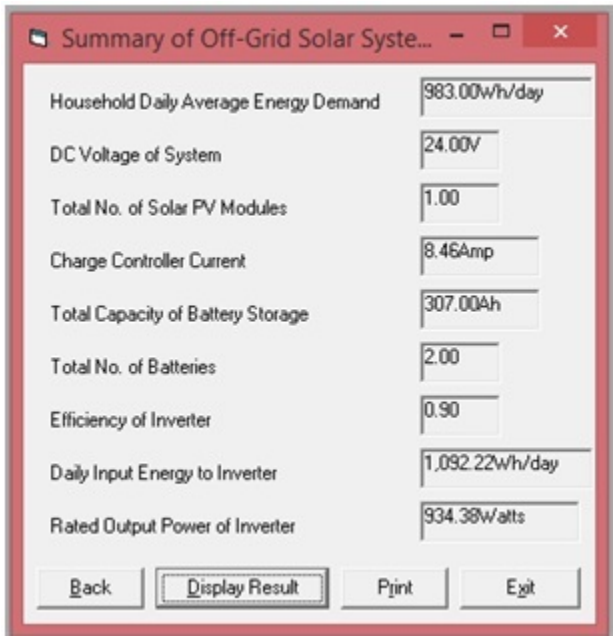

Figure 7. Summary of Off-grid solar PV system components specifications

V. Conclusion

The average solar radiation of Sapele town is enough to provide the energy requirement of a building in this area if it is efficiently tapped. Although the initial installation cost for this energy source is high, on the long run it is more economical and therefore, it is expedient for various governments to be involved in providing financial support for procurement and installation of PV system in order to make it a popular choice and propagate its use. The design of a off-grid solar system is time consuming and quite complicated as it involves the use of several variables and computations that are done manually. This paper therefore presents a simplified and shorter process of designing the off-grid solar PV system through the use of a more user friendly and dynamic computational approach.

Table 6. List of adapted variables with meanings and units

Serial	Variable	Meaning	Unit
1	ΣE	Daily energy demand	Watt-hour/day
2	E_{avg}	Daily average energy demand	Watt-hour/day
3	H_s	Average sun hours per day	hours/day
4	V_{dc}	DC voltage of system	Volts
5	P_{max}	Average maximum power	Watts
6	I_{dc}	DC current of system	Amperes
7	M_s	No. of modules in series	
8	M_p	No. of modules in parallel	
9	V_m	Rated voltage of module	Volts
10	I_m	Rated current of module	Amperes
11	M_T	Total no. of modules	
12	I_{cc}	Charge controller current	Amperes
13	F_s	Factor of safety	
14	E_{est}	Estimated energy storage	Watt-hour/day
15	A_d	Days of autonomy	

16	E_s	Safe energy storage	
17	D_d	Max allowable depth of discharge	
18	B_{TC}	Total capacity of battery storage	Ampere-hour
19	B_{TN}	Total no. of batteries	
20	B_C	Capacity of one battery	Ampere-hour
21	B_S	No. batteries in series	
22	B_P	No. of batteries in parallel	
23	V_i	DC voltage of one battery	Volts
24	P_T	Total power of all loads	Watt-hour/day
25	P_{IV}	Power delivered by inverter	Watts
26	P_r	Resistive loads (power)	Watts
27	P_i	Inductive loads (power)	Watts
28	P_{KVA}	Rated output power of inverter	Watts
29	PF	Power factor	
30	P_{T1}	Continuous power load to inverter	Watts
31	η_{IV}	Efficiency of inverter	
32	E_{IV}	Daily input energy to inverter	Watt-hour/day
33	I_B	Max continuous input current to inverter	Amperes

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Energy Audit of a Crumb Rubber Manufacturing Industry

(Case Study of Imoniyame Crumb Rubber Processing Factory Ughelli)

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Abstract- Crumb rubber production is an energy intense process that requires proper monitoring to avoid energy waste. Owing to the high cost of energy and its impact on production cost, an energy audit of Imoniyame Holdings Limited is necessary for production cost reduction and to remain relevant in a competitive environment. A one year energy audit of the plant was carried out. Detailed performance data were collected for the major energy consuming sections of the plant. These were the oven, production lines and the lighting sections. From the work, the energy consumed by the oven for the period of audit was 9,472.32GJ which was 53.6% of the total energy of 17,614.343GJ consumed for the period. The oven is therefore recognized as having the highest energy saving potentials. The specific energy consumption and the specific energy cost of the plant were 4.298MJ/kg and N13.87/kg of crumb rubber respectively. The heat losses through the stack can be recovered by the introduction of a heat exchanger between the stack and the circulating water. It was shown that when this is done, an annual savings of N3,204,929.56 will be made from the cost of diesel fuel. It was also ascertained that the specific energy consumption and the specific energy cost will be reduced to 3.99mJ/kg and N13.09/kg of crumb rubber respectively.

Index Terms- Energy audit; manufacturing processes; specific energy cost/consumption; energy saving potential; heating processes.

I. INTRODUCTION

Background of the study

The alarming high cost of energy has necessitated the need for a proper check of its usage. Although energy losses in plants or industrial processes are inevitable, there is need to reduce such losses. The inspection, survey and analysis of energy flow is significant in the conservation of energy in any industry. It has a direct effect on the overall cost of the product. This is a major aspect of interest to the management of a production plant. In addition to saving cost and remaining competitive, energy efficiency or conservation is also an essential step being currently taken towards overcoming the mounting problems of worldwide environmental pollution and global warming caused through the release of harmful emissions and green house gases into the atmosphere from industrial activities.

Demonstrating good environmental image will not only be required but will have a beneficial effect on a company's reputation, Lovetta (2002). All energy sources need to be used in ways that respect the atmosphere, human health and the environment as a whole. This is important because scientific data and a range of disastrous consequences such as change in rainfall patterns, melting of polar ice-caps, causing flooding and harming air quality. A number of studies on energy and environment have concluded that environmental degradation can be reduced by switching to cleaner fuels and reducing the energy intensity of economic activity by using best practices and best technology in both energy production and consumption, Utomo (2008).

Imoniyame Holdings Limited was founded in 1998 to produce crumb rubber (processed rubber), which is a major input in tyre manufacturing. The firm gets raw rubber lumps from plantation of small-holder farmers and processes them into crumb rubber for exports. Findings showed that the firm is exporting nearly 100% of its products to Bridgestone Tyre Company, one of the largest tyre companies in the world. Findings also revealed that in 2012, the firm spent about N80 million on energy. This huge amount, calls for proper energy investigation.

1.2 Importance of energy audit to production plant

According to Ughwumiakpor (2002), energy audit is important for the proper planning, operation and maintenance of production plants and processes. Managers need the result of such audit to take decision on which process out of competing numbers

that should be selected for use, bearing in mind the efficiency of energy utilization, environmental implications and process cost effectiveness.

Few factories have a precise idea of the energy consumption of different production areas and in the absence of a detail internal monitoring; the energy efficiencies of the different process operations are unknown. Knowledge of the energy consumption in the different areas of a factory is very important for several reasons and these are as follows:

(A) The cost of fuel has risen remarkably in recent years. Energy saving measures has therefore become inevitable. Apart from the more obvious improvements in the housekeeping aspects of factory practice, most effective savings are usually made in the high energy consuming area. This area can be highlighted by energy audit.
(B) If a new or modified production line is being proposed, the cost of energy required to run it is usually compared with cost of energy required to run the existing processes. It is only by having a detailed breakdown of fuel consumption in the different areas of a factory can such a comparison be made and this is provided by energy audit.
(C) If an operator wishes to compare his energy efficiency with that of a competitor in the same industrial sector, only by identifying the energy requirements of different operational areas of the factory can a satisfactory comparison be achieved. Without a detailed audit, it is not possible to achieve this.
(D) Energy audit gives industry-based management operation engineers and accountants a sound method of adopting fuel cost between different cost-centres.
(E) Factories take interest in energy audit in order to have an overview of the environmental impact, of their operations. It is essential to carry out a wide-ranging examination of the neighborhood and in some cases on the nation. Such audit is called environmental impact audit.

The energy consumer be it in industry or domestic sector has a responsibility of improving the way in which the energy is used. Energy audit will highlight the most energy-intensive items, or equipment of a plant or process. If correctly carried out, it should enable the energy manager to identify any inefficiency or wastage area that needs rectification. Significant savings will probably be made with comparatively low-capital investment, but on the long term the effectiveness of planning and forecasting of energy demand and prices will determine where future investment in new plants or modifications to existing equipment will be directed.

1.3 Statement of the problem

In view of the fact that environmental degradation and its negative effect on human health and the environment is a consequence of industrial waste and that the cost of the crumb rubber production is on the increase as a result of the high cost of energy, a stack heat recovering system which will reduce energy consumption and at same time reduce environmental pollution will be introduced.

1.4 Aim of the study

The aim of this study is to identify and evaluate opportunities that will reduce production cost through energy conservation and planning in a rubber crumb processing factory.

1.5 Objectives of the study

The objectives of the study are:

i. To determine types and sources of energy used.
ii. To identify areas of high-energy consumption by carefully examining the records of the energy consumption.
iii. To ascertain the specific energy cost and the specific energy consumption.
iv. To determine the efficiencies of major energy consumers like burners and to determine where the most significant energy saving potentials are.
v. To determine the amount of energy saved and the cost equivalent.
vi. To develop technical solution to reducing the energy losses identified.
vii. To carry out economic analysis of the selected solution.

1.6 Methodology of the study

The following methodology was adopted

i. Study of similar works done on crumb rubber either through available text, library and/or internet.
ii. A visit to the company (Imoniyame Holdings Limited Ughelli) to gather existing data of all energy systems and facilities.
iii. Discussion sessions were held with head and staff of various departments of the company in order to obtain relevant information concerning their operations and facilities.
iv. From the data collected, analysis was made to determine where the most significant energy saving potential could be found.
v. The major energy consuming systems were analyzed based on the first law of thermodynamics since this will account for all energy and materials input in terms of demand, utilization and losses.

1.7 Limitation of the study

Various limitations faced by researchers have direct effect on the actualization of the real goal of the research. One of the major limitations in the course of this study is the poor record keeping of the establishment. The period of one year audit could also be seen as insufficient for an elaborate energy audit report. However, the records were just for a period of one year.

Notwithstanding the limitation, the audit procedure developed could stand as standard of comparison for further energy performance evaluation of Imoniyame Holdings Limited Ughelli. It should be noted that the limitation identified above do not in any way invalidate the study. It is only fair to state that one was aware of the limitations.

II. LITERATURE REVIEW

2.1 Levels of energy audit

An energy audit is a systematic approach to problem solving and decision making. The primary goals of an energy audit are to qualify and quantify how the plant energy systems are performing. Energy audits vary in depths depending on the plant energy distribution system, the scope and capabilities offered by the energy auditor. There are three progressive levels or types of audit.

1. **Walk –Through Analysis/Preliminary Audit**

This is also called simple audit. It involves brief interviews with site operating personnel, a review of the facility's utility bills and other operating data. It is geared toward the identification of the potential for energy improvements, understanding the general plant configuration and defining the type and nature of energy systems. Usually, the walk-through audit report does not provide detailed recommendations, except for very visible projects or operational faults.

2. **Energy Survey and Analysis**

The energy survey and analysis starts with the findings from the walk-through analysis. It is done by evaluating the plant energy system in detail to define a variety of potential energy efficiency improvements. This study involves a detailed analysis of energy consumption to quantify base load, seasonal variation and effective costs.

3. **Detailed Analysis of Plant**

This is called the investment grade. Before making this level of investment, the plant management will want to have much more thorough and detailed understanding of the benefits, cost and performance expectations. A detailed audit will provide technical solution options and economic analysis for the factory management to decide project implementation or priority.

2.2 Energy audit in the production industry

Industrialization entails the manufacture of a great number of products in large quantities.

Invariably, energy is required among other inputs in the primary and auxiliary processes. Therefore energy audit of production plants entails a comprehensive examination of energy available, sources, inputs, usage and possible ways of converting wastage into useful forms with the overriding aim of reducing the production cost of a commodity from the plant. The renewed interest in energy audit gained its momentum as a result of economic, environmental and political changes in the last three decades. Before this time, low prices of available fuel and poor awareness of the limited qualities of fuel resources had created a lapse in the necessity for organized energy studies.

The industrialized world, notably United Kingdom and United States, picked overwhelming interest in energy audit and management, including conservation. After the 1973/74 fuel crises, when the United States of America had a fuel embargo, even though it lasted for one year, it made the Americans to start looking inward on the agreeable terms for conservation and audit that was to protect her from subsequent short-fall in fuel supply. Since then, several countries like Nigeria have seen the gains that could be realized from such a practice.

Some energy audits done earlier on production plants were done by simply cost-evaluating the plant material flows or by the use of "crude" arithmetic procedures which do not give insight to the efficiency of the system operations or ways of improving them largely because they were carried out by analysts who were not devoted to the engineering concerns. A good example is the resource cost audit which expresses everything in monetary terms. Its limitation is that energy and materials cost world-wide is not uniform. Also, it cannot explain the extent to which machines and operations are efficient.

A detailed overview of an industrial energy audit approach is shown in Fig. 2.1 by Ali, (2010). In this lay-out, a step by step approach on how to carry out energy audit is shown.

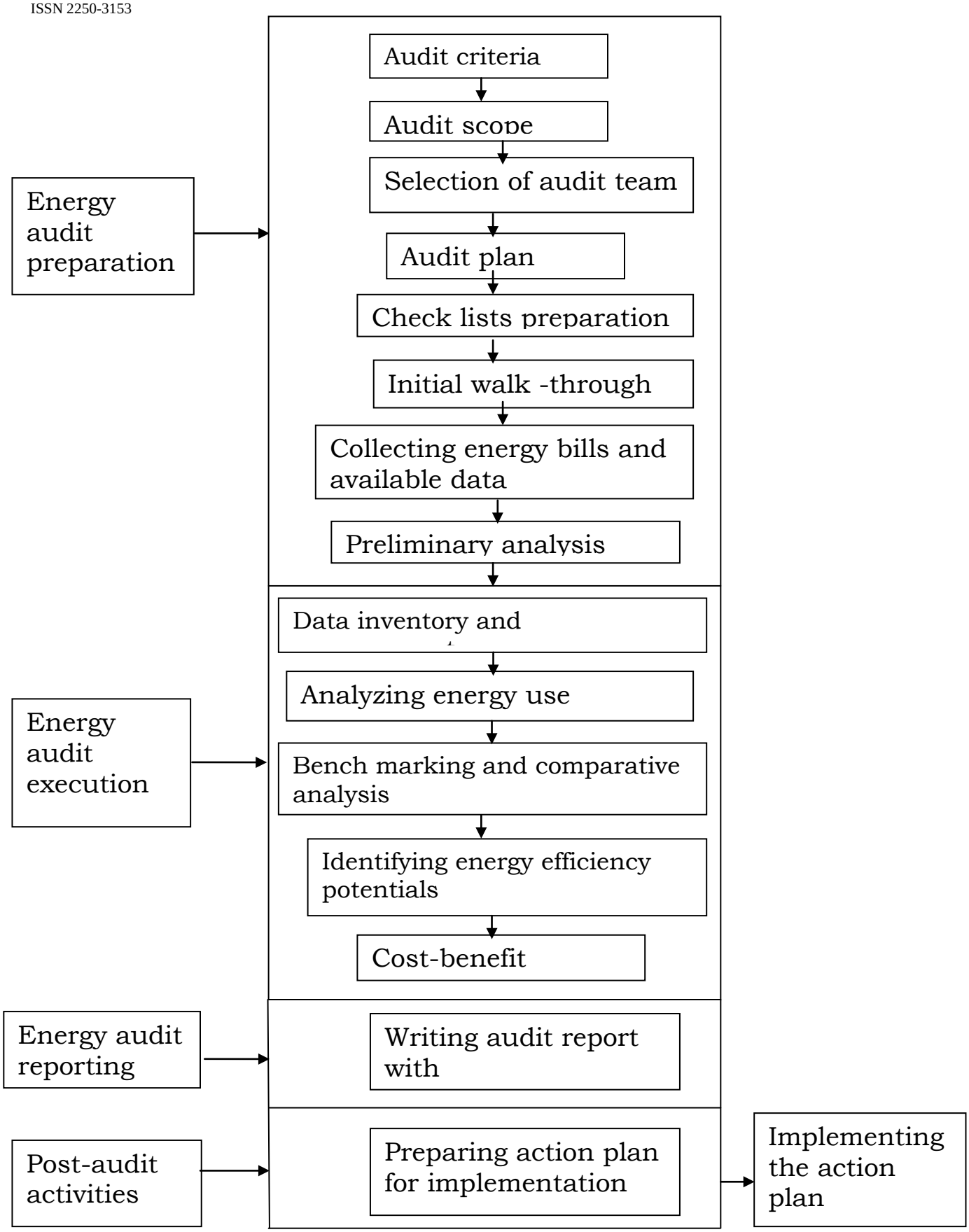

Fig. 2.1 Overview of an industrial energy audit

According to Aiyedun and Ologunye (2001), in an energy audit work in the food industry, with Cadbury Nigeria PLC as case study, it was noted that for many industries, the cost of energy consumed is a major factor in the operation cost and must be closely monitored and reduced to a possible minimum in order to improve profitability and competitiveness. In their work, data was collected for a five-year period (1994-1998) and various energy performance parameters were used in analyzing the data. Data collected included annual electricity bills, fuel oil and water consumption and annual production over the period of 5 years.

The intensity of energy was defined as the ratio of the energy consumed per year in GJ to the floor area of the factory in square meters. The treated floor area of Cadbury Nigeria PLC was estimated to be 22,294.55m^2. The normalized performance indicator (NPI) was defined as:

$$NPI = \frac{\text{Total energy consumed}}{\text{Floor Area}} \times \text{hours of use factor}. \qquad \text{…….. (2.1)}$$

The normalized performance indicator is a parameter used in assessing the energy performance of a factory. The value of NPI obtained for a factory is usually compared with standard NPI values quoted by the energy efficiency office (EEO) for such a factory. The NPI value calculated for the five-year period gave an average of 1.16GJ/m^2. This was rated as “fair” for the factory, meaning that significant savings and improvement in energy usage is still achievable. The average cost of energy input per kg of product was estimated as N4.96/kg. The highest value of N6.09/kg in 1995 was attributed to the wastages and lack of cost consciousness.

According to Agbro (2007), in an energy audit of a glass factory (Beta Glass PLC-Delta Plant), it was established that to produce one ton of glass in the plant, about 10.89GJ of energy is required at a cost of N5,343. It was revealed in the work that some glass plants around the world use as low as 7.5GJ of energy to produce a ton of glass. It was noted that about 52.55% of the total energy input to the plant and about 84.52% of the total energy input to the manufacturing process was consumed in the furnace. The work showed that the furnace was the most energy intensive unit in the plant and also holds the greatest energy saving potential in the plant. The unit energy consumption of the furnace was estimated at 5.78GJ per ton of glass. This according to the work competes favourably with what is obtainable in some present day furnaces.

In another energy audit work carried out by Clarke and Wilson (1993), study was made on the energy required to produce a wide range of major industrial goods. In their work, result of two energy audits in the engineering sector, food can manufacture and construction machinery (an earth moving grader) were highlighted. For food cans, the study shows a process well optimized in terms of energy consumption with little prospect of significant future reduction in the energy required for their production. For the grader, improvements were shown to be possible both from modification to the process which would directly reduce the energy needed, and at the design stage where the materials needed in the finished products are determined.

In the audit study, the energy used directly and indirectly in each step of the manufacture was considered. The direct energy used is the fuel and electricity attributable to the production of the product. The indirect energy use include the energy which has to be used to provide the materials used as well as the other goods and services needed for the manufacture of the product. The overall energy requirement for making a product is the gross energy requirement (GER) while the energy used within the factory walls is the process energy requirement (PER). These are expressed as energy requirements per unit of product and are often expressed in terms of Giga Joules per tonne of product.

2.3 Energy audit methods

Basically, the two scientific approaches to energy audit of production plants are the first and second laws of thermodynamic method of audit and each of them gives efficiency of plant operation by quantifying the energy together with it’s utilization factor at every point in the flow process. These methods are followed because of their detailed and informative scientific backgrounds.

2.3.1 Material-energy balance method.

This method is also called input and output method of audit, and is based on the first law of thermodynamics and its corollaries. The first law is a law of conservation of energy and mass and states that neither energy nor mass can be destroyed, but that it could be changed from one form to another. For example chemical energy in fuel can be changed to mechanical, electrical, heat and light while mass can be changed from solid to liquid to gas.

The first law method of audit monitors in details material and energy flows right from the initial raw material and energy input to the final product. Arbitrary boundaries are set up between the plant and the surroundings to obtain thermodynamic state of the system under consideration. The whole plant is apportioned into units and the units are similarly divided into simple operation units to facilitate a thorough audit. From the analysis, the efficiencies of major process operations are calculated. The direction and modes of heat gains and losses from the units are calculated so that optimal consequences of the application of heat conserving measures may be derived. Thus the method provides a comprehensive audit of energy input, utilization and output.

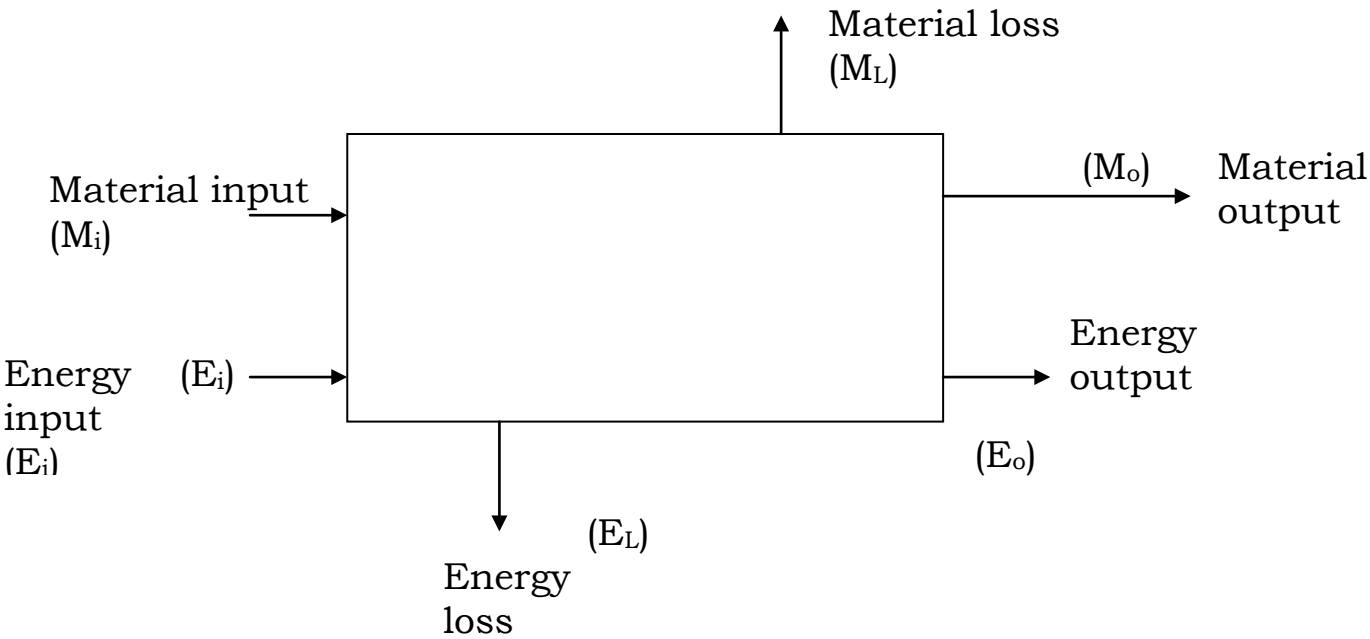

Fig. 2.2 A simple industrial mass-energy flow process

2.3.2 Available work (exergy) method

Availability of energy or exergy is a measure of the maximum reversible work transfer that can be realized when taking a fluid at any state P_1 and T_I from its given state to a "ground" or "dead" state which is at the lowest energy potential, and in which it is in thermal and mechanical equilibrium with the environment. The ground state may be defined by:

$P = P_0$, $T = T_0$, $Z = Z_0$ and $u = o$.

The above definition is based on the second law of thermodynamics. Energy audit analysis carried out based on the second law, calculates the grade of energy required at each process in terms of available energy. It usually encompasses heat and material balance for the process but extends to include entropy changes and the attendant losses to available energy.

For a non flow process, availability or exergy:
$= (U-U_o) + P_o (V-V_o) - T_o (S-S_o)$ - - - - - 2.3
$= (U + P_oV - T_oS) - (U_o + P_oV_o - T_oS_o) = A - A_o$ - - - 2.4
The property $A = U + P_oV - T_oS$ is called the non-flow exergy function.

For a steady flow process,
Availability or exergy $= (H - T_oS) - (H_o - T_oS_o) = B - B_o$ - (2.5)
The property B = H – ToS is called the steady flow exergy function. In the above equation,
$U - U_o$ = change in internal energy
$S - S_o$ = change in entropy
$V - V_o$ = change in volume
$H - H_o$ = change in enthalpy.

2.3.3 Adoption of the method of audit

The material – energy balance method serves as a spring board for the available work method. The material –energy balance method gives the amount of material and energy at a specific plant unit while the available work method gives the effectiveness of the various processes in the units. It is thus clear that the two methods compliment each other. A combination of the two methods facilitates realistic and practical results. Owing to the challenges of obtaining all the input data required for the application of the second law method of audit and the fact that there has not been any major energy audit project on the plant under study, this audit will be based on the first law of thermodynamics, that is the material – energy balance method. However, the availability method will also be incorporated where it is found necessary.

2.4 Crumb rubber production in nigeria

According to National Rubber Association of Nigeria (2002), rubber production has been on the downward trend in recent times, falling from 113, 479 tpa (tons per annum) before the advent of crude oil to 46,000 tpa in 2004. The industry witnessed exit of

major players between 2000 and 2001, when international rubber prices crashed to as low as $50 per ton. Reasons for consistent lower production in the industry ranged from low yield in plantations, dwindling international rubber prices to volatility of oil prices and energy challenges. Shortages in supply of rubber from rubber trees further increases the pressure on the industry. Raw materials, which are the lumps from rubber trees are in short supply because most of the trees were planted in the 1960s and they have a life cycle of about 30years.

2.5 Crumb rubber production process

There are four production lines in Imoniyame Holdings Limited Ughelli (IHL). The four production lines are independent of each other but operate basically with the same principle. Each of the lines is divided into two sections, wet end and dry end. The natural rubber latex tapped from rubber plantations are processed from the wet end to the dry end with the aid of electric motor driven conveyor belts and chains.

2.5.1 Wet end procedure

The scaled and bought rubbers from customers are conveyed into a soaking pool by belt. This helps to remove initial dirt like sand attached to the rubber. There is a stirrer in the pool ensuring that dirt is partially separated from the rubber. Processes under the wet end are as follows:

(A) **Slab cutting machine**

The rubbers from the soaking pool are transferred into slab cutting machine with the aid of a conveyor belt. The machine cuts the rubber in pieces before they are transferred into a braker. The pieces of rubber are transferred into a pre-cleaning pool. Thereafter, the stirred pieces of rubber are transferred to a braker for further reduction of size.

(B) **Hammer mill**

The hammer mill is separated from each other by a pre cleaning pool and a conveyor belt. The hammer will reduce the rubber latex further to ensure dirts are not trapped in between latex. After a thorough hammering, the rubber latex is conveyed to the creeper with a chain bucket.

(C) **Creeping machine**

Like the hammer mill, the creeping machines are ten in number. They are usually referred to as CP1 to CP10. There is a shredder between CP4 and CP5 and a bank pool (BP1) between CP8 and CP9. There is also a bank pool (BP2) between CP10 and the second shredder. This arrangement is necessary for a perfect and a dirt-free crumb rubber production.

(D) **Shredding mill**

After the creeping process that takes place from CP1 to CP4, the rubber latex is passed through a shredder mill. There are two shredder mills, namely SM1 and SM2. The shredder reduces the rubber to a finer particle. This is usually the last stage of dirt screening. SM1 reduces the rubber latex to a fine particle that will be creeped in CP5 to CP8 before they will be stored in the first bank pool (BP1). After much stirring, the materials are then conveyed to CP9 and CP10 for further creep actions. From CP10, the materials are conveyed to the second bank pool (BP2). The materials are passed to SM2 for the final shredding process. This marks the end of the wet end process.

2.5.2 Dry end procedure.

The materials from the wet end are transferred to the suction pump which is the first stage of the dry end procedure. It is then transferred to the drying section through a trolley system. Some of the dry end procedures are:

(A) **Burner chambers.**

The burners G2 and G4, usually attached to the oven are arranged in series. The materials are passed to the oven whose temperature is regulated to 115^0C and stay there for about 15 minutes. The dried, hot materials are then transferred to a cooling section. The cooling fan blows off the heat contained in the materials. A huge amount of heat energy is released to the atmosphere through the stack each time the oven is open for the trolley to feed in materials.

(B) **Finishing section**

The compressed material is then passed through a metal detector machine (MDM). 36 baled bags of 35kg each make up a crate or pallet. A sample of the finished products is taken to the laboratory for testing to ensure that world and demand standard of Standard Indonesia Rubber (SIR) is met before packaging for shipment. The entire production process is summarized in a schematic diagram shown in Fig. 2.3

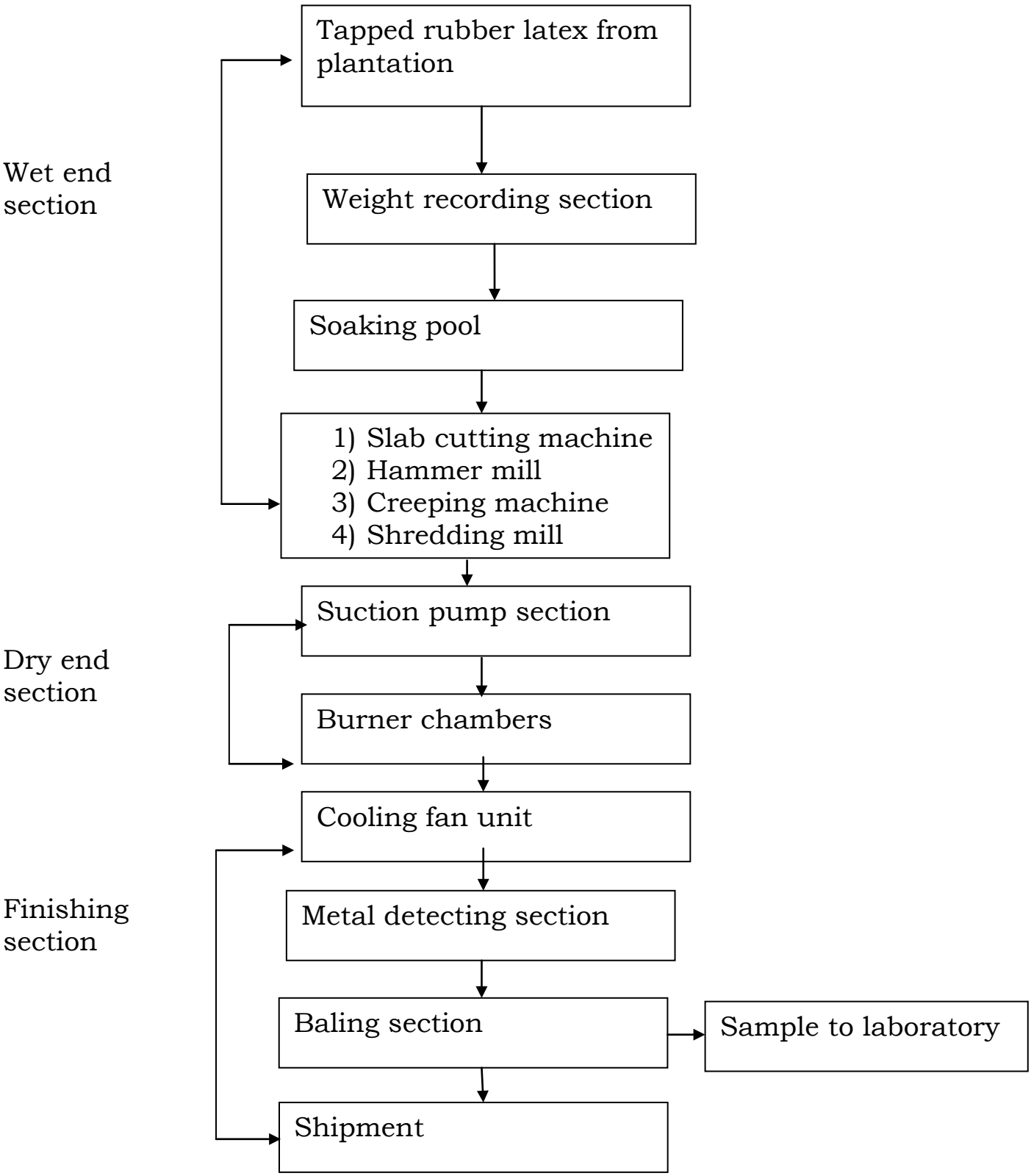

Fig 2.3 Schematics of crumb rubber production process

2.6 Laboratory test of crumb rubber

Before a produced crumb rubber is packaged for delivery, various tests are carried out to ensure quality control quality assurance, customers' requirement and world rubber standards are met. The main tests are as follows:

(A) Determination of ash content:

Ash from the oxidation of natural rubber represents a minimal figure for the amount of mineral matter comprising potassium, magnesium, calcium and sodium and the trace elements in the rubber. To determine the ash content of a lot Specified Singapore Rubber (SSR), a test portion of 5-10g is cut from the homogenized piece and weighed to the nearest 0.1mg. It is placed in a crucible which has previously been weighed and then put in a muffle furnace of temperature 550 $\pm$ 20^{0}C and the door closed. When ashing is complete, the crucible is cooled in desiccators and weighed to the nearest 0.1mg to conform to the grade for which the rubber has been tested.

(B) Determination of volatile matter:

Volatile matter in natural rubber consists primarily of moisture but includes any other materials volatile to 100^{0}C. Excessive moisture results in mould growth and malodour during storage and shipment. To determine volatile matter, a test portion of approximately 10g is weighed to the nearest 1mg. It is sheeted out to 2mm and then dried at 100 $\pm$ 30^{0}C for four hours until the loss in weight on successive weighings after heating periods of 30 minutes is less than 1mg.

(C) Determination of nitrogen

Nitrogen occurs in natural rubber usually as a protein and the determination is therefore to provide an estimate of the protein content in the lot of SSR being tested. The process used is a semi-micro procedure where in the rubber is oxidized by heating a mixture of potassium sulphate and converting sulphuric acid, together with a catalyst, thereby converting nitrogen compounds into ammonia hydrogen sulphate, from which the ammonia is removed by distillation after making the solution alkaline. The liberated ammonia is absorbed in boric acid solution and titrated with standard acid.

(D) Determination of plasticity retention index

The plasticity retention index (PRI) is a measure of resistance of raw material rubber to oxidation. A high resistance to oxidation is shown as a high value of the index. The test includes measurement of the rapid plasticity of the rubber test pieces before and after heating in an oven. The rapid plasticity is measure in the Wallace rapid plastimeter and heating is carried out on punched test pellets for 30 mins at 1400^{0}C. Laboratory technicians measure the rapid plasticity of heated pellets on the Wallace rapid plastimeter.

(E) Determination of dirt content

One of the major criteria of SSR is the dirt content of any lot. To determine this, a homogenized test portion of 10-20g is cut into 1g pieces and dissolved in xylene or white spirit to which is added a peptizing agent. When the rubber is completely dissolved, the solution is poured through a sieve and the trapped dirt weighed. The dirt content is expressed as a percentage of the test piece.

III. METHODOLOGY

3.1 Sources of energy

The energy consumed in the plant, comes from two main sources: The Diesel fuel and Benin Electricity Distribution Company (BEDC). The diesel fuel is used for the running of two standby diesel generators (Cater-Pillar, 3512 generator set) and two burners Grade 2 (2G) and Grade 4 (4G) attached to the oven. When there is BEDC supply, the plant runs wholly on it except for the burners that uses diesel always.

3.2 Procedure for energy data collection

The monthly electrical energy consumption is measured in kWh in a central meter. The rating in cost per kWh for each month was also taken from the meter. Since there were no sub meters, the central meter billing was used for the entire plant. Also stated in the bill are the fixed charge and the value added tax (VAT). The collection of the readings was achieved using the following equations.

Cost = Reading (kWh) x cost per kWh - - - - 3.1

VAT = 5% (cost + fixed charge) - - - - - 3.2

Total monthly cost = cost + fixed charge + VAT - - 3.3

Diesel consumed was read from stored tank record. The tank is calibrated in cm. 1cm equivalent is 112 litres. The cost per litre for the period of audit is N105.00. Since there were no sub-meters indicating quantity of diesel consumed by each burner and the generator, the records were then taken from the stored tank.

Mass of diesel (kg) = Volume (litres) x specific gravity of fuel…….3.4

3.3 Crumb rubber production

The monthly production records were collected from the production section. The monthly production are shown in Table 3.1

Table 3.1: Monthly production output

Month (2014)	Production output (Metrictonne)
Jan-14	839.825
Feb-14	719.075
Mar-14	733.145
Apr-14	350.665
May-14	304.255
Jun-14	81.235
Jul-14	202.044
Aug-14	183.680
Sept-14	145.880
Oct-14	159.005
Nov-14	166.565
Dec-14	219.100
Total	4,104.474

3.4 Production period

From the information gathered from the records keeping sections, it was clear that operation/production were not done on Sundays. This audit will therefore be based on an average of 26days in a month. The numbers of working days for the period of audit are shown in Table 3.2.

Table 3.2: Number of days in each month of 2014

Month (2014)	No of Sundays	Other days
JAN-14	4	27
FEB-14	4	24
MAR-14	5	26
APR-14	4	26
MAY-14	4	27
JUN-14	5	25
JUL-14	4	27
AUG-14	5	26
SEPT-14	4	26
OCT-14	4	27
NOV-14	5	25
DEC-14	4	27
	52	313

$$\frac{313}{12} = 26.083333 \approx 26$$

3.5 Oven energy efficiency evaluation

The basic idea is that, if an oven is operating steadily, the mass flowing out of the oven is equal to the mass flowing into the oven. Similarly, the energy in is equal to the energy flowing out. These balances are dependent on the assumption of steady operation, so that the accumulation of mass and energy inside the oven can be neglected. It is understood however, that an operating industrial oven/furnace does not operate under perfectly steady conditions. In an energy assessment, the steady-state idealization is more accurate when applied to a long-term average of oven operation, rather than to the instantaneous operation.

From the operating records, 420kg of crumb rubber are passed through the oven in 15mins. The inlet temperature of the crumb rubber into the oven is ambient temperature averaged at 27^0C. Also, the temperature of the burner is regulated to 115^0C.

$Q_{CR} = M_{CR} \times Cp_{CR} \times (t_2 - t_1)$ - - - - - - -(3.5)

Where:
Q_{CR}= Quantity of heat received by crumb rubber.
M_{CR}= Mass flow rate of crumb rubber,
Cp_{CR}= Specific heat capacity of natural rubber latex.
t_1 = Crumb rubber inlet temperature.
t_2= Oven/crumb rubber outlet temperature.
M_{CR} = 420 kg/15 mins = 0.4667 kg/s.
Cp_{CR}= 1880 J/kg ^{0}C = specific heat capacity of natural rubber
Q_{CR} = 0.4667 × 1880 × (115-27)
Q_{CR} = 77,210.848 J/s
Heat content or heat received by crumb rubber is 77,210.848J/s.

Also, heat supplied by oven = $M_f \times$ GCV, where M_f = mass of fuel, GCV = Gross calorific value of fuel. From Table 3.9, the burner's consumption rating is 11kg/h.

$$\text{Oven Efficiency} = \frac{\text{Heat received by crumb rubber}}{\text{Heat Supplied by oven}} \quad - \quad - \quad 3.6$$

$$= \frac{M_{CR} Cp_{CR} (t_2 - t_1)}{M_f \times GCV}$$

$$= \frac{77210.848}{11/3600 \times 46 \times 10^6}$$

= 0.54.93

Oven Efficiency = 54.93%

From the oven efficiency result evaluated, the amount of useful energy by the oven is 54.93% of the total energy supplied to the oven (i.e, 9, 472.32 GJ).

$$\text{Useful energy by oven} = \frac{54.93}{100} \times 9{,}472.32$$

= 5,203.145GJ

$$\text{Lost energy by oven} = \frac{45.07}{100} \times \frac{9{,}472.32}{1}$$

= 4, 269. 175GJ

These losses may be attributed to wall losses, opening losses, stack heat losses etc.

3.5.1 **Wall Losses (Q_{wa})**

An infra-red thermometer was used to measure the outer surface temperature of the various sections of the oven in order to calculate the heat losses through these sections. The temperature measurements were taken at about five points in each location and the average was computed.

The quantity of heat, Q released from the wall of a heating oven/furnace can be calculated using the formulae, Trinks and Mawhinnet (1967).

$$Q = ax\,(t_1 - t_2)^{5/4} + 4.88\,E\left[\left(\frac{t_1 + 273}{100}\right)^4 - \left(\frac{t_2 + 273}{100}\right)^4\right] \quad \text{……..3.7}$$

Where:
Q = Quantity of heat released (kcal/m^{2}h)
a = factor regarding direction of the surface of natural convection.

For top (crown), a = 2.8, side wall, a = 2.8. For bottom (hearth), a = 1.5.
t_1 = Temperature of external wall surface of oven [^{0}C].
t_2 = Temperature of air around the oven [^{0}C].
E = Emissivity of external wall surface of oven.
Fig 3.1 Shows the size of the oven under investigation.

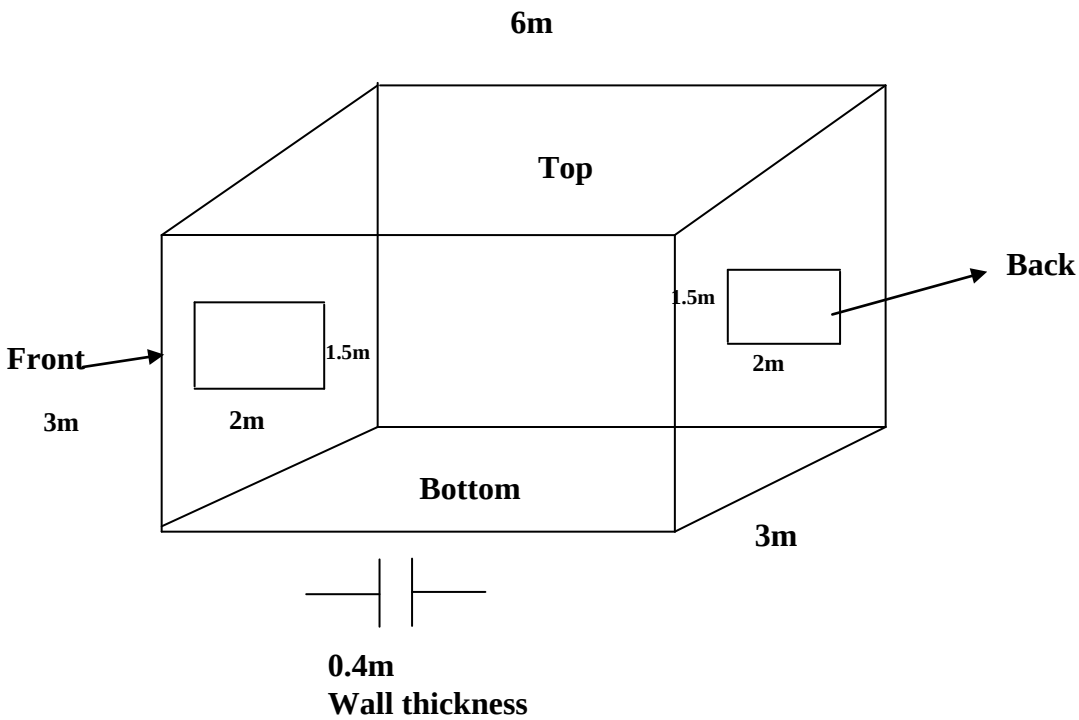

Fig. 3.1: Dimension of IHL oven
For top, $t_1 = 80^0$C, $t_2 = 35^0$C, E = 0.8, a = 2.8

$$Q_{Top} = 2.8(80 - 35)^{1.25} + 4.88 \times 0.8\left[\left(\frac{80+273}{100}\right)^4 - \left(\frac{35+273}{100}\right)^4\right]$$

$$Q_{Top}\ 326.343 + 3.904(155.274 - 89.992)$$

$$Q_{Top} = 326.343 + 254.861 = 581.204\ \text{kcal/m}^2\text{h}$$

$$\text{but}\ 1\,\text{kcal} = 4.184\,\text{kJ}$$

$$1\,\text{kcal/h} = 4.184\text{kJ/h} = \frac{4.184}{3600}\text{kW}$$

$$\therefore\ 1\,\text{kcal/h} = 1.162222 \times 10^{-3}\ \text{kW}$$

$$\therefore\ Q_{Top} = 0.6755\text{kW/m}^2$$

For side wall, $t_1 = 80^0$C, $t_2 = 35^0$C, E = 0.8 and a = 2.8. There are two sides with same dimension as the top. Therefore, the heat lost through side is twice that lost through top.

$$\text{Qside} = 2 \times 0.6755\,\text{kW/m}^2$$

$$= 1.351\,\text{kW/m}^2$$

For front & back, $t_1 = 80^0C$ $t_2 = 35^0C$, E = 0.8 and a = 2.8.

$$Q_{f\ ront} = 2.8\,(80-3)^{1.25} + 4.88 \times 0.8 \left[\left(\frac{80+273}{100} \right)^4 - \left(\frac{35+273}{100} \right)^4 \right]$$

$$Q_{f\ ront} = 326.343 + 254.861 = 581.204\ \text{kcal/m}^2\text{h}$$

$$Q_{front} = 0.6755\text{kW/m}^2$$

$$\text{But } Q_{front} = Q_{Back} = 0.6755\text{kW/m}^2$$

$$Q_{Bottom} = 1.5\,(80-35)^{1.25} + 4.88 \times 0.8 \left[\left(\frac{80+273}{100} \right)^4 - \left(\frac{35+273}{100} \right)^4 \right]$$

$$Q_{Bottom} = 174.826 + 3.904\,(155.274 - 89.992)$$

$$Q_{Bottom} = 429.687\ \text{kcal/m}^2\text{h}$$

$$Q_{Bottom} = 0.49939\ \text{kW/m}^2$$

Table 3.3 shows the summary of oven wall losses.

Table 3.3: Estimation of oven wall losses

Location	**Area (m^2)**	**Heat flux (kW/m^2)**	**Heat loss (kW)**
Top	18	0.6755	12.159
Sides (2)	18	1.3510	24.318
Front	9	0.6755	6.080
Back	9	0.6755	6.080
Bottom	18	0.4994	8.989
			57.626

It should be noted that the production crew operates on two shift of 12 hours per shift with a break of 2 hours in between shift. That makes the total working hours per day to be twenty hours (20hrs/day).

Heat losses through the walls = 57.626 kW $\times$ 12 months
$\times$ 26 days $\times$ 20 hrs $\times$ 60 mins $\times$ 60 secs.
Heat losses through the walls = 1, 294.51 GJ

3.5.2 **Radiation (opening) losses**

The heat loss from an opening (in kcal/hr) can be calculated using the formula

$$Q = 488 \left(T/100 \right)^4 \times a \times A,$$ Trinks and Mawhinent (1967). - 3.8

Where: T = Absolute temperature (K)
A = Areas of opening (m^2)
a = Factor for total radiation.

See attached graph by Trinks and Mawhinnet (1967) for the estimation of factor of total radiation for various opening shapes. It depends on the ratio of the diameter or least width to the thickness of wall.

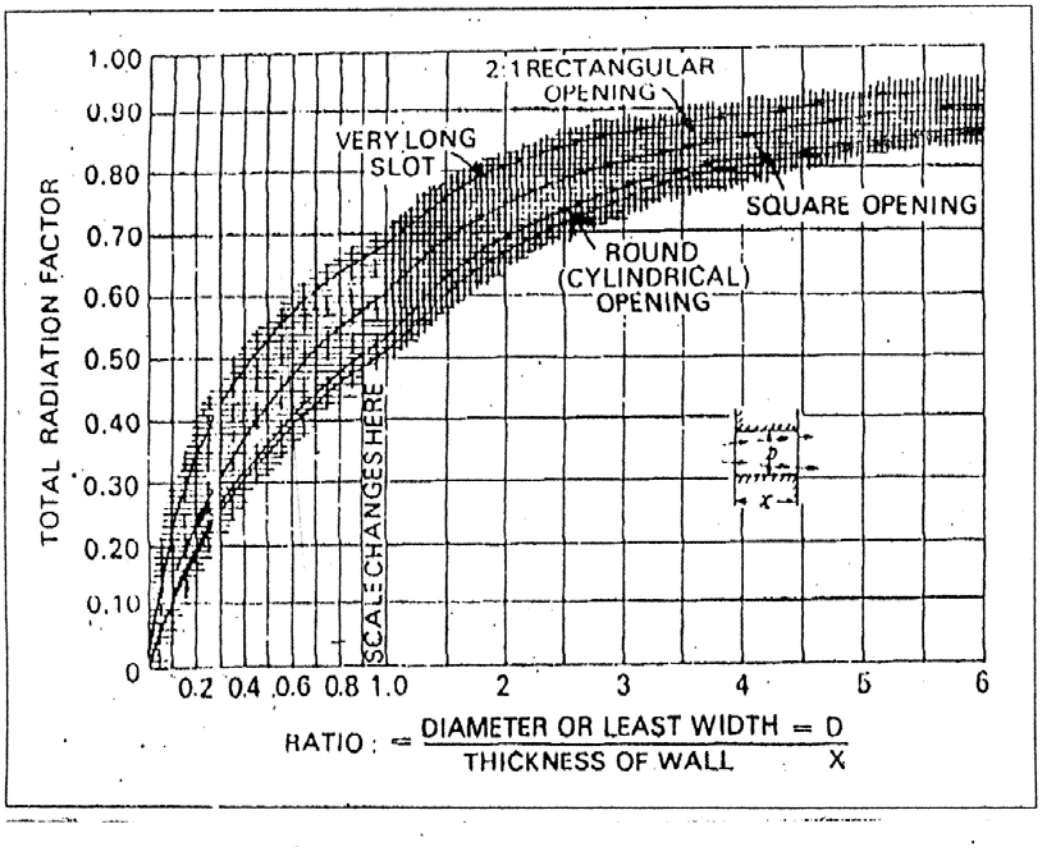

Fig. 3.2: Graph for estimation of factor of total radiation**.**

$$\frac{\text{Diameter}}{\text{Thickness of wall}} = \frac{D}{x} = \frac{2}{0.4} = 5$$

Ratio = - - - - 3.9

For a rectangular opening, the total radiation factor, a corresponding to a ratio of 5 is 0.85. See attached graph. The average temperature of the oven, t = 115^0C (388.15k)

Area of opening = 1.5 × 2 = $3m^2$.

$$Q = 2\left[488\left(\frac{388.15}{100}\right)^4 \times 0.85 \times 3\right]$$ for inlet and outlet.

Q = 11.2274kW

But opening is made every quarter of an hour

:. Q = 2.8069kW.

Therefore, the heat losses due to opening for the period of audit are estimated to be:

Q = 2.8069 × (12month × 26 days × 20 hrs × 60min × 60sec)

Q = 63.054GJ

3.5.3 **Stack heat losses of oven**

A significant amount of heat is lost through the stack, providing an opportunity to further improve the process efficiency. The heat lost via the stack is calculated as:

$$Q_{stack} = M_{product}\ Cp_{stack\ gases}\ (\Delta T)_{stack} \quad - \quad - \quad - \quad - \quad 3.10$$

where: $M_{product}$ = mass flow rate of stack gases

$Cp_{stack\ gases}$ = Specific heat capacity of stack gases

ΔT = stack temperature difference.

The stack gases mass flow rate could be evaluated from the combustion analysis of diesel fuel using air as the oxidant. This could be achieved as follows:

(a) **Combustion analysis of diesel fuel**

The average chemical formula for diesel fuel is $C_{12}H_{23}$. The chemical equation for the stoichiometric combustion of diesel using oxygen as the oxidant is,

$$4\,C_{12}\,H_{23} + 710_2 \rightarrow 48\,CO_2 + 46H_2o$$

Stoichiometric Air/Fuel Ratio (SAFR) = $\dfrac{\text{Mass flow rate of air}}{\text{Mass flow rate of diesel}}$ …….3.11

For gravimetric analysis, the percentage composition of oxygen by mass is 23.3% while Nitrogen is 76.7%.

Mass of oxygen = 71 (32) = 2, 272kg.

Mass of air = $\dfrac{2,272}{0.233} = 9,751.073\text{kg}$

Mass of diesel = 4 (12 × 12 + 23 × 1) = 668kg

$$\therefore \text{SAFR} = \frac{\text{Mass flow rate of air}}{\text{Mass flow rate of diesel}} = \frac{9,751.073}{668} = 14.5974$$

Now, assuming an Actual Air/Fuel Ratio of 20,

AAFR = $\dfrac{\text{Mass flow rate of air}}{\text{Mass flow rate of diesel}} = 20$

but mass flow rate of diesel = $\dfrac{\text{mass of diesel consumed}}{\text{oven firing time}}$ - 3.12

Mass flow rate of diesel = $\dfrac{319,328.8}{12 \times 26 \times 20 \times 3600}$ = 0.014215 kg/s

:. Mass flow rate of air = 20 × mass flow rate of diesel

= 20 × 0.014215

= 0.2843kg/s

But mass flow rate of stack gases (product) = mass flow rate of diesel + mass flow rate of air

= 0.014215 + 0.2843

= 0.298515kg/s

The equation for the combustion of diesel using air as the oxidant is,

$$4\,C_{12}\,H_{23} + 71\left(0_2 + {}^{79}\!/_{21}\,N_2\right) \rightarrow 48CO_2 + 46\,H_2\,0 + 71\left(\frac{79}{21}\right)N_2$$

For 1 kmol of diesel, the equation becomes

$$C_{12}\,H_{23} + 71/4\left(0_2 + 79/21\,N_2\right) \rightarrow 12CO_2 + 23/2\,H_2 0 + 71/4\left(\frac{79}{21}\right)N_2$$

Where oxygen is 21% by volume in air and nitrogen is 79% volume in air.
For an actual air/fuel ratio (AAFR) earlier assumed,

$$\frac{AAFR}{SAFR} = \frac{20}{14.5974} = 1.3701$$

$$C_{12}\,H_{23} + 1.3701\left(71/4\right)\left[O_2 + \frac{79}{21}N_2\right]$$

$$\rightarrow 12\ CO_2 + 23/2\ H_2O + 1.3701\left(\frac{71}{4}\right)O_2 + 1.3701\left(\frac{71}{4}\right)\left(\frac{79}{21}\right)N_2$$

(b) **Production analysis**

Table 3.4 shows the combustion products analysis for the determination of the specific heat capacity of the stack gases.

Table 3.4: Combustion products analysis

Consistent	**Mass of products (kg) per kmol of fuel (diesel)**	$\frac{m_i}{\sum m_i}$
Co_2	528	0.1296
H_2o	207	0.0508
O_2	778.2168	0.1910
N_2	2,561.6303	0.6286
	4,074.8471	1.000

$$Cp_{stack} = \frac{Mass\ of\ CO_2}{\sum m_i} Cp_{Co_2} + \frac{Mass\ of\ H_2O}{\sum m_i} Cp\ H_2O +$$

$$\frac{Mass\ of\ O_2}{\sum m_i} CpO_2 + \frac{mass\ of\ N_2}{\sum m_i} Cp_{N2} \qquad - \quad - \quad 3.13$$

The stack mean temperature = $\frac{(27+273.15)+(115+273.15)}{2}$

$= 344.15k$

The specific heat capacity of the products of combustion taken at the stack mean temperature of 344.15K from thermodynamic properties table is as follows. This is interpolated between 325K and 350K.

$$\frac{350\ -\ 325}{344.15 - 325} = \frac{unknow\ -L}{F\ -L}$$

Unknown = 0.766 (F – L) + L

Where L = Last reading, F = First reading. This is shown on Table 3.5.

Table 3.5: Specific heat capacity (Cp_s) of combustion products at stack mean temperature

Product	**Cp_s at 350K**	**Cp_sat stack mean Temp (344.15K)**	**Cp_sat 325K**
Co_2	0.895	0.889	0.871
H_2O	1.880	1.878	1.871
O_2	0.928	0.927	0.923

N_2	1.0407	1.0407	1.040

$$\therefore Cp_{stack} = (0.1296)(0.889) + (0.0508)(1.878) + (0.1910)(0.927) + (0.6286)(1.0407)$$

$$Cp_{stack} = 1.0419 kJ/kgK$$

$$\therefore Q_{stack} = M_{product} \times Cp_{stack} \times \Delta T$$

= 0.2985 × 1.0419 × (115 – 27)
= 27. 37kW

Heat lost through = 27.37 × 12 × 26 × 20 × 3600
Stack for the period of audit
≫ = 614.84GJ

3.6 Energy saving opportunities

For improvement of the plant energy utilization and conservation, different fuel economy measures can be employed. Some of these measures are:

1. Control of furnace/oven draught.
2. Installing more efficient burners.
3. Proper heat distribution inside oven.
4. Improved oven insulation.
5. Reducing heat losses from oven opening.

3.6.1 Maximum heat recoverable from stack

The gases leaving the stack are at a high temperature and therefore high enthalpy. The gases lost to the atmosphere represent a huge loss of energy. Some of this energy can be recovered by passing the hot gases from the stack through a heat exchanger where the heat transferred from the gases will be used to raise the temperature of the pool circulating water for effective wash of the crumb rubber.

Assuming a heat exchanger effectiveness (Thermal ratio) of 0.75 is introduced between the circulating pool water and the stack, then these savings will be made.

$$E = \frac{\text{Temperature rise in ciruclating water}}{\text{Max temperature difference available}} \quad - \quad - \quad - \quad - \quad - \quad 3.14$$

$$E = \frac{Tw_2 - Tw_1}{Tstack - Tw_1}$$

Where: E = Thermal ratio, assumed to be = 0.75
Tw_2= Temperature of circulating pool water after heat exchanger.
Tw_1= Temperature of water before heat exchanger measured to be 16^0C.
Tstack = Temperature of the stack gases (115^0C).

$$0.75 = \frac{Tw_2 - 289.15}{388.15 - 289.15}$$

Tw_2= 363.4k (90.25^0C).

This implies that the crumb rubber will now be fed into the oven at a new temperature of 90.25^0C.

$$\text{Heat energy Saved by oven} = \text{Heat recived by crumb rubber without heat exchanger} - \text{Heat received by crumb rubber with heat exchanger}$$

- -3.15

$$\gg \quad = M_{CR} \times Cp_{CR}(t_2 - t_1) - M_{CR} Cp_{CR}(t_2 - t_{w_2})$$

$$\gg \quad = \quad M_{CR} \times Cp_{CR}\left[(t_2 - t_1) - (t_2 - t_{w_2})\right]$$

Heat energy = $0.4667 \times 1880\ [(115 - 27) - (115 - 90.25)]$ saved by oven
$\gg$ = 877.396 (88-24.75)
= 56, 127.797J/s
Heat energy saved = 56, 127.797 × 12 × 26 × 20 × 3600
by oven for the period of audit
$\gg$ = 1, 260.85GJ

3.7 **Cost analysis of energy saved**

Since the oven is solely run on diesel fuel, heat energy saved in the oven will be attributed to the diesel fuel. The total energy consumption of diesel fuel for the one year period of audit was 14,689.127GJ. This amounted to N37, 338.000. If the suggestion of the introduction of heat exchanger is carried out, 1, 260.85GJ of energy will be saved for the period. This will amount to N3,204, 929.56. On a daily average, N10,239.39 will be saved. This is about 97.5 litres of diesel in a day. The saving will have effect on both the specific energy cost and the specific energy consumption.

$$\frac{\text{old cost - savings}}{\text{Total production output}}$$

New specific energy cost = - -3.16

$$\gg = \frac{56,914,940 - 3,204,929.56}{4,104.474}$$

New specific energy cost = N13, 086/ton or N13.086/kg.

Similarly, the specific energy consumption based on the change made will be:

$$\frac{\text{Total Energy Consumed - Savings made}}{\text{Total Production output.}}$$

New specific energy consumption = - - - - - - - - - - 3.17

$$\gg = \frac{17,\ 641.343\ -\ 1,260.\ 85}{4,\ 104.474}$$

New Specific Energy Consumption = 3.99GJ/ton or 3.99MJ/kg.

IV. Results and Discussions

4.1 **Electrical consumption**

From the data collected from the company, the annual electricity consumption in the plant and the cost is analyzed in Table 4.1.

Table 4.1: Annual electrical energy consumption analysis

Month (2014)	Reading (kWh)	Cost per kWh (N/kWh)	Cost (N) x1000	Fixed charge (N)	VAT (N) x 1000	Monthly Total cost (N) x 1000
JAN-14	65,460	19.76	1,293.49	155,923	72.47	1,521.88
FEB-14	185,100	19.76	3,657.58	155,923	190.68	4,004.18
MAR-14	63,000	19.76	1,244.88	155,923	70.04	1,470.84
APR-14	101,800	19.76	2,011.57	155,923	108.37	2,275.86
MAY-14	117,900	19.76	2,329.70	155,923	124.28	2,609.90
JUN-14	47,300	19.76	934.65	155,923	54.53	1,145.10
JUL-14	39,000	20.75	809.25	155,923	48.26	1,013.43
AUG-14	61,900	20.75	1284.43	155,923	72.02	1,512.37
SEPT-14	38,900	20.75	807.18	155,923	48.16	1,011.26
OCT-14	37,100	20.75	769.83	155,923	46.29	972.04
NOV-14	36,200	20.75	751.15	155,923	45.35	952.42

DEC-14	26,400	33.33	879.91	155,923	51.79	1,087.62
TOTAL	820,060	Average 21.30	16,773.62	1,871,076	932.24	19,576.94

From Table 4.1, the annual electrical energy consumption is 820,060kWh. This was delivered to the plant at a total cost of N19,576,940. Also from Table 4.1, the total monthly cost of electrical energy consumption was calculated as N19,576,940

4.2 Fuel (diesel) consumption

The diesel consumed are stored in a tank calibrated in cm. 1cm equivalent is 112 litres. The cost per litre for the period of audit is N105.00. The monthly quantity of diesel fuel was converted to kg. The total cost of diesel fuel for the period of audit was also computed. These are shown in Table 4.2

Table 4.2: Annual diesel fuel consumption analysis.

Month (2014)	Tank reading (cm)	Equivalent liters	Mass of diesel (kg)	Cost per litre(N)	Total cost x 1000 (N)
JAN-14	220	24,640	22,126.72	105	2,587.20
FEB-14	524	58,688	52,701.82	105	6,162.24
MAR-14	465	52,080	46,767.84	105	5,468.40
APR-14	316	35,392	31,782.02	105	3,716.16
MAY-14	336	37,632	33,793.54	105	3,951.36
JUN-14	133	14,896	13,376.61	105	1,564.08
JUL-14	178	19,936	17,902.53	105	2,093.28
AUG-14	191	21,392	19,210.02	105	2,246.16
SEPT-14	166	18,592	16,695.62	105	1,952.16
OCT-14	175	19,600	17,600.80	105	2,058.00
NOV-14	190	21,280	19,109.44	105	2,234.40
DEC-14	281	31,472	28,261.86	105	3,304.56
TOTAL	3,175	355,600	319,328.8	Average 105	37,338

4.3 Energy consumption of cost

The monthly energy input to the plant from the two sources of energy outlined above was calculated as follows:
For Diesel: Calorific value = 46.0 MJ/kg.
For Electricity (BEDC): Calorific value = 3.60 MJ/kWh

January Energy Consumption

(a) Diesel: Energy consumed = 22, 126.72 kg × 46 MJ/kg
= 1,017, 829.12MJ
See Table 4.2

(b) Electricity: Energy consumed = 65, 460 kWh × 3.6MJ/kWh
= 235,656MJ
= 235.656 GJ
See Table 4.1.

February Energy Consumption

(a) Diesel: Energy consumed = 52, 701.82 × 46
= 2, 424, 283.72 MJ

(b) Electrical: Energy consumed = 185,100 × 3.6
= 666, 360MJ
= 666.36GJ and so on.

The energy consumption for the two sources of energy for the period of audit is shown in Table 4.3. Also included in Table 4.3 is the production output for the period of audit.

Table 4.3: Energy consumption/production output

MONTH (2014)	Electricity (GJ)	Diesel(GJ)	Total Energy (GJ)	Production output (Metric Tonne)
JAN-14	235.656	1,017.829	1,253.485	839.825
FEB-14	666.360	2,424.284	3,090.644	719.075
MAR-14	226.800	2,151.321	2,378.121	733.145
APR-14	366.480	1,461.973	1,828.453	350.665
MAY-14	424.440	1,554.503	1,978.943	304.255
JUN-14	170.280	615.324	785.604	81.235
JUL-14	140.400	823.516	963.916	202.044
AUG-14	222.840	883.661	1,106.501	183.680
SEPT-14	140.040	767.999	908.039	145.880
OCT-14	133.560	809.637	943.197	159.005
NOV-14	130.320	879.034	1,009.354	166.565
DEC-14	95.040	1300.046	1,395.086	219.100
TOTAL	2,952.216 (16.73%)	14,698.127 (83.27%)	17,641.343	4,104.474

From Table 4.3, the minimum amount of energy was consumed in the month of June, 2014. This was as a result of a fall in the production output. Table 4.3, also reveals that the total amount of energy consumed (for both sources of energy) and the total production output are 17, 641.343GJ and 4, 104.474 tons respectively.

4.4 Energy performance result of plant

The two main performance indicators used in a production plant will be used in evaluating the plant based on the data collected during the one year period. These are:

Specific energy consumption (GJ/TON)

This is the total energy consumed per unit of production (ton or kg).

$$\text{Specific energy consumption} = \frac{\text{Total energy consumed (GJ)}}{\text{Total production output (kg)}} \quad \text{- -4.1}$$

From Table 4.4, the total energy consumed is 17,641.343GJ while the total production output is 4, 104.474 tons.

$$\text{Specific energy consumption} = \frac{17,641.343\,\text{GJ}}{4{,}104.474\,ton}$$

= 4.298 GJ/Ton or
= 4.298MJ/kg.

Specific energy cost (n/ton)

This is the cost of energy required to produce unit ton of crumb rubber.

$$\text{Specific energy cost} = \frac{Total\ energy\ cost\ (₦)}{Total\ product\ output\ (Ton).} \quad \text{- - -4.2}$$

From Table 4.4, the total energy cost of the plant for the period of audit is N56, 914, 940.

$$\text{Specific energy cost} = \frac{\text{N56,914,940}}{\text{4,104.474 Ton}}$$

= N13, 866.56/ton or
= N13.87/kg

Summarily, to produce 1 ton of crumb rubber in Imoniyame Holdings Limited Ughelli, about 4.298GJ of energy is required at a cost of N13,866.56/ton. The result is shown in Table 4.4.

Table 4.4: Energy efficiency performance result

Total energy consumed	17, 641.343GJ
Total cost of energy consumed	N56,914,940
Total production output	4,104.474 tons
Specific energy consumption	4.298GJ/ton of crumb rubber

Specific energy cost	N13,866.56/ton of crumb rubber

From the above analysis, reasonable cost is spent on the product of crumb rubber. In order for the company to be competitive in its market, a lot of attention should be paid on energy cost reduction by management and personnel.

Fig 4.1 and 4.2 show the energy consumption and energy cost pie chart respectively.

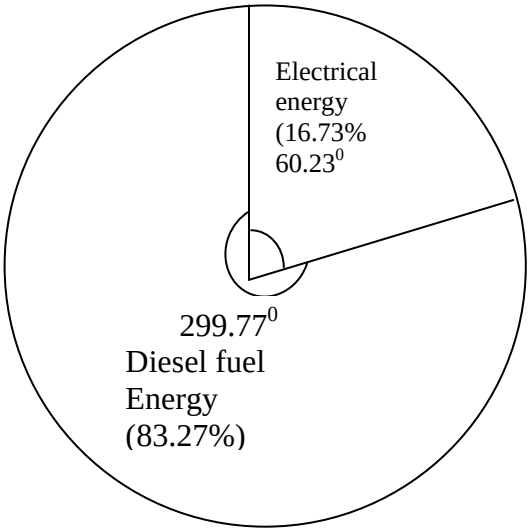

Fig 4.1: Energy consumption chart

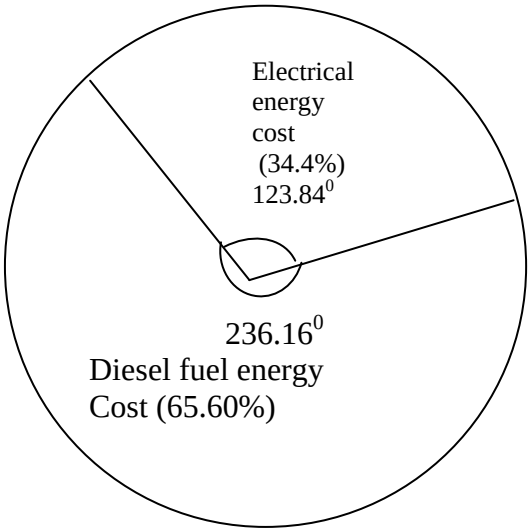

Fig. 4.2: Energy cost chart.

4.5 Diesel consumption rate of various burners

Table 4.5 gives the records of the diesel consumption of the burners in the various production lines. The 2G and 4G burners have a rating of 11kg/h. An assumption of 20 hrs operation per day was used for the audit.

Table 4.5: Diesel Fuel consumption of the various burners of the production lines

LINES	Rating of 2G and 4G (kg/h)	2G and 4G (20 hrs per day)	2G and 4G kg/month (26 days)	2G and 4G kg/yr (12 months)
A &B	11.00	220.00	5,720.00	68,640.00
C	11.00	220.00	5,720.00	68,640.00
D	11.00	220.00	5,720.00	68,640.00
			17,160.00	205,920.00

Energy Consumed by Burners = mass of diesel/yr × Heating value of diesel.

= 205, 920 kg/yr × 46 MJ/kg

= 9, 472, 320 MJ/yr

= 9, 472.32 GJ/yr

Therefore, the energy consumed by the oven for the one year period of audit is 9, 472.32GJ.

4.6 Sankey diagram of IHL oven

A Sankey diagram is drawn from the oven analysis done earlier. Fig. 4.3 shows the Sankey diagram of IHL oven operations.

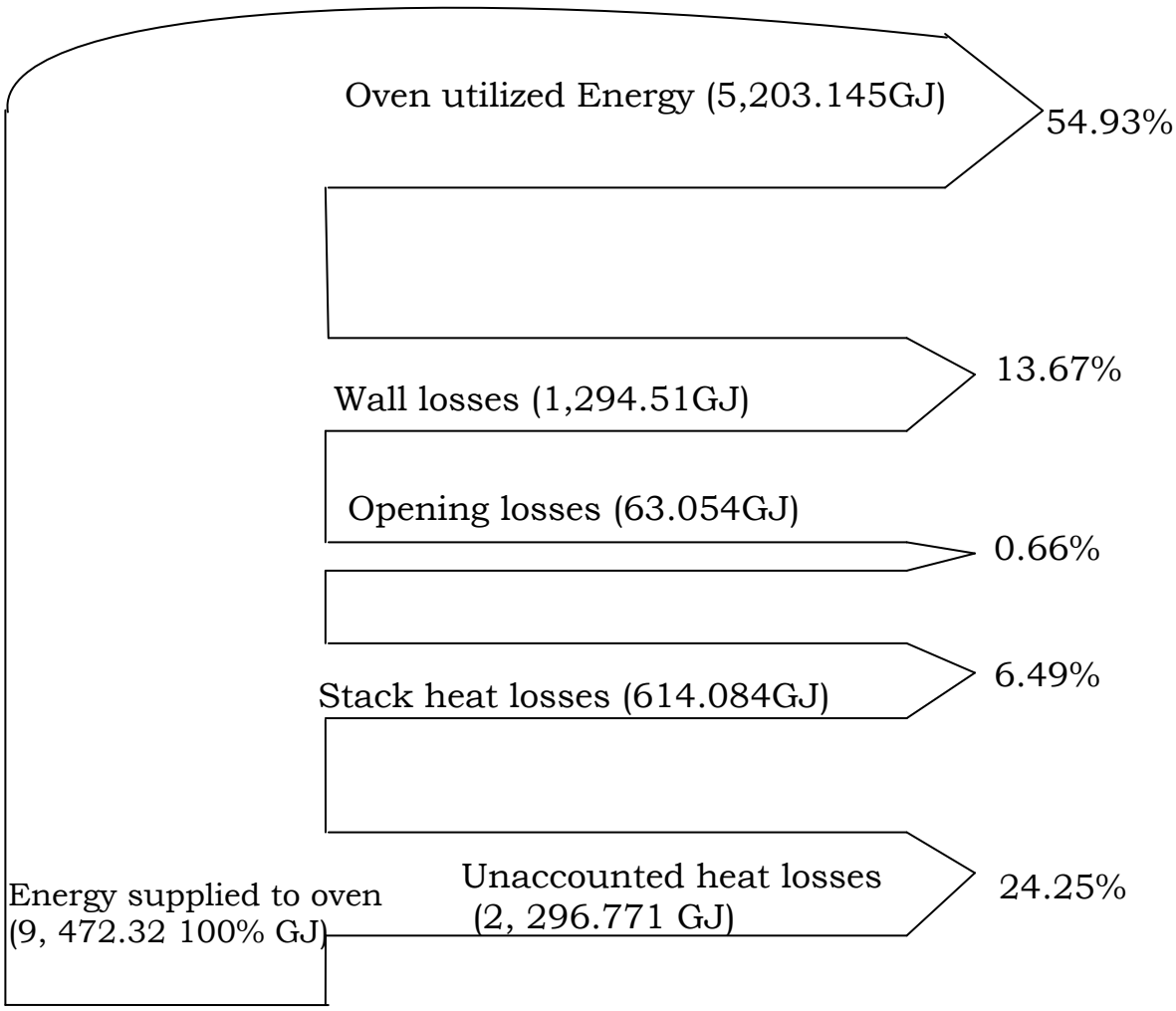

Fig. 4.3: Sankey diagram of IHL oven operations

4.7 **Energy pathway of IHL**

This is the energy distributed to various sections of the plant for the period of audit. This is shown in fig: 4.5

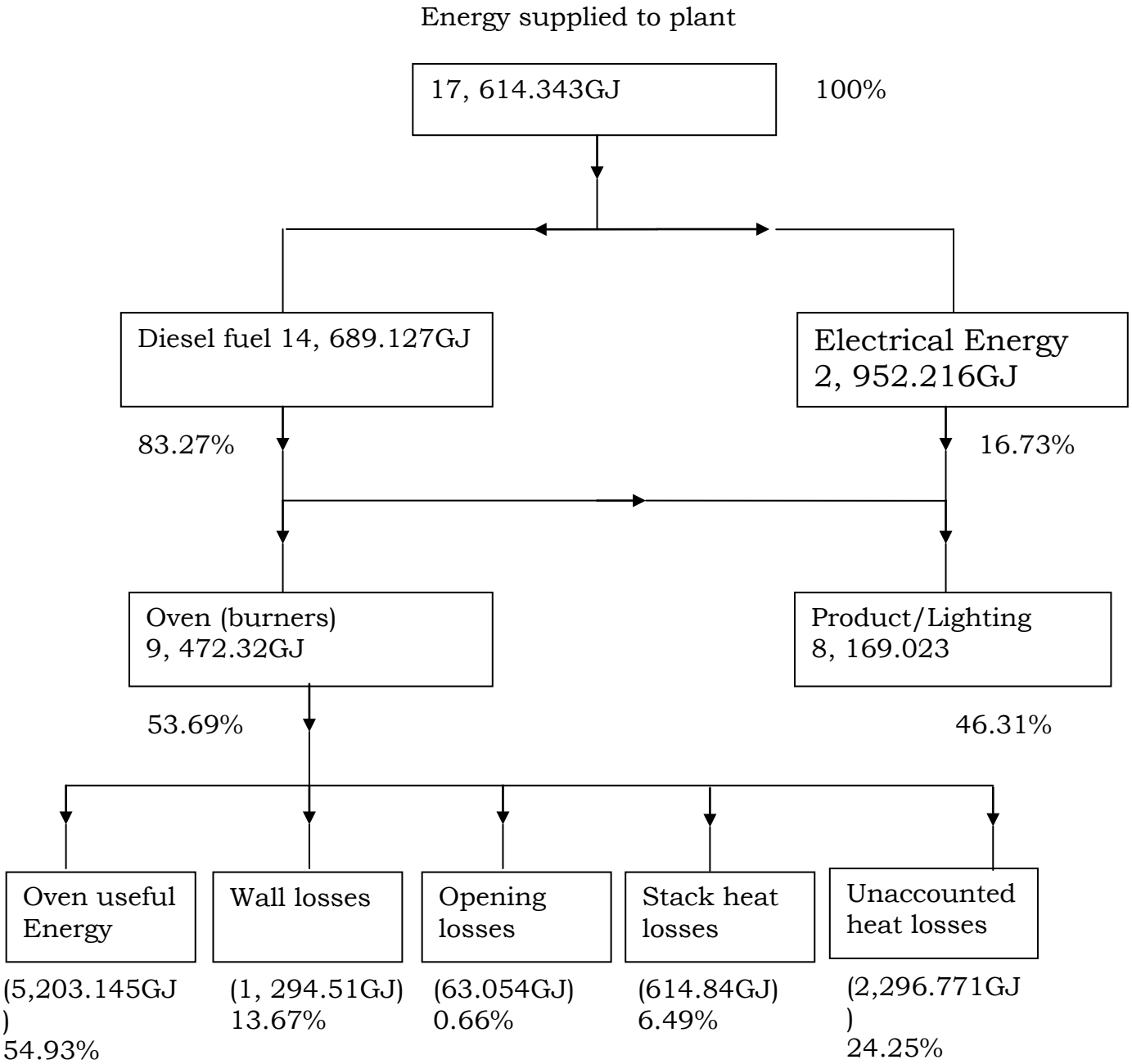

Fig. 4.5: Energy pathway of IHL.

4.8 Discussion

Crumb rubber production is an energy intensive process. Efficient use of energy is necessary to ensure that crumb rubber manufacturers like Imoniyame Holdings Limited Ughelli, remain competitive. It was ascertained in this audit that the oven with burners attached to it is the largest energy consumer in the crumb rubber processing plant. Periodic evaluation of the oven's energy efficiency can potentially pay huge dividend through reduced energy usage. With significantly higher prices of diesel fuel and electricity, reducing energy use will become increasingly important. The procedure developed through this work can be extremely beneficial by providing a structured approach for assessment of the oven's energy efficiency and the identification of potential system improvements.

4.9 Observations

From the result and findings of the energy audit carried out in the crumb rubber factory, the following were observed.

(1) The total energy consumed in the entire plant over the one year period (Jan. 2014 to Dec. 2014), is 17,641.343GJ. Electrical energy was 2,952.216 GJ, which is 16.73% of the total energy while diesel fuel was 14,689.127GJ representing 83.27% of the total energy. This shows that the plant depends more on diesel fuel.
(2) The total cost of energy in the plant for the period (Jan. 2014 to Dec. 2014) of audit was N56,914, 940 of which diesel fuel is 65.6% while Electrical accounts for 34.4%.
(3) The total production output for the period (Jan. 2014 to Dec. 2014) of audit was 4, 104.5 tons of crumb rubber.
(4) The burners in the oven are the most energy intensive units in the plant. 9, 472.32GJ of energy which is 53.6% of the total energy consumed was by the burners (oven). This unit hold the greatest energy saving potential in the plant.
(5) It was also observed that notable amount of electrical energy could be saved by developing an overall motor inventory and replacement plan in the plant.

4.10 Efficiency of crumb rubber production

The quality of crumb rubber in Imoniyame Holdings Limited, Ughelli is SIR3. The plant specific energy consumption was 4.298GJ/ton which is also 4.298MJ/kg of crumb rubber. This is relatively high compared to 2.63MJ/kgof crumb rubber of quality SIR 3 carried out by Utomo et al. (2008). Thus, there is still need to further reduce the specific energy consumption of the Imoniyame Holdings Limited crumb rubber. This could be done by utilizing the stack heat losses with the aid of heat exchanger as suggested. When this is done, the specific energy consumption will be reduced to 3.99MJ/kg. This compared to 2.63MJ/kg of crumb rubber, of same quality (SIR3) carried out by Utomo et al (2008) will be seen as fair.

The specific energy cost was computed to be N13.87/kgof crumb rubber. This could be reduced to N13.086/kg of crumb rubber by the introduction of heat exchanger to recover the heat lost through the stack. This could also be achieved by the reduction in price of diesel fuel and amount of kWh of electricity or outright conservation of the sources of energy. The 4,104.475 tons of crumb rubber produced during the period of audit (Jan. 2014 to Dec. 2014) can be improved on by implementing the following measures:

(1) Availability of fund for raw materials (natural rubber latex).
(2) Increase in export demand.
(3) Improved effective production process.

V. Conclusion and Recommendation

5.1 Conclusion

The energy audit of Imoniyame Holdings Limited has been done successfully. The energy pathway showing amounts and percentages of energy spent in various section were also shown.

From the audit, the total amount of energy supplied to the plant was 17, 641.343GJ. Diesel fuel which was 83.27% of the total energy was 14, 689.127GJ while electrical energy from BEDC was 2,952.216GJ representing 16.73% of the total energy supplied. The total cost of energy under the period of audit (Jan. 2014 to Dec. 2014) was N56,914,940. Of this amount, N19,576,940 representing 34.4% of the total cost was spent on electrical energy while N37,338,000 representing 65.6% of the total cost was spent on diesel fuel. The total tonnage produced was 4,104.475 tons for same period. The audit also reveals that the specific energy consumption for a crumb rubber production in Imoniyame Holdings Limited is 4.298MJ/kg. The specific energy cost was N13.87/kg of crumb rubber.

From the oven analysis, the efficiency of the oven was discovered to be 54.93%. The oven section consumed 9,472.32GJ. This is about 53.69% of the total energy supplied to the plant for the period of audit. The production and lighting sections consumed 8,169.023GJ. This is about 46.31% of the total energy supplied to the plant for the period of audit. The Sankey diagram of Fig. 4.3 reveals that 2,296.771GJ of energy representing 24.25% of the total energy supplied to the oven was unaccounted for. This could be due to oven design error, errors in measurement, calculation and evaluation or errors due to human operation. From the first law of thermodynamics which is the principle of conservation of energy, a huge improvement can still be made.

5.2 Recommendations

From the energy audit carried out on Imoniyame Holding Limited Ughelli (a crumb rubber processing factory), the following recommendations are suggested.

1. The heat lost through the stack should be recovered by introducing heat exchanger between the stack and the pool circulating water. This will help to wash the crumb rubber cleaner and faster and at same time preheat the crumb rubber before entering the oven. This will reduce the heat required from the oven, increase its life span, and improve its efficiency. When this is done, the following improvement will be made.

i. A daily savings of N10,239.39 will be made. This will amount to N3,204,929.56 in a year. It will reduce the total cost of energy from N56,914,940 toN53,710,010.44 within the one year period of audit.
ii. The specific energy consumption will drop from 4.298 MJ/kg to 3.99MJ/kg of crumb rubber.
iii. The specific energy cost will also be reduced from N13.87/kg to N13.086/kg of crumb rubber.

2. Different metering system should be adopted to separate the energy consumption of the production lines from lighting. This will help to know the exact amount of energy required per production line and the base load energy (lighting) required when there is no production. Separation will reveal energy wastage areas.
3. The diesel supply lines to the 2G and 4G burners should be separated and different meters attached to know the energy consumed by different burners.
4. Appropriate energy record keeping should be practised to enable this kind of audit done over a longer period of time. A good average will give a more accurate result that will influence management decision in terms of policy making.

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Nomenclature

Symbol	Description	Unit
A	Area	m^2
a	Factor for total radiation	
Cp	Specific heat capacity	kJ/kgK
CP_{CR}	Specific heat capacity of crumb rubber	kJ/kgK
E	Emissivity	
GCV	Gross calorific value	kJ/kg
M	Mass	kg
$\dot{M}$	Mass flow rate	kg/s
NPI	Normalized Performance Indicator	GJ/m^2
Q	Quantity of Heat	kJ
T	Absolute temperature	K
Δt	Temperature difference	K

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"Performance of IC Engine by Using Mahua Oil (*Madhuca indica*) Biodiesel"

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Abstract

There is an increasing interest in India, to search for suitable alternative fuels that are environment friendly. This led to the choice of Mahua Oil (MO) as one of the main alternative fuels to diesel. In this investigation, Mahua Oil Biodiesel (MOB) and its blend with diesel were used as fuel in a single cylinder, direct injection and compression ignition engine. The MOB was prepared from MO by transesterification using methanol and potassium hydroxide. The fuel properties of MOB are close to the diesel and confirm to the ASTM standards. From the engine test analysis, it was observed that the MOB, B5 and B20 blend results in lower CO, HC and smoke emissions as compared to diesel. But the B5 and B20 blends results in higher efficiency as compared to MOB. Hence MOB or blends of MOB and diesel (B5 or B20) can be used as a substitute for diesel in diesel engines used in transportation as well as in the agriculture sector.

Keywords: Alternative fuel, mahua oil, biodiesel, engine performance

1. Introduction

During recent years high activities can be observed in the field of alternative fuels, due to rapid decrease in world petroleum reserves. It has been massive demand for diesel in India. Hence, government of India has taken necessary steps to fulfill future diesel and gasoline demand. Biodiesel and alcohol are considered as alternative fuels. These fuels are being looked to provide employment generation to rural people through plantation of vegetable oils and can be beneficial to sugarcane farmers through the ethanol program [1]. Mohibbe et al. [2] reported that the fatty acid methyl esters of oils of 26 species were found most suitable for use as biodiesel. Jamieson [3] listed over 350 oil-bearing crops while Duke and Bagby [4] identified 70 species of oil seeds with considerable potential. Mahua name for a medium to larger tree, madhuca longifolia of family sapotaceae with wider and round canopy and attains a height up to 20 meters. As a plantation tree, Mahua is an important plant having vital socio-economic value. This species can be planted on roadside, canal banks etc. on commercial scale and in social forestry programmes, particularly in tribal areas. The drying and decortication yield 70% kernel on the weight of seed. The kernel of seed contains about 50 % oil. The oil yield in an expeller is nearly 34 - 37% [5]. Transesterification is affected by type of catalyst, reaction time and temperature and purity of reactants [6]. Generally a two step procedures is used to produce biodiesel from MO having high free fatty acids [7] and nuclear magnetic resonance test can be used to determine the biodiesel conversion [8]. Engine manufacturers recommend the use of biodiesel up to 50% in the diesel engines. But most of the engine manufacturers prefer B5 blend due to its better cold starting and lower lubricating oil dilution characteristics. Hence in the present work, B10 and B40 blends were used as fuel and the performance was compared with neat diesel and MOB.

1.1 AN OVERVIEW OF DIESEL ENGINE

The diesel internal combustion engine differs from the gasoline powered Otto cycle by using highly compressed, hot air to ignite the fuel rather than using a spark plug (compression ignition rather than spark ignition).In the diesel engine, only air is initially introduced into the combustion chamber. The air is then compressed with a compression ratio typically between 15:1 and 22:1 resulting in 40-bar (4.0 MPa; 580 psi) pressure compared to 8 to 14 bars (0.80 to 1.4 MPa) (about 200 psi) in the petrol engine. This high compression heats the air to 550 °C (1,022 °F). At about the top of the compression stroke, fuel is injected directly into the compressed air in the combustion chamber. This may be into a void in the top of the piston or a *pre-chamber* depending upon the design of the engine. The fuel injector ensures that the fuel is broken down into small droplets, and that the fuel is distributed evenly. The heat of the compressed air vaporizes fuel from the surface of the droplets vapour is then ignited by the heat from the compressed air in the combustion chamber, the droplets continue to vaporize from their surfaces and burn, getting smaller, until all the fuel in the droplets has been burnt. The start of vaporization causes a delay period during ignition, and the characteristic diesel knocking sound as the vapor reaches ignition temperature and causes an abrupt increase in pressure above the piston. The rapid expansion of combustion gases then drives the piston downward, supplying power to the crankshaft. Model airplane engines use a variant of the Diesel principle but premix fuel and air via a carburetion system external to the combustion chambers.

The high level of compression allowing combustion to take place without a separate ignition system, a high compression ratio greatly increases the engine's efficiency. Increasing the compression ratio in a spark-ignition engine where fuel and air

are mixed before entry to the cylinder is limited by the need to prevent damaging pre-ignition. Since only air is compressed in a diesel engine, and fuel is not introduced into the cylinder until shortly before top dead centre (TDC), premature detonation is not an issue and compression ratios are much higher.

1.2 COMBUSTION IN C.I. ENGINE

The process of combustion in C.I. engine is fundamentally different from that in a S.I. engine. In the S.I. engine a homogeneous carbureted mixture of petrol vapor and air, in nearly stoichiometric or chemically correct ratio, is compressed in the compression stroke through a small compression ratio (6:1 to 11:1) and the mixture is ignited at one place before the end of the compression stroke (say before 30° before TDC) by means of an electric spark.

In C.I. engine, air alone is compressed through a large compression ratio (12:1 to 24:1) during the compression stroke raising highly its temperature and pressure. In the highly compressed and highly heated air in the combustion chamber (well above ignition point of fuel) one or more jets of fuel are injected in the liquid state, compressed to high pressure of 110 to 200 bar by means of a fuel pump. Each minute droplet as it enters the hot air (temperature 450-500°C and pressure 30-40 bar) is quickly surrounded by an envelope of its own vapor and this, in turn and after an appreciable interval, is inflamed at the surface of the envelope.

1.3 MAHUA OIL *(Madhuca indica)*

The two major species of genus Madhuca found in India are Madhuca Indica (syn. Bassia latifolia) and Madhuca longifolia (syn. Brassica longifolia). Mahua is the widely accepted as local name for the fat from both these species. This plant is common in deciduous forests. The seed and oil potential of this tree in the country is 5.00 lakh and 1.8 lakh M. tons.

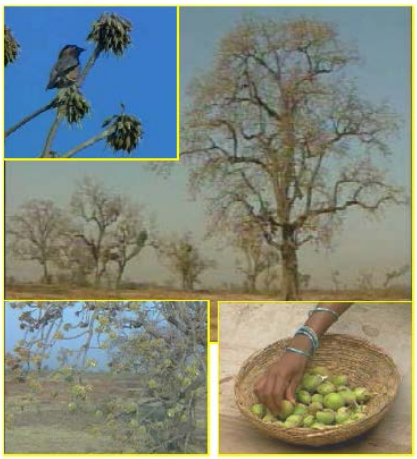

Plate 1.1: Mahua (Madhuca Indica)

a. Botanical Name : Madhuca indica
b. Family : Sapotaceae
c. Common Names

Sanskrit	:	Madhuka
A.P	:	Ippe, Yappa
Gujarat	:	Mahuda
Hindi	:	Mahua, Mohwa,
Karnataka	:	Hippe
Kerla	:	Ponnam, Ilupa
Maharashtra	:	Mahwa, Mohwra
Orissa	:	Mahula, Moha,
Tamil Nadu	:	Illupei, elupa
West Bengal	:	Mahwa, Maul,
English	:	Butter tree

1.4. Botanical Features

M. Latijolia is a deciduous tree white M.Congijolia is ever green or semi ever green tree. Attains height upto 70 ft. The tree matures and starts bearing 8 to 15 years, and fruits upto 60 years. The two species are not differentiated in Trade. The kernels are 70% of seed by weight, are seed contains two kernels, having 2.5 cm x 1.75 cm size oil content in latifolia is 46% and 52% in long folia. In seeds oil content is 35% and protein in 16%.

1.5. Flowering

The flowering season extends from February to April. The copious fall of succulent, corollas weave a cream colored carpet on the ground. It is rich in sugar (73%) and next to cane molasses constitute the most important raw material for alcohol fermentation. The yield of 95% alcohol is 405 liters from one ton of dried flowers.

1.6. Fruiting

The matured fruits fall on the ground in May and July in the North and August and September in the South. The orange brown ripe fleshy berry is 2.5 to 5 cm long and contains one to four shining seeds. The seeds can be separated from the fruit wall by pressing. Drying and decortications yield 70% kernels on the weight of seeds.

1.7. Mahua Oil

Mahua seed contains 35% oil and 16% protein. The characteristics of fat are as under:

Characteristics of Fat

Characters Characteristic/valve

1. Color Pole yellow
2. Consistency Plastic
3. Refractive index at 40 degree C1.452 to 1.462
4. Specific gravity at 15 degree C 0.856 to 0.870
5. Iodine valve 58.00 to 70.00
6. Specification valve 187 to 196
7. Sponification valve 1.00 to 3.00

2.1 EXPERIMENTAL PROCEDURE

1) Switch on the mains of the control panel and set the supply voltage from servo stabilizer to 220 volts.
2) The main gate valve is opened, the pump is switched ON and the water flow to the engine cylinder jacket (300 liters/hour), calorimeter (50 liters/hour), dynamometer and sensors are set.
3) Engine is started by hand cranking and allowed to run for a 20 minutes to reach steady state condition.
4) The engine software Lab view 7.1 optimized for engine analysis by Deepti Engineering Services, Bangalore is used for taking readings.

The engine has a compression ratio of 17.5 and a normal speed of 1500 rpm controlled by the governor. An injection pressure of 200 bar, 250 bar and 300 bar are used for the analysis. The engine is first run with neat diesel at loading conditions such as 6.5, 13, 19.5 and 26 N-m. Between two load trials the engine is allowed to become stable by running it for 3

minutes before taking the readings. At each loading condition performance parameters namely speed, exhaust gas temperature, brake power, peak pressure are measured under steady state conditions. The experiments are repeated for various load conditions for S10, S20 and S30 bio-fuel. With the above experimental results, the parameters such as total fuel consumption, brake specific fuel consumption, indicated specific fuel consumption, specific energy consumption, brake thermal efficiency, indicated thermal efficiency, mechanical efficiency are calculated. Finally graphs are plotted for these parameters against various load conditions for diesel and S10, diesel and S20, diesel and S30 bio-diesel. From these plots, performance characteristics of the engine are determined.

2.2 EXPERIMENTATION

The experiments were conducted on a direct injection compression ignition engine for various loads and blends of biodiesel & pure diesel. Analysis of combustion characteristics and performance parameters like peak pressure, specific fuel consumption (SFC) and Brake thermal efficiency are evaluated.

3 RESULTS AND DISCUSSIONS

3.1 PERFORMANCE CHARACTERISTICS

3.1.1 Brake thermal efficiency

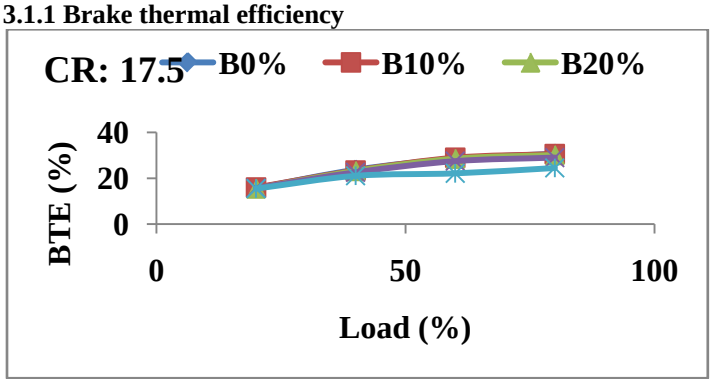

Fig 3.1 Variation of BTE with load for different percentage of Mahua oil and diesel with CR 17.5

The variation of brake thermal efficiency with load at different percentage of diesel- Mahua oil biodiesel blends are shown in figures 3.1 From the figure it was observed that the brake thermal efficiency increases with load in all cases. It was further observed that the Brake Thermal Efficiency of the Mahua-biodiesel is marginally less by 1.0-2.0% compared to neat diesel operation for normal injection timings.

3.1.2Total fuel consumption

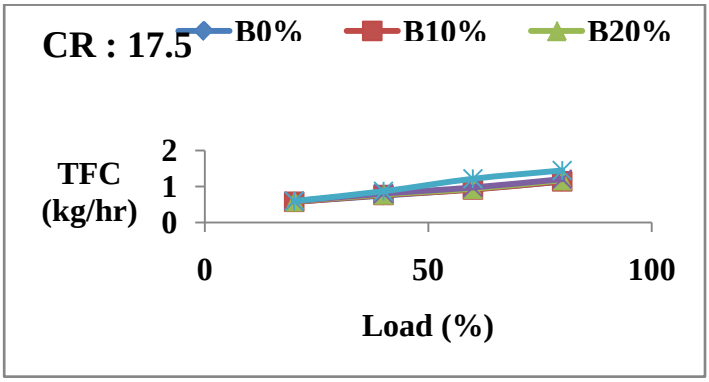

Fig 3.2 Variation of TFC with load for different percentage of Mahua oil and diesel with CR17.5

The variation of total fuel consumption with load at different percentages of diesel- Mahua oil biodiesel blends are shown in figures 3.5 From the figure it was observed that the total fuel consumption increases with load in all cases. From the figure it was observed that the total fuel consumption of the Mahua oil -biodiesel was marginally increases compared to neat diesel operation for normal compression ratio. At 80% load, the total fuel consumption of engine when run an engine with neat diesel is 1.132 kg/hr, where as it is 1.146kg/hr, 1.177 kg/hr, 1.201 kg/hr, and 1.450 kg/hr when engine is run on diesel with 10% Mahua oil-biodisel, 20% Mahua oil-biodisel, 30% Mahua oil -biodisel and 40% Mahua oil -biodisel respectively.

3.1.3 Brake specific fuel consumption

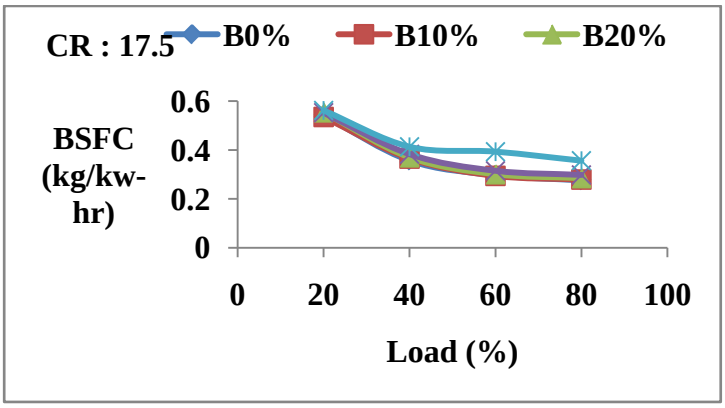

Fig 3.3 Variation of BSFC with load for different percentage of Mahua oil and diesel with CR17.5

The variation of brake specific fuel consumption with load at different percentages of diesel- Mahua oil biodiesel blends are shown in figures 6.9 to 6.12. From figure it was observed that the brake specific fuel consumption decreases with load in all cases. At 80% load, the brake specific fuel consumption of the engine when run on neat diesel is 0.275 kg/kW-hr, where as it is 0.300 kg/kW-hr, 0.290 kg/kW-hr, 0.300 kg/kW-hr, 0.358 kg/kW-hr when engine is run on diesel with 10% Mahua oil -biodisel, 20% Mahua oil -biodisel, 30% Mahua oil -biodisel and 40% Mahua oil -biodisel respectively.

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3.1.4 Air Fuel Ratio

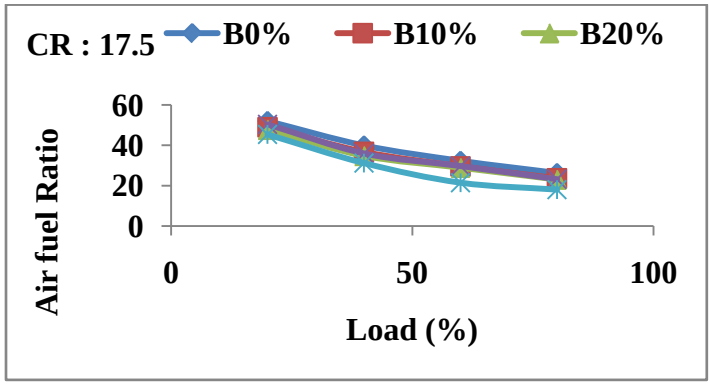

Fig 3.4 Variation of AFR with load for different percentage of Mahua oil and diesel with CR17.5

The variation of air fuel ratio with load at different percentages of diesel- Mahua oil biodiesel blends are shown in figures 6.21 to 6.24. From the figures it was observed that the air fuel ratio decreases with load in all cases because as the load increases the consumption of fuel increases hence air fuel ratio reduces.

At 80% load (fig 6.21), the air fuel ratio of engine when run on neat diesel is 25.94, where as it is 23.78, 23.16, 23.64 and 17.93 when engine is run on diesel with 10% Mahua oil -biodisel, 20% Mahua oil -biodisel, 30% Mahua oil -biodisel and 40% Mahua oil -biodisel respectively.

3.1.5 Volumetric efficiency

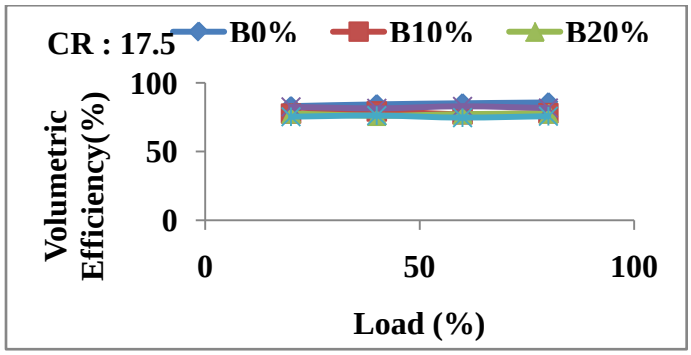

Fig 3.5 Variation of volumetric efficiency with load for different percentage of Mahua oil and diesel with CR17.5

The variation of volumetric efficiency with load at different percentages of diesel- Mahua oil biodiesel blends are shown in figures 6.25 to 6.28. From the figure it was observed that the volumetric efficiency almost keeps constant for biodiesel blends. This is because of no much variation in airflow.

3.1.6Indicated thermal efficiency

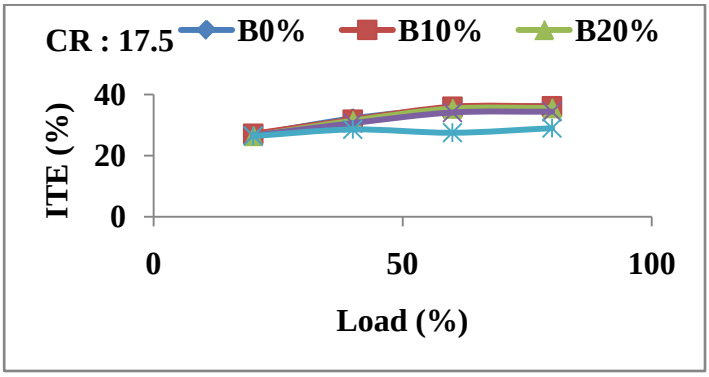

Fig 3.6 Variation of ITE with load for different percentage of Mahua oil and diesel with CR17.5

The variation of indicated thermal efficiency with load at different percentages of diesel- Mahua oil biodiesel blends are shown in figures 6.28 to 6.32. From the figure it was observed that the indicated thermal efficiency increases with load in all cases. From the figure it was further observed that the indicated thermal efficiency of the Mahua oil -biodiesel is marginally less by 1.0 - 5% compared to neat diesel operation for normal compression ratio. From the figure 6.28 it was observed that the indicated thermal efficiency for neat diesel at 80% load is 36.27%, where as it is 36.05%, 36.18%, 35.13%, 29.03% when run an engine with B10, B20, B30, & B40 Mahua oil - biodiesel blends. Thus for Mahua oil -biodiesel blend the indicated therma1 efficiency will be 0.11% less for 10% Mahua oil blend, 0.72% less for 20% blend, 1.89% less for 30% blend, 7.30% less for 40% blend at 80% load.

4. Conclusions

In the present work the performance evaluation of single cylinder four stroke DI diesel engine using neat diesel and Mahua oil for different blends and compression ratios are carried out.

- Performance of the 20% Mahua oil -biodiesel blend was only marginally poorer at part loads compared to the neat diesel performance.
- At higher loads engine suffers from nearly 1 to 1.5% brake thermal efficiency loss for 20% and 30% blends.
- As the blend increases that is for 30% and 40% at full load engine suffers nearly 3 to 4.5% of the break

thermal efficiency loss due the lower heating value of the biodiesel and incomplete combustion.

- The decrease in compression ratio the break thermal efficiency also decreased because of decrease in airflow leads to incomplete combustion.

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The Performance and Emission Test for Modified Piston of 2 Stroke Petrol Engine

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Abstract
The aim of this project is to investigate the effect of high refractive index material coating on piston head of a two stroke petrol engine. The experiment was based on comparison of Performance & Emission characteristics of a two stroke petrol engine (0.81 Kwh at 5500 Rpm) with a conventional piston and modified piston (coated piston head). Performance parameters such as brake power, specific fuel consumption, volumetric efficiency & emission parameters such as HC, CO are calculated and compared for conventional and modified piston engine .The resultant values are plotted for
1. Volumetric efficiency vs valve opening
2. Specific fuel consumption vs valve opening
It was observed from the experiment that specific fuel consumption is minimum and volumetric efficiency is maximum for modified piston compared to conventional piston.

Keywords:- Brake power, specific fuel consumption, volumetric efficiency.

I. INTRODUCTION

1.1 HEAT ENGINES

A heat engine is a device, which transforms the chemical energy of a fuel into thermal energy and uses this energy to produce the mechanical work.

Heat engines are classified into two types.
1. External Combustion Engines.
2. Internal Combustion Engines.

External combustion engine is one in which the products of combustion of air and fuel transfer heat to a second fluid, which then becomes the working fluid for producing power. Steam engine is an example of external combustion Engine.

Internal Combustion Engine is one in which the products of combustion of air and fuel becomes directly motive the motive fluid. Petrol engines, gas engine, diesel engine, wankel engine, the open cycle gas turbine, jet engine are the examples of internal combustion Engines.

The main advantage of IC engines over EC engines are greater mechanical simplicity, lower ratio of weight and bulk output due to absence of auxiliary apparatus like condenser and boiler and hence lower initial cost, higher overall efficiency and lesser requirement of water for dissipation of energy through cooling systems. IC engines are mainly used for transport vehicle, automobiles, locomotive, aircraft etc.

1.2 TURBULENCE

Turbulence plays a very vital role in combustion phenomenon. The flame speed is very low in non-turbulent mixtures. A turbulent motion of the mixture intensifies the processes of heat transfer and mixing of the burned and unburned portions in the flame front (diffusion). These two factors cause the velocity of turbulent flame to increase practically in proportion to the turbulence velocity. The turbulence of the mixture is due to admission of fuel-air mixture through comparatively narrow sections of the intake pipe, valves, etc. in the suction stroke. The turbulence can be increased at the end of the compression by suitable design of combustion chamber, which involves the geometry of cylinder head and piston crown. The degree of turbulence increases directly with the piston speed.

If there is no turbulence the time occupied by each explosion would be so great as to make the high speed internal combustion engines impracticable. Insufficient turbulence lowers the efficiency due to incomplete combustion of the fuel. However, excessive turbulence is also undesirable. The effects of turbulence can be summarized as follows,

(i) Turbulence accelerates chemical action by intimate mixing of fuel and oxygen. Hence turbulence allows the ignitiol4, advance to be reduced and therefore weak mixtures can be burnt.

The increase of flame speed due to turbulence reduces the combustion time and hence minimizes the tendency to detonate.

(ii) Turbulence increases the heat flow to the cylinder wall and in the limit excessive turbulence may extinguish the flame.

(iii) Excessive turbulence results in the more rapid pressure rise (though maximum pressure may be lowered) and the high rate of pressure rise causes the crankshaft to spring and rest of the engine to vibrate With high periodicity, resulting in rough and noisy running of the engine

II. EXPERIMENTAL

2.1 EXPERIMENTAL SETUP:.

A two-stroke, or two-cycle, engine is a type of internal combustion engine which completes a power cycle in only one crankshaft revolution and with two strokes, or up and down movements, of the piston in comparison to a "four-stroke engine", which uses four strokes. This is accomplished by the end of the combustion stroke and the beginning of the compression stroke happening simultaneously and performing the intake and exhaust (or scavenging) functions at the same time.

Experimental setup

1. Two stroke petrol engine
2. Blower
3. Venturimeter
4. Two way valve
5. Manometer
6. Fuel tank
7. Specific fuel indicator

2.2 ENGINE SPECIFICATION:-

Side view of engine used in Test Rig

SL. NO	ENGINE PARAMETERS	SPECIFICATIONS
1	Engine maker	Enfield India ltd, Madras
2	Engine type	M-30(Enfield, 2 stroke)
3	Number of cylinder	Single cylinder
4	Number of strokes	4 Strokes
5	Rated power	0.81 kw @ 5500 rpm
6	Bore Diameter	30.2mm
7	Stroke length	43mm
8	Piston diameter	30mm
9	Compression ratio	(28:1)
10	Rated speed	5500rpm
11	Type of cooling	Air cooling
12	Fuel	Petrol
13	Load measurement	Based on valve opening
14	Speed measurement	Tachometer

2.3 PISTON COATING:-

A **coating** is a covering that is applied to the surface of an object, usually referred to as the **substrate**. The purpose of applying the coating may be decorative, functional, or both. The coating itself may be an all-over coating, completely covering the substrate, or it may only cover parts of the substrate. An example of all of these types of coating is a product label on many drinks bottles- one side has an all-over functional coating (the adhesive) and the other side has one or more decorative coatings in an appropriate pattern (the printing) to form the words and images.

Paints and lacquers are coatings that mostly have dual uses of protecting the substrate and being decorative, although some artists paints are only for decoration, and the paint on large industrial pipes is presumably only for the function of preventing corrosion.

Functional coatings may be applied to change the surface properties of the substrate, such as adhesion, wetability, corrosion resistance, or wear resistance. In other cases, e.g. semiconductor device fabrication (where the substrate is a wafer), the coating adds a completely new property such as a magnetic response or electrical conductivity and forms an essential part of the finished product.

A major consideration for most coating processes is that the coating is to be applied at a controlled thickness, and a number of different processes are in use to achieve this control, ranging from a simple brush for painting a wall, to some very expensive machinery applying coatings in the electronics industry. A further consideration for 'non-all-over' coatings is that control is needed as to **where** the coating is to be applied. A number of these non-all-over coating processes are printing processes.

III. PERFORMANCE CHARACTERSTICS:

3.1 SPECIFIC FUEL CONSUMPTION (SFC):

Comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 2000rpm

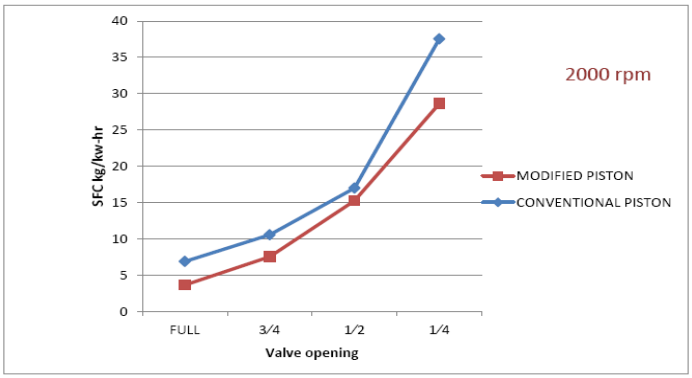

Fig 3.1(a) Comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 2000rpm

- From the above graph it is observed that specific fuel consumption for modified piston is minimum when compared with conventional piston for different valve opening at 2000rpm.
- For full valve opening SFC for modified piston is 3.24Kg/Kw hr and for the conventional piston is 6.88Kg/Kw hr at 2000 rpm.

Comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 2500 rpm

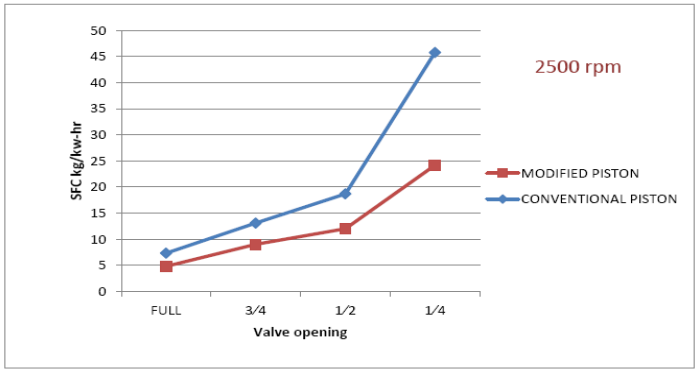

Fig 3.1(b) comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 2500 rpm.

- From the above graph it is observed that specific fuel consumption for modified piston is minimum when compared with conventional piston for different valve opening at 2500 rpm.
- For full valve opening SFC for modified piston is 4.80 Kg/Kw hr and for the conventional piston is 7.34 Kg/Kw hr at 2500 rpm.

Comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 3000 rpm

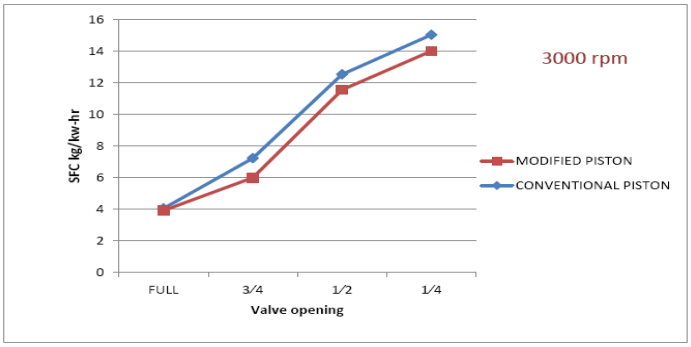

Fig 3.1(c) Comparing the specific fuel consumption of conventional piston and modified piston for different valve opening at 3000 rpm

- From the above graph it is observed that specific fuel consumption for modified piston is minimum when compared with conventional piston for different valve opening at 3000 rpm.
- For full valve opening SFC for modified piston is 3.93 Kg/Kw hr and for the conventional piston is 4.60 Kg/Kw hr at 3000 rpm.

3.2 VOLUMETRIC EFFICIENCY:

Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 2000 rpm

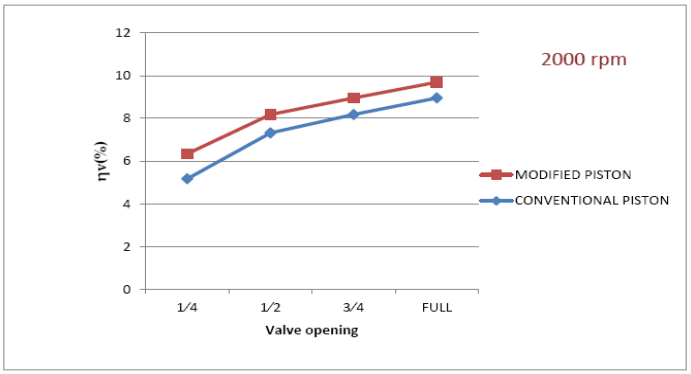

Fig 3.2(a) Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 2000 rpm

- From the above graph it is observed that volumetric efficiency for modified piston is maximum when compared with conventional piston for different valve opening at 2000 rpm.
- For full valve opening volumetric efficiency for modified piston is 9.7% and for conventional piston is 8.96% at 2000 rpm.

Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 2500 rpm.

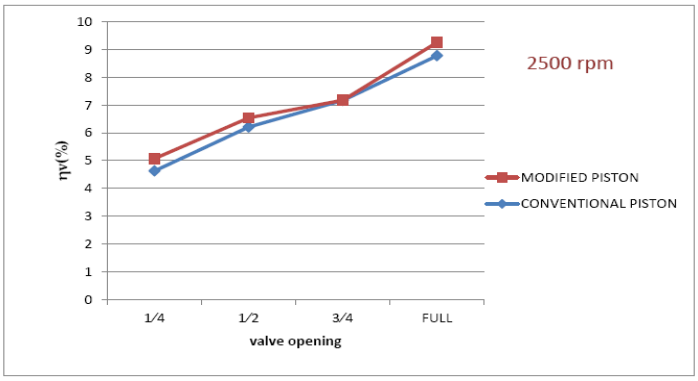

Fig 3.2(b) Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 2500 rpm

- From the above graph it is observed that volumetric efficiency for modified piston is maximum when compared with conventional piston for different valve opening at 2500 rpm.
- For full valve opening volumetric efficiency for modified piston is 9.26% and for conventional piston is 8.78% at 2500 rpm.

Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 3000 rpm

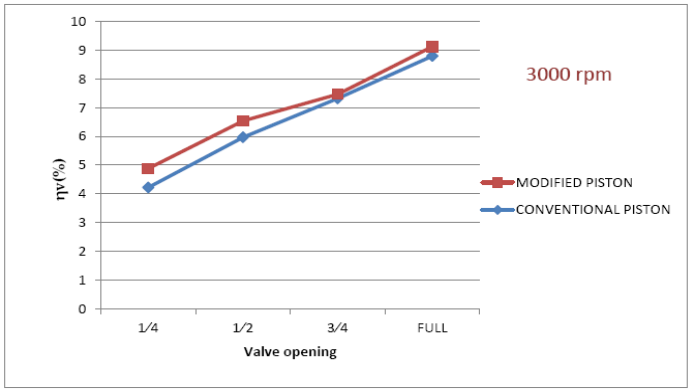

Fig 3.2(c) Comparing the volumetric efficiency of conventional piston and modified piston for different valve opening at 3000 rpm

- From the above graph it is observed that volumetric efficiency for modified piston is maximum when compared with conventional piston for different valve opening at 3000 rpm.
- For full valve opening volumetric efficiency for modified piston is 9.13% and for conventional piston is 8.80% at 3000 rpm.

CONCLUSION

- Brake thermal efficiency for modified piston at 10 microns metal coating for two stroke petrol engine is increased by 0.0035 Kw, 0.0036 Kw, 0.0002, 0.0013 Kw compared to conventional piston at the valve opening FULL,3/4**,** 1/2**,** and ¼ respectively**.**
- Specific fuel consumption of modified piston for 10 microns metal coating for two stroke petrol engine is reduced by 3.64 kg/Kw-hr , 3.02 kg/Kw-hr ,1.74 kg/Kw-hr, and 8.95 kg/Kw-hr compared to conventional piston at the valve opening FULL, 3/4**,** 1/2**,** and ¼ respectively.
- Volumetric efficiency of modified piston for two stroke petrol engine is increased by 0.74%, 0.78%, 0.86%, and 1.17% compared to conventional piston at the valve opening FULL, 3/4**,** 1/2**,** and 1/4 respectively.

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Design and Shape Optimization of Solid Concrete Blocks for Masonry Structures in Northern Areas of Pakistan

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Abstract- *This research paper aims at the development of new type of concrete block by introducing frog in the traditional solid concrete block. The main objectives are to improve the bond shear strength, diagonal shear strength, improve handling ability and reduce the weight of the optimized block to counter health injuries during construction process. Intensive comparative assessment of solid and frog concrete block was conducted. Final results concluded that frog concrete block was far superior in structural, economy, quality and handling performance.*

Index Terms- Earthquake, Economy, Frog Concrete Block, Shear Strength, Solid Concrete Block.

I. Introduction

IN developing countries i.e. Pakistan, India, and Bangladesh, getting a home ownership is extremely difficult for low income holder because of the exorbitant increase in construction and materials cost. Whereas, in developing countries, there are effective policies and housing programs set by governmental and financial institutes which grants aid to needy citizen in helping them out by providing cheap housing ownership keeping all imperative living standards in consideration**[1]**.

In 2005, Pakistan was hit by devastating earthquake of magnitude 7.6 which resulted in enormous human causalities and infrastructural damage. According to the government of Pakistan, the death toll was estimated to be 100,000 while 3.5 million people render homeless. The monetary damage was projected to be $ 5.3 billion. In addition, 203,579 housing units were completely destroyed, while, more than 196,574 units were severely damaged; which were designated unfit for living. Additionally, 55,000 units were moderately damaged but were cleared for livelihood **[2]**.

In Pakistan, the factor of economized building is normally misunderstood. Most of the time while incorporating the factor of economy other structural parameters are largely compromised. It was revealed in 2005 damage assessment report conducted by World Bank and Asia Development Bank in collaboration with Ministry of Planning and Development Division that the substantial damage was the direct outcome of poor structural design, low quality of construction materials, poor workmanship, fewer knowledge about different masonry materials, lack of confinement of masonry wall, and suboptimal construction practices **[3]**.

Masonry construction is one of the oldest form constructions dating back to 7500 BC. Usually, the most commonly masonry materials that are used all over the word are bricks and concrete blocks. In Pakistan, different masonry materials are used for construction. After 2005 earthquake, building topology assessment was conducted which revealed that the construction environment is mostly dominated by brick masonry with staggering 62.38% of the total construction environment. Other construction materials that are used in Pakistan are given in Figure 1**[4]**.

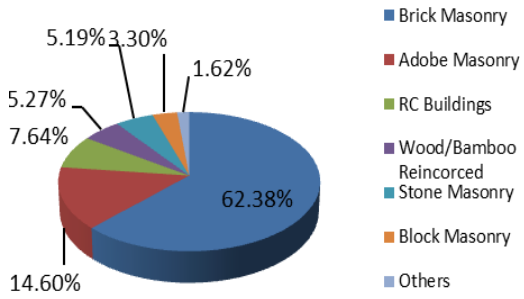


Figure 1: Building Topology of Pakistan

The annual production of bricks in Pakistan is roughly estimated to be 45 billion units **[5]**.

Now-a-days the use of brick as masonry materials is largely discouraged because they are not considered sustainable. These industries are responsible for 5% of total carbon dioxide emission and a total of 4.5% of artificial global warming **[6]**. Furthermore, the use of stone as a construction material is widely discouraged by designers due to its poor structural performance in earthquake regions. In addition, the production of bricks in mountainous regions is usually not feasible due to unusual climatic situation i.e. high rainfall **[7]**.

Besides, concrete blocks are preferred due to various advantages: thermal and sound insulation; durable; adequate strength and structural ability; fire resistant; low maintenance (no efflorescence); reduction in mortar consumption; environmentally friendly (constituents can be replaced by waste products like rice husk, fly ash etc); better architectural features; faster and easier construction **[8]**.

The above statements from designers and environmental experts skyrocketed the demand for concrete blocks in northern areas of Pakistan which were soon accommodated by locally established factories in that region. Moreover, in Pakistan, mostly solid concrete blocks are used and knowledge about hollow concrete block is very limited. Solid concrete blocks are heavy and causes health issues i.e. neck and back pain injuries

during material handling process. In addition, solid concrete block masonry is weak in shear strength, hence, fails to cater the demand of lateral force (earthquake), and ultimately contributes in collapse of the structure. Additionally, solid concrete blocks are costly when compared with other masonry construction materials i.e. stone and brick masonry. Therefore, this research addresses the aforementioned issues by optimizing the shape of solid concrete block by introducing frog in traditionally available concrete block and then comparing it with latter. It is pertinent to mention that no research work has been done in Pakistan on the shape optimization of solid concrete blocks.

II. Objectives Of This Research

The main objectives of this research are;

i. To introduce frog (depression) in traditional concrete block;
ii. To compare basic properties of solid and frog concrete blocks;
iii. To compare mechanical properties of solid and frog concrete blocks;
iv. To improve shear strength of concrete masonry structure;
v. To conduct economic analysis of concrete masonry structure with other masonry materials.

III. Experimental Setup & Test Results

Production of Solid and Frog Concrete Blocks:

The concrete block dimensions which is commonly used in northern region is 12 in x 9 in x 5 in (length x width x height). The dimension of frog provided in solid concrete block is 8 in x 5 in x 1 in (length x width x depth). The details of the frog concrete block are given in Figure 2.

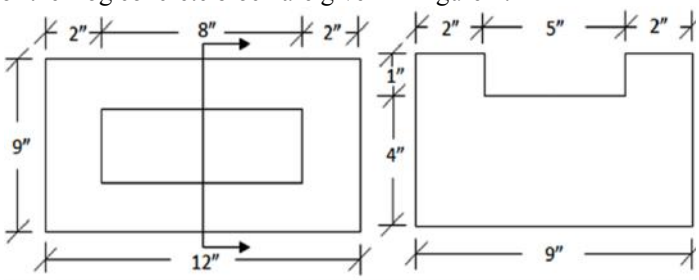


Figure 2: X-Sectional Details of Frog Concrete Block

Both type of concrete block were manufactured in 1:4:8 ratio (cement: fine aggregate: coarse aggregate), through semi-automatic molding machine as shown in Figure 3.

Figure 3: Semi-Automatic Concrete Block Machine

Figure 4: Frog Concrete Block Specimen

Basic Properties of Solid and Frog Concrete Blocks:

Basic unit tests i.e. unit weight, absorption test, compressive strength test, and modulus of rupture test were performed to analyze and compare the properties of solid and frog concrete blocks in compliance with ASTM C-140.

Table 1: Unit Test Comparisons

Test Name	*Solid Concrete Block*	*Frog Concrete Block*
Weight	41.23 lb	32.09 lb
Unit Weight	132.82 lb/ft^3	129.34 lb/ft^3
Absorption Test	4.21 %	4.54 %
Compressive Strength Test	953.90 psi	934.24 psi
Modulus of Rupture Test	142.53 psi	159.01psi

The test arrangement for unit compressive strength test was in accordance with ASTM C-140 as shown in Figure 5.

Figure 5: Unit Compressive Strength Test

The modulus of rupture test was performed in compliance with ASTM C-67. The test arrangement is shown in figure 6.

Figure 6: Modulus of Rupture Test

Mechanical Properties of Solid and Frog Concrete Blocks:

It is very essential that an engineer is well aware of basic mechanical properties not as an individual entity but also its behavior as an assemblage. Specially, in unreinforced masonry, assemblages tests play an imperative role in accurately assessing the structural performance of a masonry structure.

The mortar which was used for prisms construction had a ratio of 1:6 (cement: sand) with w/c of 0.85. The average 28 day strength was 1768.70 psi with COV of 5.71 %.

Compressive strength prisms were constructed as per guidelines set by ASTM C-1314. A total of three prisms were constructed in running bond with height to thickness ratio of 1.67. The prisms were cured for 28 days. Before testing, specimens were properly capped as per ASTM C-1552 specifications. The test arrangement for compression prism test is shown in figure 7. Results of the test are given in Table 2.

Figure 7: Compression Prism Test

Diagonal shear strength prism construction and test was performed as per ASTM E-519. The dimension of diagonal test prism was 25 in x 25 in x 9 in (length x height x thickness). A total of 3 prisms were constructed and were cured for 28 days before testing. The test arrangement for diagonal test prism is shown in Figure 8. The test results are given in Table 2.

Figure 8: Diagonal Shear Strength Test

The bond shear strength was performed according to BS EN 1052-3 standard. A total of 3 prisms in a triplet arrangement were constructed. The prism consists of three blocks arranged one over the other bonded with each other by mortar. The dimension of prism was 12 in x 9 in x 15 in (length x width x height). Prisms were cured for 28 days before testing. The test arrangement is shown in Figure 9. The test results are given in Table 2.

Figure 9: Bond Shear Strength Test (Triplet Test)

The detail test results of masonry assemblage are given in Table 2.

Table 2: Masonry Assemblage Test Comparison

Test Name	*Solid Concrete Block*	*Frog Concrete Block*
Compression Prism Test	865.98 psi	848.23 psi
Compression Test (Masonry Structure)	785.96 psi	779.85 psi
Diagonal Shear Strength Test	447.61 psi	512.33 psi
Bond Shear Strength Test (Triplet Test)	51.83 psi	98.53 psi

IV. Analysis & Discussion Of Results

The solid concrete block volume was reduced by 7.41% when frog was introduced; which contributed in 22.17 % weight reduction. In addition, the absorption rate and the unit weight of solid and frog concrete blocks were practically identical.

Regarding the unit compressive strength comparison, 2.06% drop was recorded in frog concrete block specimen due to reduction in the volume. Hence, it proved that reducing the quantity of specimen material will have negative implication on the compressive strength. Since, the compressive strength is already too great, the reduction will have no significant impact on the frog concrete block masonry. The COV of solid and frog concrete block specimens were recorded to be 13.98% and 11.28%.

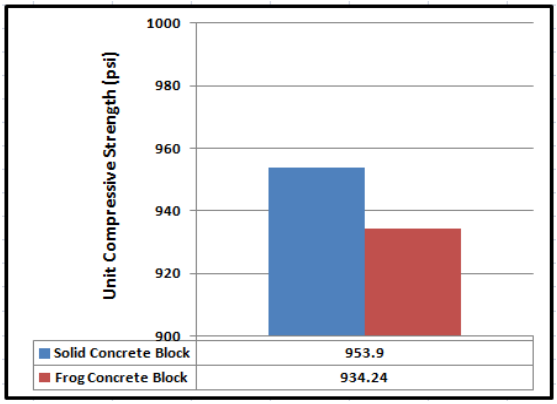


Figure 10: Unit Compressive Strength Test Comparison

Flexure capacity of solid and frog concrete block was evaluated and the result comparison is given in Figure 11. The flexure capacity of frog concrete block was improved by 11.57%. The COV of solid and frog concrete block specimens were recorded to be 7.78% and 3.33%.

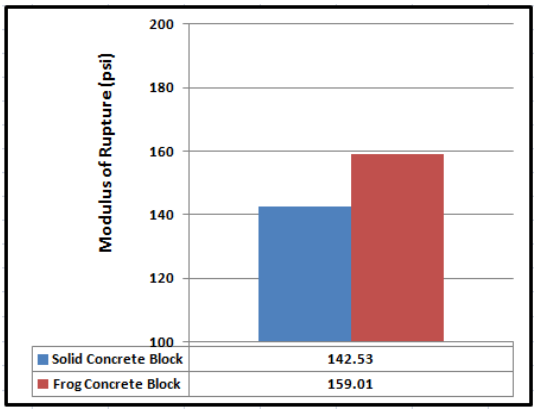


Figure 11: Modulus of Rupture Test Comparison

The compression test values of prisms constructed from frog and solid concrete block were compared. It was found that the marginal plummet recorded in the unit compressive strength test of frog concrete block was compensated by excess mortar. Hence, the compressive strength of both type of prism specimens were nearly identical as shown in Figure 11. The compressive strength of masonry structured was computed by multiplying a correction factor based on height to thickness ratio as shown in Figure 12. According to this, the height to thickness ratio was 1.67 and the correction factor for the aforementioned ratio was 0.9076. Usually, it has been proved that if the height to thickness is kept in between 2 to 5, there will be rapid decline in the compressive strength of masonry prism **[9]**. Furthermore, the strength of mortar usually does not play a major role in improving the compressive strength of masonry structure as the difference is usually trivial **[10]**. The COV of prism constructed from solid and frog concrete blocks were recorded to be 7.98% and 9.24%.

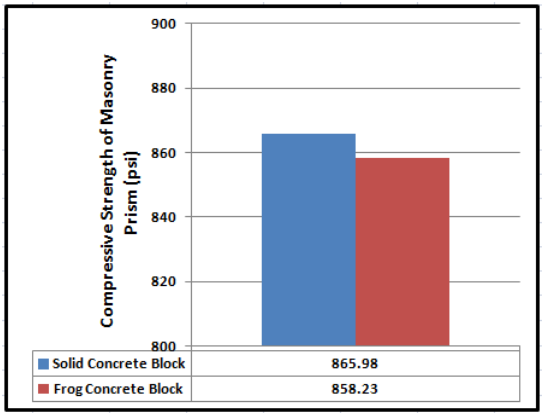


Figure 12: Compression Prism Test Comparison

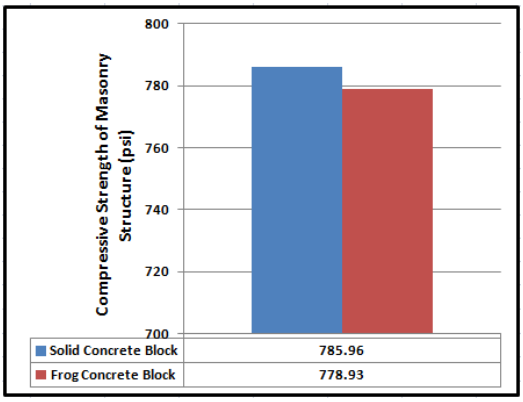
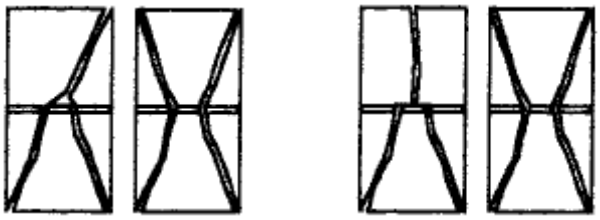


Figure 13: Compression Masonry Comparison

The failure mode of compression prisms were drawn and are given in Figure 14. Figure 14 (a) represent cone and shear type of failure, while Figure 14 (b) represent cone and split failure.



(a) Solid Concrete Block Prism **(b) Frog Concrete Block Prism**

Figure 14: Modes of Failures – Compression Test

The test results of diagonal shear strength of masonry also known the principal tensile strength, of solid and frog concrete block were compared as shown in Figure 15. Prism constructed from frog concrete blocks improved the shear strength significantly by a total of 14.46%. Hence, providing frog in traditional concrete block will potentially improve the shear strength and will improve masonry structural performance in earthquake regions. The COV of prism constructed from solid and frog concrete blocks were recorded to be 5.49% and 4.01%.

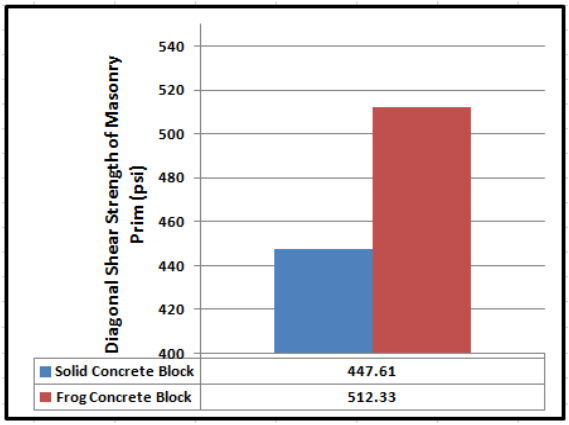


Figure 15: Diagonal Shear Strength Test Comparison

For the in-plane shear strength, triplet test was performed on specimens constructed from solid and frog concrete blocks and then the results were compared as shown in Figure 16. Block assemblage constructed from frog concrete block amplified the in-plane shear strength by almost 90%. Furthermore, it was also proved that altering mortar ratio had noteworthy effect on the bond shear strength. So, providing frog in concrete block will enormously improve the capacity of masonry structure for catering the lateral force in earthquake region. The COV of prism constructed from solid and frog concrete blocks were recorded to be 6.98% and 7.33%.

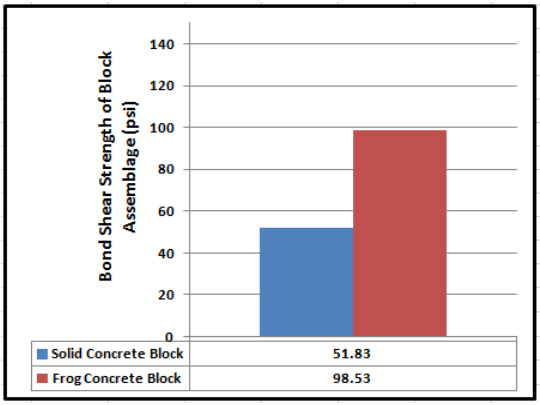
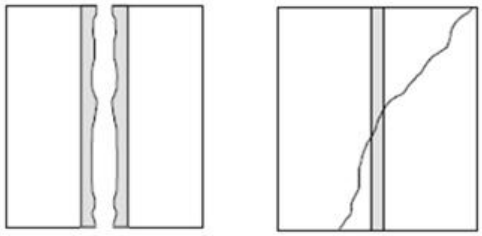


Figure 16: Bond Shear Strength Test Comparison

The failure modes of solid and frog concrete block assemblage were also noted as given in Figure 14. In solid concrete block assemblage, shear failure in mortar was observed, due to weak bond shear strength (Figure 17 (a)). In frog concrete block assemblage, crushing and splitting failure was observed (Figure 17 (b)).



(a) Solid Concrete Block Assemblage **(a) Frog Concrete Block Assemblage**

Figure 17: Modes of Failure – Triplet Test

For economic comparison, a theoretical study of flood protection wall was conducted having length of 250 ft, and height of 5 ft. The thickness of flood protection wall was kept 9 in – a usual field practice widely adopted in Pakistan. The unit price of brick in Pakistan is Rs. 7/unit. The dimensions of brick which is used in Pakistan are 9 in x 4.5 in x 3 in (length x width x height). A total of 13,333 units were required to construct this flood protection wall with a cost of Rs. 93,333. The unit price of solid concrete block in northern area of Pakistan is Rs. 22/unit. A total of 3000 units were required to construct the flood protection wall with a total cost of Rs. 66,000. Lastly, since the dimension of solid and frog concrete block were same, same number of units were required for the construction of flood protection wall, while, the only major difference was the unit price. After duel consultation with number of factory owners, they decided to sell the frog concrete block at Rs. 18/unit, if the product was commercialized. So, a total of 3000 units were required to construct the flood protection wall with a total cost of Rs. 54,000. Upon conclusion, it was proved that frog concrete block was 43% more cost-effective than brick masonry and 19% more efficient than solid concrete block masonry.

V. Conclusion & Recommendation

Based on intensive experimental work and meticulous investigation of masonry units and masonry assemblage's specimens of traditional concrete block and optimized concrete block, we have reached a conclusion that optimized version of concrete block, also known as frog concrete block, performed better in compressive strength, flexure strength and compression prism strength: the values of both type of specimen were nearly identical, hence, the difference can be ignored, as it had no potential impact on the structural performance. Additionally, the optimized concrete block specimens for diagonal shear strength and bond shear strength superseded in strength compared with its traditional counterpart, the solid concrete block. Lastly, the optimized concrete block was far more economical than solid concrete block and brick that are locally available in an exorbitant amount.

In order to analyze more closely its behavior in earthquake regions, it is recommended to perform full fledge 'Shake Table Test' to understand it structural performance and different modes of failure and to provide effective countermeasures to improve its performance.

In addition, more work shall be done on the dimension of frog. Optimized concrete block specimens shall be constructed with different frog dimensions. Different tests shall be performed to find out the dimension of frog that will produce maximum optimum results without compromising other parameters.

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Awareness and Effectiveness of Physiotherapy Interventions among Pregnant Women Attending Antenatal Care in Gangawatakoralle

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Abstract

Background:Physiotherapy interventions in antenatal health care provide many benefits to pregnant mothers. Adequate awareness of physiotherapy interventions in antenatal care is important to practice it during pregnancy. The quality of life during pregnancy in pregnant mothers and the effectiveness of physiotherapy interventions in quality of life has not been investigated previously in Sri Lanka. The aim of this study is to explore the level of the awareness of physiotherapy interventions in antenatal care and effectiveness of physiotherapy interventions in quality of life among pregnant women in Gangawatakoralle division, Kandy.

Methods:A descriptive cross sectional study was conducted among 174 pregnant mothers. Effectiveness of physiotherapy interventions in quality of life was assessed among 52 mothers after one month period using a self-administered questionnaire.

Results: Awareness of physiotherapy among pregnant women is poor (38%) (n=174). Awareness of physiotherapy interventions in antenatal care is poor (40%) (n=174). There is no association between age and physiotherapy interventions in antenatal care. ($p=0.690$, $\alpha=0.05$). There is no association between education level and physiotherapy interventions in antenatal care ($p=0.474$, $\alpha=0.05$). There is an improvement in quality of life by means of physiotherapy interventions in pregnant women ($p=0.007$, $\alpha=0.05$).

Conclusions:Awareness in physiotherapy in antenatal care among pregnant women attending antenatal care in Gangawatakoralle is poor. There is a positive effect of physiotherapy interventions in quality of life of pregnant women during pregnancy. Measures should be taken to improve their awareness, knowledge and practices of antenatal physiotherapy during pregnancy.

Key words: antenatal care, awareness, quality of life, physiotherapy

INTRODUCTION

A healthy woman is the most important bond in the family, which in turn becomes an important factor in the society. Pregnancy, childbirth and postpartum are common events in the life of women that influence all aspects of their lives. Some studies have reported that physical performance of women and their level of health and wellbeing decrease after childbirth compared to pre-pregnancy period, having a negative effect in their quality of life (Bahadroran and Mohamadirizi, 2015).

Physiotherapy plays an important role in obstetrics, both in antenatal and postnatal periods. It is not associated with any risk factors to the newborn. It can also lead to beneficial, long-term effects for women (Nascimento, 2012). Physical activities are important for pregnant women as they help to overcome pregnancy-related complications and maintain good physical fitness. Women who practiced antenatal exercises (birthing ball exercises) with supervised practice showed quicker deliveries during labour (Fournier, 2017). In addition, it is proved that higher physical activities in multiparous women during late pregnancy positively influence the duration of the second stage of labour (Kondo, 2016). Furthermore there is evidence that proves females who practiced antenatal exercises have fewer chances of caesarean section, backache and urinary incontinence (Khatri and Pandey, 2014).

Antenatal exercises include pelvic floor exercises (Kegel exercises), core stability, abdominal exercises, breathing exercises, aerobic, postural education and back care (Britnell, 2005; Kramer, 2006).Pelvic floor exercises (Kegel exercises) are commonly used prenatal exercises to strengthen the pelvic floor muscles. It is proven that an intensive pelvic floor muscle training during pregnancy prevents urinary incontinence during pregnancy and after delivery (Morkver, 2003). In addition, there are evidences to show that pelvic floor muscle strengthening has been effective at shortening the first and second stages of labour. Antenatal

pelvic floor muscle strengthening may not increase the risk of episiotomy, instrumental delivery and perineal laceration in the primigravida, a women who is pregnant for the first time (Du, 2015). Pelvic floor muscle strengthening also has a positive association with improvement of stress urinary incontinence (Bo, 2003).

Obstetrical physiotherapy is an important part of maternal health in developed countries. But in countries such as Sri Lanka, obstetrical physiotherapy is not yet well known. Sri Lanka has become the best country on maternal mortality rate among South Asian countries in 2014 (The Island, 26 January, 2014).However, the quality of life during pregnancy and postpartum is still uncertain. Therefore, assessing the quality of life of pregnant women will provide important evidence to improve health related services of our country.

Furthermore, some studies have proven that physiotherapy interventions in antenatal period helps pregnant women in reducing complications of pregnancy, reduce the time spent in labour (Du, 2015) and helps faster post-delivery recovery (Arati et al.,2014). It is a fact that the role of physiotherapy interventions increases the effectiveness of maternal healthcare.

Many women suffer in silence and are unaware of available physiotherapy interventions. Several studies around the world have shown that pregnant women who attend antenatal care are unaware of physiotherapy interventions, which are practiced in antenatal period. Due to lack of awareness, women fail to get the advantage of physiotherapy interventions that can improve their quality of life and relieve their suffering. Therefore, it is necessary to make women aware of physiotherapy interventions that are practiced for maternal health.

METHODS

A descriptive and mixed cross sectional study was conducted among pregnant women attending antenatal care in Gangawatakoralle from May to July 2017 using a self-administered questionnaire. Approval was obtained from ethics review committee, faculty of allied health sciences, university of peradeniya and relevant authorities.

Questionnaire was intended to assess the awareness of physiotherapyand physiotherapy interventions in antenatal care and the quality of life of pregnant women. WHOQOL-BREF was used (obtained from WHO website) to assess the quality of life in which was evaluated from 4 domains; physical health, psychological, social relationship and environment by 26 questions.

All the pregnant women attending antenatal care in Gangawatakorella were taken as the study sample and pregnant women who did not give consent, pregnant women who are in their first trimester, pregnant women who are absent for antenatal care in Gangawatakoralle, and pregnant women with following conditions; hypertension, placenta previa, incompetence cervix, gestational diabetes, loss of amniotic fluid were excluded from the study.

Nine subdivisions were included for the study and 2 subdivisions (Udabowala and Suduhampola) were not included due to unavoidable reasons. An explanation of the study was given to the pregnant mothers who were volunteers to participate in the program. Questionnaires were distributed among the participants along with the consent form. Investigators conducted an awareness program of physiotherapy interventions used in antenatal care with demostrations. The participants were met again after one month for the second time. At that time, post-test data were collected with the second questionnaire to re-assess quality of life measures.

Statistical analysis:
Statistical Package for the Social Sciences (SPSS) version was used.

RESULTS

Of the 320 pregnant mothers who were approached, 146 had to be excluded because their consent could not be obtained (7) and 139 were under the exclusion criteria. Hence, a total of 174 pregnant mothers were considered for this study.

Awareness of physiotherapy and physiotherapy interventions in antenatal care:

38% (n=66) of pregnant women were aware of physiotherapy. Among 38% of pregnant mothers who were aware of physiotherapy, 94% (n= 58) of pregnant mothers were not aware of physiotherapy interventions in antenatal care. Among the 62% (n=108) of pregnant mothers who were not aware of physiotherapy, 10% (n=11) of pregnant mothers were aware of physiotherapy interventions (exercise) in antenatal care. According to the results, only 40% of the study participants were aware of antenatal physiotherapy.

Pearson Chi-Square test revealed that there was no significant relationship between age of pregnant women and awareness of antenatal physiotherapy, (p=0.05) (table 1) and no significant relationship between educational level of the study participants and their awareness of antenatal physiotherapy (p=0.05)(table 2).

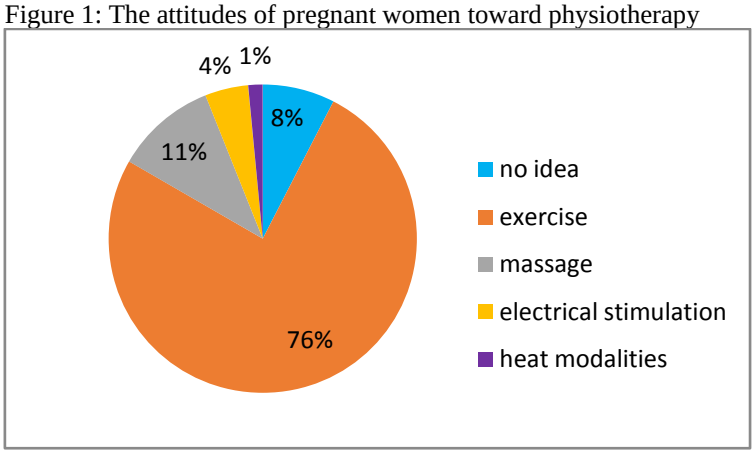
Table 1:Awareness of antenatal physiotherapy versus age

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.066[a]	5	.690

Table 2: Awareness of antenatal physiotherapy versus educational level

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.543[a]	5	.474

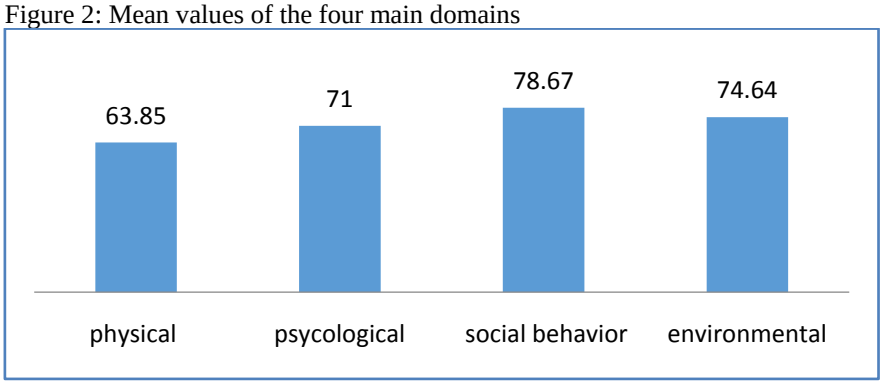
Figure 1: The attitudes of pregnant women toward physiotherapy



Quality of life of pregnant women:

It was evaluated by analyzing four main domains; physical, psychological, social behavior and environmental factors. Figure 2 displays the mean values of transformed scores of these four main domains accordingly to WHOQOL-BREF questionnaire.

Figure 2: Mean values of the four main domains



Effectiveness of physiotherapy intervention on quality of life of pregnant women attending antenatal care in Gangawatakoralle

From the total sample of 174, only 66 pregnant women mothers from 6 divisions of Gangawatakorelle were included in the post-test sample. It was due to that some participants were absent for the clinics and some had the deliveryduring the one month period. Furthermore, 4 divisions had to be eliminated from post-test data collection due to time constraints. The results of the post-test indicated that 52 out of 66 (79%) pregnant mothers reported to have done the prescribed antenatal exercises.

The effectiveness of physiotherapy interventions was analyzed by two sample t-test. Pre-test and post-test mean values were interpreted in paired sample t-test, calculated p value is 0.007 at α=0.05. Therefore there is a significant improvement in quality of life before and after applying physiotherapy interventions during pregnancy.

All pregnant mothers who were met for the second assessment (including those who could not do the prescribed exercises, n=66), mentioned in their feedback on our antenatal programme as “good” and “very important to have.”

Table 3 shows that the average rating of statements regarding physiotherapy and table 4 indicates the prevalence of complications in pregnancy in second and third trimester.

Table 3: Average rating of statements regarding physiotherapy

	Average score
Physiotherapy has positive role in antenatal care	8
Physiotherapy can reduce complication of pregnancy	8
Physiotherapy helps to fast post-delivery recovery	8
Physiotherapy intervention were helpful and should be recommended During pregnancy	8
Antenatal exercise programme should be done in antenatal clinics	9

Table 4: Prevalence of complications in pregnancy pertaining to each trimester

Complication	Prevalence in 2nd trimester	Prevalence in 3rd trimester
Backache	42.6%	27.8%
Urinary incontinence	33.9%	17.3%
Painful leg	39.1%	15.6%
Leg swell	14.7%	10.3%
Hand swell	7.8%	2.6%
numbness	15.6%	10.3%
Leg cramp	20.0%	17.3%
Fatigue	24.3%	11.3%

DISCUSSION

The awareness of physiotherapy services available in hospital (38%) and utilization of physiotherapy interventions during antenatal period and also overall awareness regarding physiotherapy (40%) are extremely low. Among the 62% of pregnant mothers who were not aware of physiotherapy, 10% were aware of exercises in antenatal care.

In terms of the specific objectives of the study, there was no relationship between awareness of physiotherapy interventions in antenatal care and the age ($p=0.69$ $\alpha=0.05$). Similarly, there was no relationship between awareness of physiotherapy interventions in antenatal care and education level ($p=0.47$ $\alpha=0.05$). When considering the education level, less than 50% of each category, except one group (diploma, n=5) responded positive for awareness of physiotherapy. It emphasizes that regardless of age or educational level, the awareness of physiotherapy interventions in antenatal care is very poor.

According to Sajan, (2013) there is a significant relationship between mother's age and utilization of physiotherapy interventions, and mother's education level and utilization of physiotherapy interventions. But in our study, the utilization of physiotherapy services during the antenatal period is negligible and it was found that there was no relationship between age or educational level and awareness of physiotherapy. In addition, the majority (77%) of the participants in our study selected exercise as their perception between the four given choices.

The effectiveness of physiotherapy interventions is assessed through the physical domain of quality of life by comparing pre- and post-intervention scores on a questionnaire.From thepre-test, the overall quality of life was in an appreciable level among the pregnant mothers. We assume that the reasons for this observation are satisfaction of pregnancy, cultural values, positive attitudes toward pregnancy and positive support by family members. The social behaviour domain is the domain which obtained the highest value among four domains while physical domain obtained the lowest value. This shows the negative effect of pregnancy in physical health of pregnant mothers.

According to the post-intervention results, there was an overall improvement of quality of life in physical domain compared to pre-intervention values. However, some of the individual values have decreased comparing to the pre-intervention assessment. It may be due to progression of pregnancy, increasing foetal weight, hormonal changes and psychological stress. Because of

increase of foetal growth, the foetal weight also increases, which in turn affects the centre of gravity. In addition, some mothers had not followed adequate frequency of exercises which was prescribed during the intervention programme.

According to the results, backache was the major complication of pregnant mothers (46.55%). The prevalence of backache in the 2nd trimester was higher than in the 3rd trimester according to our study. This particular observation contradicts with the study conducted by Carvolho (2016) on evaluating the frequency of lower backache during the pregnancy, which showed that lower back pain was more frequent during3rd trimester.

Out of 66 mothers, only 52 mothers reported to have engaged in recommended exercises at home. Most of the pregnant mothers had done the prescribed exercises according to their complications of pregnancy. As the reasons for not engaging in exercise, majority of the participants mentioned lack of time and tiredness when coming back home after the job and family work.

CONCLUSION

Awareness of physiotherapy treatments and interventions in antenatal care among pregnant mothers in Gangawatakoralle area is poor. However, the quality of life of pregnant mothers who are attending to the antenatal clinics in Gangawatakoralle is already in a good level among them.

The study reveals that there is no significant relationship between age and educational level of pregnant women and the awareness of physiotherapy interventions in antenatal care. The significant reason for the poor awareness about antenatal physiotherapy interventions are, poor practice of physiotherapy interventions during antenatal period in general and poor referral of pregnant mother for physiotherapy treatments or exercises. It was found that we could improve physical wellbeing through introducing physiotherapy interventions which in turn improved quality of life. Significant number of pregnant mothers (79%) followed the recommended antenatal exercise programme. That was a satisfactory outcome we could obtain and some pregnant mothers were willing to get involved in these kinds of programmes. The only limitation for them to practice physiotherapy interventions was the lack of awareness of antenatal physiotherapy. Therefore, we strongly suggest that these type of programmes should be conducted in the community more often and, if possible, all areas.
Physiotherapist have a significant role to play for the establishment of physiotherapy services in women's health and it will pave the way for improve quality of health service provided to pregnant women in Sri Lanka. Another important fact that we observed was the positive attitudes of women where they tend to face everything strongly and with a positive approach. Almost all pregnant mothers perceive their quality of life and health more towards the positive side.

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Voice Recognition Software with Emotion Discerning Capabilities

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Abstract- The purpose of this project is to develop a voice recognition system that distinguishes different emotions. Innovative headways have made it conceivable to make various software applications for speech recognition. However, currently available software – commercial as well as research-based voice recognition - is not advanced enough to correctly discern and categorize the emotional status of a speaker (Wheeler et al., 2017). The aim of this project is to create software using MATLAB that will not only identify and categorize the emotions of a speaker but also provide appropriate feedback by the determined moods/emotions.

Index Terms: Matlab program, voice recognition system, software, samples of voices.

I. Introduction

Software solution is ideal to this project because it is possible to program almost anything if the process is well understood and is also accurately defined. In this project, the programmers will define various emotions and moods using well-recognized conventions. For instance, happy people whisper and laugh frequently. On the contrary, disturbed individuals talk angrily; they raise their voices and may swear several times. The voice recognition software will be programmed to monitor voice intonation, identify voice stress patterns, and determine the nature of the words uttered to capture the moods or emotional status of the speaker. The aim is generating content that is mirrors their emotional state.

For a start, the application will be programmed to distinguish between two common emotions: happiness or joy, and sadness or agitation. When a person is happy, the program will output relevant content that will encourage the individual to share his or her happiness. It will also encourage them to continue talking. When the software recognizes that a person is sad, it will provide comforting words to help the person deal with his or her ordeal. By focusing on two emotions at first, it will be possible to gain significant knowledge and skills regarding how to improve the application in the future. It is also easier to design a simpler version of a pilot program.

II. Description of How the Engineering Design Process is Incorporated into the Project

The success of the program will depend on the utilization of efficient procedures. In this regard, the engineering design process will be strictly followed to ensure thoroughness and clean implementation. The methods of engineering design are the establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation (Fuggetta& Di Nitto, 2014).

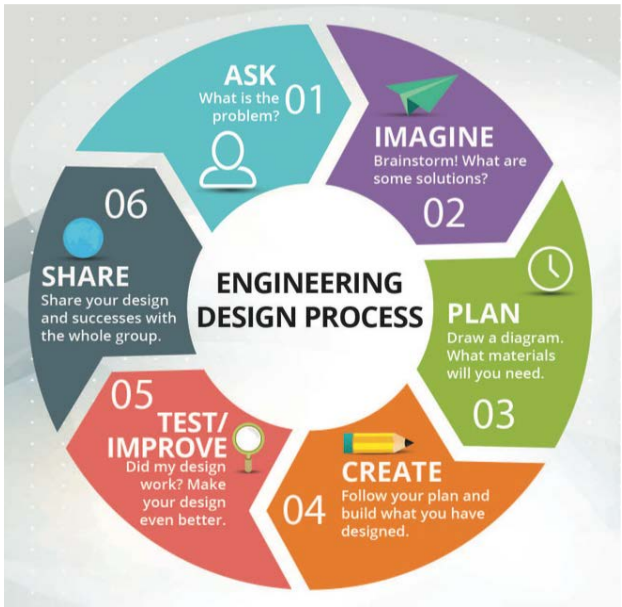

Fig 1: Engineering Design Process As shown in Fig 1, the fundamental elements of engineering design process are

establishment of objectives and criteria (asking what the problem is), synthesis (imagining or brainstorming some solutions), analysis (planning), construction (construction by following the plan), testing (to see if the design works), and evaluation (which includes sharing the success of the project with others).

The primary objective of this project is to create voice recognition software that can discern the emotions of a speaker. After the system successfully classifies the type of emotions the user exhibited, it can authentically engage the user by accessing the internet, and – through speech technology – utter relevant stories whose similarities would either enforce positive emotions or mitigate negative ones. The voice recognition system will possess some characteristics of an intelligent system. This socially aware system is capable of forging some form of semi-natural emotional bonds with the people. The system will most likely find numerous applications in robotics and other areas.

As far as the criteria are concerned, voice-based characteristic such as pitch and frequency will be used to define the mechanism for judging the emotions based on how words are uttered. Visual cognition is another tool that might be employed in MTALAB. With the computer vision tool box that is available in MTALAB, capturing facial features such as the mouth or eyes orientation is a very effective way of identifying emotions. But essentially, judgments of the emotions of an individual will be based on intonation, and the specific words said. It is expected and assumed that people interacting with the software will follow globally recognized – cross cultures - conventions most of the time. For instance, it is anticipated that a person filled with happiness will talk pleasantly and use kind words. They will also laugh often and be more attentive. On the other hand, a frustrated individual will be expected to swear frequently, or at least use negative words. The software will pick these variations in voice and intonation to determine the moods of a person accurately. The program will also contain learning capabilities so that it can increase its effectiveness over time.

Synthesis is the next step in the engineering design process. It is about looking at the idea and putting it all together to create a product that meets the desired goals. The synthesis may involve an analysis of the feasibility of the product and its appropriateness (Tayal, 2013).

In this project, integration will include considering the viability of adding new feature to current project, and how it can be used shortly to solve global problems. It is always important to ensure that projects are not only doable but also economically viable. Previously, it has been noted that a piece of software that can accurately discern the moods of a person can be integrated into socially aware robots to improve how they relate to humans.

The analysis is the detailed examination of the elements or structure of the new product with the aim of understanding its inner workings and making any necessary improvements. For this project, the analysis will focus on the accuracy of the definition of emotions. Errors in definition will lead to inaccurate interpretations of emotions and moods. Therefore, it is important to be as accurate as possible and to ensure that the working definitions for the program are useful and reliable. In this project. Additionally, psychologists and language experts will be consulted to offer their inputs. Using

the services of cultural and language professionals will increase the effectiveness of the definitions provided, and reduce the likelihood of error.

Construction is the actual method of building the system. In this project, construction will be done using Matrix Laboratory (MATLAB) programming language. Carefulness should be highly maintained during the construction phase to avoid critical errors that can render the system functionless and in inappropriate (Moore, 2014). The use of an appropriate and resilient system can reduce the level of mistakes during construction. MATLAB is the preferred construction method because it is the language of technical computing. Voice recognition is a specialized function that requires a flexible programming language that is optimized for solving technical problems. MATLAB is considered the most dominant and preferred language for expressing computational mathematics in a natural way (Moore, 2014). Other reasons for choosing MATLAB include the fact that it allows engineers to run their analyses on big sets of computational data and easy integration with other programming languages. Finally, MTALAB has powerful built-in tools that save hours of development time, especially during the prototyping phase.

Once construction is complete, testing must be carried out to see whether the new system achieves the previously identified goals. The testing primary function is to determine the resilience of the scheme, and what developers may need to modify to improve the performance. Testing for this voice recognition software will try to determine whether the program can identify emotions and respond accordingly or not. The testing phase is also critical because it is used to determine whether any errors were introduced during coding. The testing team can then immediately fix such errors before the system is deployed.

A system that has been constructed, tested, and found to meet all requirements as outlined in the project proposal must go through an evaluation to allow the builder to make decisions about the nature and appropriateness of the final output. After evaluation, the builders can either embrace or enhance the project through another cycle. For the speech recognition software, the evaluation will determine its effectiveness and appropriateness.

IV. V-chart for System Design and Verification

The V-chart - or model as used in software engineering - is comparable in some respect to the waterfall model (Chandra, 2016). The V-chart shows the software development process and how different phases are related to each other (Mc Hugh et al., 2013). Fig. 2 represents the V-chart model for the current project.

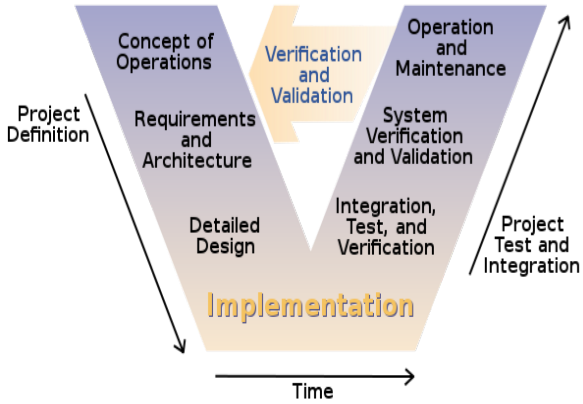

Fig 2: V-Chart Model

V. Summary of How Realistic Design Constraints Are Being Incorporated into the Project

The current project is enormous, and there is considerable hope that it will contribute positively towards the advancement of knowledge especially in speech recognition technologies. However, the economic, environmental, ethical, health, safety, social, political, sustainability, and manufacturability problems also plague the project. The economic challenges are being addressed by seeking sponsorship and reducing wasteful and expensive processes. Environmental issues are being addressed through multiple approaches, including efficient utilization of resources. Proper steps are also being taken to ensure there are no ethical concerns like an infringement of intellectual property or lack of compensation for those who are part of this great process. Health and safety issues are managed by using appropriate inputs and ensuring that outputs are not hazardous.

VI. Description of the Deliverables of the Project and Their Final Status

The final deliverable for the project is a voice recognition software application that can accurately categorize the mood or emotional state of an individual.

1) Product Development

Product development will commence immediately after all the necessary details have been confirmed. It is important to have all details in order before beginning the actual development to ensure a smooth process. A team of software engineers, who are conversant with MATLAB to ensure the achievement of the best outcomes, will develop the product. Effective development of the product will depend on exploratory conceptualization, plans and requirements, requirement baseline, product design, and detailed design. The exploratory conceptualization is to develop a prototype of the voice recognition software. The requirements will include the ability to program and define the key variables of the software. The software will recognize voices and classify them according to moods.

2) Testing

Testing of the product will be performed after every significant milestone of the project. Regular testing ensures that errors are detected and removed early. Testing will look at the effectiveness of the product and determine what needs to be done to align the final product with the aims and objectives of the project. Tests for the product will include unit tests, integration and system test, acceptance test, validation and verification, and installation. Unit tests will check every piece of software produced to ensure it meets the project requirement. Integration and system tests will ensure that the software is carefully and appropriately put in the electronic devices. Thereafter, the user acceptance test will aim to ensure aspect is executed according to

plan. Lastly, the user acceptance tests validate the new system and verify it before installation. During the installation process, the engineers will maintain all records of both proper software performance and of any failure encountered. The revision of the system to compensate for errors detected during these tests will follow the similar procedures and controls as for any other software change.

VII. Other Considerations

The speech recognition software will be devised in the English language. In other words, the software will only recognize words that are spoken in English. The program will also capture the feelings or moods of the speaker – through voice and visual cognition - and produce consistent output to either encourage the speaker to keep sharing information or comfort the speaker. This new development will become an important component especially in applications such as the socially conscious robots.

1) Economic

Economic considerations are important in every project. In the current one, measures will be taken to ensure that there are some economic advantages to it. For instance, it should be easy to manage and use. The product should also be affordable, and the benefits of the project should surpass the cost of development. It should also be easy to distribute and utilize the new software after it is completed. The current plan is practical and makes economic sense because it can be used in robotics and the manufacture of automobiles. Additionally, machine learning capabilities should be incorporated into the project. This will lay the foundation to further develop the product to be utilized many other diverse walks of life such as mental institutions.

2) Environmental

The project will bring about real relationship and interactions between human beings and machines. Since creating this voice recognition software involves coding, the project does not pose any direct threat to the environment. In fact, the software will possibly contribute towards preserving and improving the environment; an enhanced version of the software – through machine learning – could detect through their voice the likely hood of involvement in an altercation. By so doing, the software will calm the person and reduce the likelihood of the person destroying the environment due to anger. Or, it could alternatively call a relative to be present in the scene.

3) Ethical

The project is also acceptable when ethical considerations are made. Engineers will create the application with the aim of giving people some socially significant feedback. The voice recognition software does not “indulge” in any unethical processes. Instead, it encourages individuals to be more effective and more in-tune with the environment. The engineers will also uphold honesty in their work. Consequently, the final product will be caring, fair, and respectful just as programmed. Engineers will also respect the rights of others in every phase from programming to implementing the software.

4) Health and Safety

The product will be created such that it is appropriate and does not have any health or safety issues. The use and disposal of the product will not cause any health problem because it is essentially code. The hardware components required to implement the program will also meet the requirements created by the relevant health and safety protection agencies.

5) Manufacturability

To mass produce the software efficiently and economically, a legacy organization will be given the source code and told to implement it in a variety of hardware components. In the initial

stage, a company will be required to create software that is integrated into a simple hand-held gadget that people can talk to. The gadget will have speech recognition and speech output capabilities.

6) Political

The project will be created to follow existing regulations to avoid issues that may arise from failure to abide by existing laws. The engineers will look at all relevant legislation and regulations influencing software development and comply with every single requirement.

7) Social

The current software will be used for social purposes. In fact, the speech recognition software will be helpful in guiding individuals on what they need to do depending on their moods and emotions. Social concerns are always related to a broad grouping of people with common traditions, institutions, or corporate activities and interests, and it is always important to respect their values. On a different note, the product can be further developed to promote cross- cultural awareness. Since it will incorporate machine learning algorithms that will increase the product cultural awareness as it is being used.

8) Sustainability

The project is also sustainable as it does not utilize any natural resource once completed. It is a simple voice recognition software that will identify a person's emotions immediately when the user talks. This project is sustainable in a way that it does not deplete or permanently damage the use of a resource. Additionally, the product can be utilized in customer service settings. It can give feedback to employees regarding how they fared during interactions with customers. And fee collected from clients can be used to further sustain and develop the product.

VIII. Conclusion

Field recognition systems exist in the market today but none of them can be said to be effective in the discernment of the moods of the person talking with the aim of providing them with the needed advice. The current project will create voice recognition software with the capability of understanding the moods of the person with the aim of giving appropriate advice. Such voice recognition systems can be used to improve the human-machine interactions in the future and form a strong foundation for other improvements especially with regards to socially aware systems.

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Human Resource Development (HRD) Practices of Non-Governmental Organisations (NGO's) in Ghana's Health Sector

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Abstract- Over the years Non-Governmental Organisations (NGOs) have played a vital role in the socio-economic development of Ghana. The study examined the HRD practices of NGOs in Ghana with particular focus on NGOs in the health sector. The study combines mixed research methods. A sample size of 30 NGOs registered with the Department of social welfare and members of the Ghana Coalition of NGOs in Health was used. Descriptive statistics was used to analyze the data. The study observed that although NGOs in Ghana health sector employ some HRD practices in their operations, much attention is not giving to these practices. The study therefore recommended that Human resource development need to be introduced properly to the NGOs as it helps maintain talents in workers due to the capacity trainings attended.

Index Terms- Resource; Human; Health; Development; Sector, NGOs

I. Introduction

The idea of NGO became popular in 1945 resulting from the establishment of the United Nations Organisations which recognised the need to give a consultative role to organisations which were classified as neither government nor members (Willet, 2002). NGOs over the years have played a significant role in many instances to move states from one party rule towards multi-party democracies, hence providing the crucial internal impetus to complement the prevailing favourable international conditions that emerged for democratic transition at the end of the bi-polar era. (Masterson, 2006).

In contemporary times NGOs have created the platform for citizens to work togethervoluntarily to promote social values and civic goals pertinent to the development of thesociety. They promote local initiative and problem-solving through their work in variousarenas of social life namely environment, health, poverty alleviation, culture & the arts,education among others. NGOs reflect the diversity of society itself. Such organisationsenable experimentation and social change by taking on challenges that the public and privatesectors simply do not (Singh, 2014). NGOs are part of civil society organizations that are able to take risksthat are economically unacceptable to business and politically unacceptable to government.

Today, countless innovations pioneered by NGOs have subsequently been adopted asgovernment policy interventions. The Millennium Development Goals prior to their adoptionwere being pursued by various local and international NGOs. The role of NGOS and other Civil Society groups in the 2012 elections is a clear example of the power of such organisations in nation building.

Numerous models of service delivery that are considered "best practice" today were devised, tested, and improved over many years of experimentation by NGOs (Heintz, 2006). In Ghana for example NGO and Civil Society advocacy campaigns induce the government to adopt policy reforms and force improvements in business practices.NGOs in Ghana are formed independently of the State but register voluntarily under specified laws in order to gain official recognition to pursue purposes that are not for profit but oriented toward public benefit. Such registration qualifies NGOs to access public development fund, be it from external Development partners or benefit from tax exemptions. NGOs in Ghana may be local or international; secular or faith-based; and membership or non-membership based. They operate in fields such as health, education, rural and urban development, environment, population and social welfare (GAPVOD Draft National Policy 2004).

NGOs play a very important role in the socio economic development of Ghana by supplementing the state's efforts in providing sustainable development. They provide umbrella of services including the promotion of equality and human rights, legal services, education and training programmes and they also fill development gaps where government is short. According to Lekorwe (2007, p.7) it is through the complementary efforts of NGOs and interest groups that good governance can be promoted. NGOs also help to ensure that government goods and services reach the grassroots, the poor, the disadvantages in society and the marginalized. They also help citizens participate and influence the decision making process as well as the management of public affairs.

NGOs are also involved in employment creation, micro-credit/financing, economic development, skills training, gender awareness and action, peace and human rights, informal economic activity, anti-corruption, poverty reduction and advocacy on policy reforms (Lekorwe, Ibid). They operate across sectors, regions and direct their services towards the community, the deprived and underprivileged as well as the general public. NGOs are not homogenous actors. They differ in activities, structure, organisation, resources, leadership, membership, ideology and aspirations.

Contemporary Organisations are placing much value on human resources considering their relevance as an important asset necessary to survive and achieve sustained competitive advantages. In spite of this, the usage of effective human resource management (HRM) practices in many local Non Govermental organizations (NGOs) is often low in the list of management priority (Batti, 2014). According to Batti (ibid) Successful NGOs are those that recognize the significance of the human element on organizational success and emphasize on their development, satisfaction, commitment and motivation in order to attain desired objectives. NGOs often do not realize the relevance of effective management of human resources to the wellbeing of the organization and hence do not invest adequate time or resources to build their capacity in necessary human resource competencies (Batti, ibid). Against the background the study seeks to examine the human resource development (HRD) practices of NGOs in the health sector of Ghana.

II. PROBLEM STATEMENT

For NGOs to thrive there is an urgent need for professional human resource development practices within the work environment due to the particular important role they perform in the society. However, most NGOs receive little sponsorship, making one wonder how they are able to engage the services of such high profile professionals to streamline their human resource planning.Moreover, increased societal and human needs have led the proliferation of NGOs theirattendant activities. There are reports of low salaries, high staff turnover, mass desertion,ineffective leadership and above all misappropriation of project funds (Regional Reports ofGCNH). This study therefore seeks to examine the role of NGOs in the development ofGhana's human resource and further assess the impact of the human resources developmentstrategies pursued NGOs in Ghana, particularly NGOs in the Health sector.

The purpose of this study is to find out the practices currently being employed by the NGOs in the health sector in Ghana. The study also seeks to examine the policies that guide HRD activities in NGOs in Ghana with particular focus on the NGOs in the health sector and also identify the factors that influence various HRD practices.

III. LITERATURE REVIEW

NGOs are said to be independent, not part of the government, voluntary, non -profit and charitable which promote development oriented activities for vulnerable groups in society. Considering that as an organization, it focus on the effort and competencies of human resources in achieving its aims, there is the need for NGO's to adopt and implement human resources practices essential in enhancing the wellbeing, competencies and motivation of its employees. This implies that, although NGOs do not aim to achieve profit, to attain its goals for which they were set up, then it is critical to employ human resource development (HRD) practices in its management of staff. HRD is concerned with staffing issues, education and training, performance management, working conditions among others. It also involves many actors who have a stake in it and who can facilitate or hinder the pursuit of objectives. It is very relevant as it helps in optimizing the production and utilization of the workforce (Dussault, 1999).

Nadler (1970, p. 3) refers to HRD as a series of organised activities conducted within a specified time and designed to produce behavioural change. On the other hand, Craig (1976) indicates that HRD focuses on the central goal of developing human potential in every aspect of lifelong learning. Swanson and Holton (2001, pp. 22) indicated that HRD is a relatively new term which involved training the larger component and can be tracked back through the evolution of the human race. HRD professionals have powerful tools available to get others to think, accept and act and also have a very privileged position on accessing information that transcends the boundaries and levels of individuals, groups, work processes and the organisations. Jon and Randy (2006) related HRD as a new learning and performance wheel to a driving business performance which includes all the activities of HRD. According to Swanson and Holton (2001), suggested that the twenty-first century challenge for HRD is to engage in high technology means of developing and unleashing human expertise coming from the demand of professionals to do HRD work better, faster, and cheaper.

Drucker (1999, p. 255) indicated that "the purpose of an organisation is to make the strengths of people productive and their weaknesses irrelevant". This means that success or failure of NGOs will depend in large measure on its ability to attract, develop, and hold committed people. Most of the local NGOs formed in Ghana depend on voluntary staff to run their programmes and activities; as a result they do not have control over the quality of labour they obtain. Their staffing levels are determined by those who volunteer their services. Some of the personnel used to run the affairs of the local NGOs are not well trained to effectively carry out their duties (Gyamfi, 2010, p. 30). Leworke (2007 p. 14), suggested that lack of well trained and experienced human resources limits the extent to which local NGOs are able to manage their day to day affairs and their capacity to plan, appraise, implementing and monitor their projects and programmes. He maintains that most knowledgeable and experienced volunteers do not normally provide adequate support for NGOs activities because of the limited time they have to render their services. However, Ibrahim and Muhtesem (2006, p.4) revealled that not all people working for local NGOs are volunteers. There are paid staffs who typically receive lower pay than in the corporate private sector. As a result staff turn-over is high in local NGOs. They further maintain that the poor quality of training or lack of importance attached to training local NGO workers contribute to the organisation inability to raise funds.

Lortsman (2007, p.29) asserts that lack of human resource capacity to raise local funds is similar to the absence of institutional mechanism for local fund raising. He further argues that local fund raising requires people having the skills and willingness to do it and a good public reputation. This means that expertise are needed to plan when, where and how to seek for funds especially in an environment where the population is poor and may be suspicious of the motives. This really affects the ability of local NGOS to attract high quality employees. Considering the revelance of human resource to every organization, it could be argued that the most important resource an NGO has is its staff and volunteers. Without Human

resources, it is not possible for an NGO to achieve its mission. They do it for the passion because non-profit work is usually not very glamorous and for that matter, it is a job with long hours and low pay. Organisations may have difficulty recruiting the right individuals for the job at the salary level or struggle to retain the best performing employees.

The importance of having a competitive human resource is synonymous with the success of today's organizations. An efficient and effective human resource will produce quality, productive individuals that will eventually minimize the problems that are related to human resource such as job dissatisfaction, absenteeism, or turnover of employees Daud (2006). Evidently, the relevant of HRD can therefore not be underestimated. This study therefore seeks to find out how NGOs adapt to healthy human resource management toward maximizing the potentials of its employees.

IV. RESEARCH METHODOLOGY

This study used the descriptive survey as a means of gaining insight into HRD practices of NGOs in the Health Sector in Ghana. A mixed research method was employed to data collection. Functionally the Ghana Coalition of NGOs in Health is controlled by a Board consisting of all regional chairs, the Chairman and the vice chairperson plus three ex officio members. In this case the National secretariats are those who manage the projects and the various regions handle the implementation. This consists of 5 staff with various expertise. The regions consist of a number of NGOs. In this study the target population is NGOs in the Health sector in Ghana which is difficult to identify. This is because NGOs in health has about 15 networks. This includes the Coalitions, Alliances among others. In this study, Ghana Coalition of NGOs in Health (GCNH) was purposively sampled due to their regional presence, its membership, and thematic focus of its members such as HIV, Maternal Health, Sexual and Reproductive Health and Rights, Water and Sanitation, Immunisation, TB among others. GCNH has a bigger population therefore members were again stratified in groups as active and inactive members. For the sake of this study, 155 active members were stratified and their contacts were given by the regional chairpersons. To avoid bias, these organisations names were written and put in a bowl and a selection of 30 NGOs were sampled due to their size, year of existence and performance in terms of HRD.Formal and informal interviews covering a range of respondents including local NGOs and international NGOs were conducted. A structured questionnaire was designed to contain both close and open ended questions. In order to validate preliminary findings resulting from questionnaires, interview guide were developed for focus group discussions which were held in the National Secretariat Office of the Ghana Coalition of NGOs in Health. This was to help crosscheck individual organisational responses. The Focus group discussions were also helpful in gathering new and relevant information. This was done to pre-test the survey instrument.

Since the research was a descriptive survey, research questions one and two were analysed using frequencies, percentages and bar charts while research questions three was also analysed using interviews and focus group discussions.

V. RESULTS AND DISCUSSIONS

The findings from the field have been categorised into 3 sections. Section one discusses findings from HRD practice of selected NGOs in the region. The second section discusses the influence of financial resources on HRD activities, while the third deals with improvements of HRD practices of NGOs in the health sector.

Research Question one: what are the HRD practices of NGOs in health

This section was targeted to find out the various recruitment policies adopted by the respondents and whether they practice otherwise. It was observed that that some selected NGOs adopt recruitment policy. 46% of respondents have recruitment policy they abide by. Larger NGOs uses application as a means of recruitment and the criteria used for selection is the interview. 37% of respondents use other means for recruitment like relatives, walk-in, family members and friends without necessarily filling an application form or going through an interview process whiles 17% of respondents use employee referrals. Some even walk in without requisite qualification but they are accepted to work as volunteers to help in the communities most especially those who really understand the local languages in the villages to help eradicate diseases

Further, staff training and development practices at the various NGOs were observed. It was revealed that Staff development and training helps employees to learn new things in order to become efficient in their area of work. Greater number of respondents (13) representing 43.3% practice on the job training for their staff whiles (5) respondents provides off the job training for the employees representing 16.67%. 10% respondents practice both on-the-job and off-the-job training because of the nature of work. This is because of the inability of HR department and the essence of Human resource development which is not known.

It was further observed that training needs is identified through job evaluation, performance management, job analysis or other. Thirteen (13) respondents representing 43% training needs is determined by its importance. This means that it is necessary for the organisation to undergo such training, not specifically as a current training need. This sometimes is not compulsory for employees. 5 allow staff to attend training if only it will benefit the organisation and also if there are availability of funds. 27% respondents talks about the current needs of their staff and 30% are determined by areas related to health for instance issues relating to first Aid. This does not necessarily depends on the current training needs or its importance but rather due to lot of field work it entails.

With regards to the development activities of NGOs, it was revealed that majority of respondents organises workshop trainings for their employees, representing 43.33%. This also includes the volunteers of the organisation. Referral and internship programmes representing 16.67% are organised for only permanent staff whiles on- the- job training represents 13.33%. The study leave representing 10% are also organised for permanent staff. Majority organisation does not resort to study leave because there is no other person to stand in for the one on leave. This most at times affects progress of work.

When asked in a focus group discussion what information are given to newly employees by the various NGOs, it was

observed that a greater number of respondents (10) indicated that they discuss general information about the job, Six (6) respondents discussed about job requirements briefly and then give a manual to the new hire or volunteer to read and understand whiles 6 group of respondents talks about conditions of service. Five (5) respondents talks about job description while three (3) respondents discuss about job duties statements. It can be observed that greater number of respondents communicates general information of the job to the new hires without necessarily discussing the policies and procedures of the organisation. Here the general information is about a brief of the work that the individual is about to do together with the allowance or salary excluding policies and procedures since they do not have them in place; not even employee safety or other entitlements is discussed. Here the bottom line is that the salary is subject to availability of funds and ends there without necessarily any increment. Job requirement on the other hand explains what actually the new hire is coming to work on in the organisation and what the organisation also requires from the person. Condition of service on the other hand refers to the other incentive put in place for the new hire, be it bonuses, fringe benefits among others.

Furthermore, the study observed that in terms of how employees' performance are assessed, about 18 respondents assess performance through appraisal representing 60%. This means that despite unlimited resources to engage Human resource personnel, performance evaluation is being assessed. This goes on in the Large NGOs in Ghana and those that have permanent staff based on the project for about 5 years, appraisal is done half yearly. Also, 26% respondents do not evaluate staff performance but they only appreciate what staff has done without necessarily discussing the success and challenges they face in their job. This is because majority of the staff are volunteers and are not permanent staff. They just come in and go as the need arises. Other respondents representing 13.33% neither know the practice of job evaluation nor appreciate what staff do. With these groups of people, they have temporal staff, so whenever a project comes they are just invited to help within a short period of time and then go away. These people have their permanent job already elsewhere.

In addition, the study probe in to how the results of performance appraisals are used, the results showed that 7 respondents representing 23.33% do not provide anything after job evaluation and some although they practice it, do not attract anything afterwards. 6 respondents representing 20% each add promotion together with salary increment as well and the other did only salary increment to staff after the evaluation process. This is because staff are already not enough and there is no vacant position. This allows the staff to feel good and enables them to give off their best despite always working under pressure. 5 respondents representing 16.67% promote its staff to the next level available without necessarily adding some amount of money to their salary but rather they enjoy other benefits like travel allowance, professional education among others. These boost employee's morale and their self-esteem. The last group of respondents 3 representing 10% do otherwise like appreciating what staff has done by just saying thank you to them for doing a very great job.In addition, the study showed the extent to which the NGOs employ job design strategies. These strategies aim at properly training workers to administer their tasks differently to reduce boredom and also to help them to attain their full potential.

From the findings, it was observed that, 15 respondents representing 50% practice job enlargement. This is because whenever a new project is won they do not necessarily recruit new staff due to unavailability of funds but rather increase the work of the staff in order not to incur additional cost. 7 respondents representing 23.33% practice job rotation whiles 4 respondents representing 13.33% practice both job rotation and job enlargement. 4 respondents representing 13.33% do not practice any of the job designs. Their work is just one off thing so they don't go according to any job design.

Further from the findings, it was observed that 18 respondents representing 60% do not have HR department whiles 7 representing 23.33% were not sure due to the fact that some directors play partial role of Human Resource, some have Human Resource personnel but their role do not come out clearly as Human Resource officer. This makes it difficult for clarity purposes so some are not sure whether Human Resource manager exist or not. Also, 5 respondent representing 16.67% has Human Resource department and they are efficient in their area of work. This consists of larger NGOs and not the smaller ones.Ghana Coalition of NGOs in Health has provided HR manual which should guide the HR department and those without HR department yet some selected respondents do not have them in their possession. The study further revealed that out of the 30 respondents, 19 respondents representing 63.33% indicated that do not have HR manual despite the duties they perform. 11 representing 36.67% has Human Resource manual. The HR manual are usual designed by consultants for those who do not have HR department to serve as a guide. This manual outlines the principles that need to be adhered to.

In terms of the practice of recruitment and selection, it was revealed that, 46% of selected respondent adopt recruitment policy, this is by sending application forms to apply for a vacant position and also inviting the applicant for an interview. This allows the NGOs to get the qualified persons for the job. 37% use relatives, friends, family members and walk-in to get jobs. Whiles 17% use employee referrals. According to the respondents, various persons walk in without requisite qualification but they are accepted to work as volunteers to help in the community most especially those who really understand the local languages in the villages to help them to campaign and to eradicate diseases.

With regards to training and development, the analysis showed that, selected respondents organise training for their staff. This is by organising workshops, attending short courses and coaching within the organisation and other capacity building training programmes as these helps the staff to develop in the area of study representing 69.67%. The rest do not organise any training programmes for their staff. This is because of the inability of HR department and the essence of Human Resource development is not known by the Directors. According to the respondents, it is therefore necessary for the organisation to undergo such training, not specifically as a current training need. This sometimes is not compulsory for employees. 5 allow staff to attend training if only it will benefit the organisation and also if there are availability of funds. 27% respondents talks about the

current needs of their staff and 30% are determined by areas related to health for instance issues relating to first Aid. This does not necessarily depends on the current training needs or its importance but rather due to lot of field work it entails.Again, majority of respondents organises workshop trainings for their employees, representing 43.33%. This also includes the volunteers of the organisation. Referral and internship programmes representing 16.67% are organised for only permanent staff whiles on- the- job training represents 13.33%. The study leave representing 10% are also organised for permanent staff. Majority organisation does not resort to study leave because there is no other person to stand in for the one on leave. This most at times affects progress of work.

It was also observed that greater number of respondents communicates general information of the job to the new hires without necessarily discussing the policies and procedures of the organisation. Here the general information is about a brief of the work that the individual is about to do together with the allowance or salary excluding policies and procedures since they do not have them in place; not even employee safety or other entitlements is discussed. Here the bottom line is that the salary is subject to availability of funds and ends there without necessarily any increment. Job requirement on the other hand explains what actually the new hire is coming to work on in the organisation and what the organisation also requires from the person. Condition of service on the other hand refers to the other incentive put in place for the new hire, be it bonuses, fringe benefits among others.

Again in the study conducted, 60% assess performance through appraisal. This means that, despite the unlimited resources to engage Human Resource personnel, performance evaluation is assessed. This goes on in the large organisations that have a capacity of over 35 employees and those that have permanent staff. Other respondents representing 13.33% neither practice job evaluation nor appreciate the work done by staff. With these groups of people, they have temporal staff, so whenever a project comes they are just invited to help within a short period of time and then go away. Other respondents only appreciate what staff has done without necessarily discussing the success and challenges they face in their job.

Furthermore, 7 respondents representing 23.33% do not provide anything after job evaluationand some although they practice it, do not attract anything afterwards. 6 respondentsrepresenting 20% each add promotion together with salary increment, whilst other respondentonly increase staff salary after the evaluation process. This is because staff are already notenough and there is no vacant position. This allows the staff to feel good and enables them togive off their best despite always working under pressure. 5 respondents representing 16.67% promote its staff to the next level available without necessarily adding some amount of money to their salary but rather they enjoy other benefits like travel allowance, professional education among others. These boost employee's morale and their self-esteem. The last group of respondents 3 representing 10% do otherwise like appreciating what staff has done by just saying thank you to them for doing a very great job.

Also the study indicated that, 13.33% do not know what job design strategies is all about so they do not practice it. This is because they use a lot of volunteers and interns in the organisation. 50% of the respondents practice job enlargement. This is as a result of majority of staff practicing multitasking since permanent staff are not many and they work with more volunteers. In addition, 23.33% practice job rotation as this allows staff to experience each other's job.

Human resource information system are processes that the organisation put together to provide the human resource needs. From the study, 16.67% has HR department, these are the larger organisations that have branches in other regions. 23.33% are not sure because the director happens to be the HR manager and all decision is vested to him. Respondents also indicated that, this does not speed up processes. Again 36.67% have HR manuals without necessarily having HR department. This serves as a guide in the office whereas 63.33% do not have HR manual to guide them.With the small size, HR manual is being designed by consultants for those who do not have HR department to guide them. This manual outlines the principles that need to be adhered to in the work setting.

Research question two: How does the financial resource of an NGO influence its HRD practices?

Majority of respondents indicated that lack of financial resources impact negatively on activities of Human Resource. Some of the practical examples respondents came up with can be summarized as poor quality of work representing 16.67%, low performance of work due to inadequate funding 50%, lines of authority not clearly defined 13.33%, low motivation 10% and lack of core funding 10%. Majority respondents conceded that inadequate funding of Human resource development lead to low performance of work.

Again, according to the respondents labour turnover is high in the organisation. This is the rate at which employees leave the organisation overtime. This is as a result of low motivation in the organisation. The figure below depict the rate at which employees leaves the organisation as indicated by the respondents. The study further probed into the turnover rate among respondents. With a sample size of 30, 13 organisations experience staff turnover rate of more than 5 persons yearly. Ten (10) respondents experience 3 persons per annum of employee turnover. Five (5) persons have one employee per annum of labour turnover and 2 experience none employee turnover because they exist just a year and they have not done much projects. These findings supports the Regional reports on GCNH which specified that there are reports of low salaries, high staff turnover, mass desertion,ineffective leadership and above all misappropriation of project funds in the NGOs(Regional Reports ofGCNH).

Qualitative data analysis

In a focus group discussion, it emerged that expertise is needed to plan, when, where and how to seek for funding, especially in an environment where funds is not forthcoming. This is because scarce funding greatly complicates the ability of local NGOs to attract high-quality employees. And in effect affect the employment of Human resource to implement Human resource development activities thereby increasing labour turn-over.

Again, there are salary staff who receives low remuneration than those in the private sector, this results in staff turn-over in

local NGOs. This contributes to the organisations' inability to raise fund because of poor quality of training and lack of importance attached to training. Here staff are not given the chance to develop their career or even attend training programmes to help run the organisation. This demoralise the staff and they do not spent much time working with local NGOs. This really affects ability to raise funds to be able to employ or engage in Human Resource development activities. This is because staff are not being trained to have that skills and willingness to perform those function which do not lead to good public reputation.

Again, most of local NGOs are drawn from family and church which makes the board not formal. It is surprising to find father, mother, husband, wife, siblings, auntie or uncles constituting board members and even staff as well, due to this it is obvious that the decision making rest with the executive director. Therefore such NGO may be situated in the Executive director's home. Due to this challenge local NGOs suffer lack of management skills, technical information and clear goals and form weak structure as well.

For local NGOs to overcome these challenges have to devise better strategies to operate and raise fund to stay in that field since they have compelling missions that must be accomplished. Even if family members and church members are well educated and trained they will achieve their mission as intended.

Research question Three: How can NGOs in the health sector improve on their human resource development practices?

In an interview done, selected NGOs in Ghana and those who have long experience in those fields indicated that; Most NGOs in Ghana lack clearly defined structure in terms of organisational charts, buildings, facilities and human resources. For local NGOs to receive funding there is the need for structure to be put in place to generate local funds. Though most local NGOs operate in their own small way, do not have any structures in place. One person manages the office alone. Most at times they use their own houses which are not well furnished as their office without adequate facilities. When this happens donor funding is difficult to come by.

There is no provision of human resource activities at all due to the fact that there are no budget lines for that. This goes a long way to affect work performance because the owners themselves carry on most of Human resource activities and since they are not qualified, lack requisite skill of Human resource. Therefore no motivation is given to staff which affects work performance. This means that the owners themselves should attend courses that can broaden their horizon so that they can have the requisite skills to discharge their duties.

Quality of work is also not assured to some local NGOs because of unskilled labour they employ due to community outreach programmes. This is because most NGOs depend on voluntary staff to run their activities and programmes and generally do not have control over the quality of labour they obtain. Their staffing levels are determined by those who volunteer their services. Some of the personnel used to run the affairs of local NGOs are not well trained to effectively carry out their duties. Due to training and recruiting of experienced human resource personnel will enable local NGOs to manage their day to day affairs and can have the capacity to effectively plan, appraise, implement and monitor their projects and programmes. Also employees become creative in future by attending innovative courses to help government to restructure its strategies if what they have put in place does not merit the country. Since NGOs deal with a lot of advocacy issues, they are able to comment on issues on policies that the government have put in place which is not helping or to stand in for the voiceless in the country for there is be equity. This allows the country to thrive.

- It was also noted that most volunteers and interns do not normally provide adequate support for NGOs activities because of the limited time they have to render their services. In this case strategies should be devised so that volunteers will not work directly on the job thereby creating gaps when they leave the organisation.
- In promoting wellbeing of community members, by providing free medical care among others, and working effectively with the right people, members in the community will perceive that these local NGOs are satisfying their required need in the area of project development and service delivery. This will contribute to

> Obtaining funding for projects
> Sustain of staff
> Growth of the organisation
> Organisation ability to develop good proposal for funding.

As HRD is mainly concerned with developing competences of people, it is necessary for NGO manages to introduce motivating factors like job enrichment, developing staff potentials, creating autonomous work groups, fostering innovation and creativity and developing trust so that the work will be done be efficiently and effectively.

Discussion

The presents study revealed the HRD practices of NGOs in the Ghanaian health sector. The outcome highlights the need for NGOs and its stakeholders to place much importance on their HRD practices and this is evidence in the relevance of these practices in enhancing the performance and success of organization, for instance according to Bhumit (2015) through effective HR practices, N. M. Sadguru Water and Development Foundation, an NGO based in Dahod district working in the natural resource management sector has been culminated a distinguished triumph in employee retention and organisational growth, which is remarkable and striking for the development sector. Further, the inadequate attention giving to the practice of HRD in the NGOs especially in the Ghanaian health sector as revealed in the analysis is also a cry for NGOs to invest resources in enhancing the development and wellbeing of its employees. The inadequate employment of HRD practices can be explained from Batti (2014) assertion. According to Batti (ibid) many local NGOs face diverse challenges in the area of human resource management. Local NGOs have inadequate HR management procedures in the organization and this affects the employee's work experiences and overall performance at individual and organizational level. The author further postulate that many local NGOs due to the size of the organization and scope do not have a human resource (HR) unit or a human resource manager and therefore they appoint staff to oversee staff issues who often do

not have the required human resource skills and competencies to manage the employees. Another area that is challenging local NGOs is the fact that many depend on donor funds that are tied to funding cycles that are short term in nature. This affects the NGOs human resource capacity in terms of the number and type of staff to recruit and employment duration (Batti, 2014). These findings of Batti (ibid) supports the present findings.

VI. CONCLUSIONS

NGOs play a very important role in the socio economic development of Ghana by supplementing the state's efforts in providing sustainable development. They provide umbrella of services including the promotion of equality and human rights, legal services, education and training programmes and also fill development gaps where government is short. They have over the years demonstrated the capacity of doing more with the needed support. However, funding for effective implementation of project activities is woefully inadequate (Gyamfi, 2010). This is the more reason why Human resource development activities are not being put in place. Mostly non availability of training and development programmes to harness the competencies of staff. Due to these issues most staff are not motivated enough to even stay in the organization. In effect staff does not stay long enough in the organisation and leaves for another organization. It is therefore imperative for local NGO's to measures in place to enhance their HRD practices so as to improve employee's performance and the well-being of the organization.

VII. RECOMMENDATIONS

The recommendations that are put forward in the study are based on data analysed and interaction with the executive directors of selected local NGOs in Ghana together with experts in the field. This is an attempt to encourage the local NGOs to fill up the gaps so that they can finance their cause in much more effective way to be able to have human resource manager in place to work on human resource development activities and also use the HR manual as a guide for their activities in case they do not have a budget line for HR managers.. The recommendations are as follows:

- Local NGOs should understand the psychology of workforce, retain the best talents of the organisation, motivate them to perform better and handle diversity while maintaining unity simultaneously. Also to be able to understand the mindset of workers in order to retain them is by giving the workers other benefits apart from their salary in terms of fringe benefits and bonuses and also recognising what the workers have done and appreciate them.
- Human resource development should be addressed as s component of organisations survival in that, human beings are indispensable and managing people with various ideologies views and lifestyles need to be taken seriously. This will go a long way to maintain staff in the organisation.
- Strategies should be redirected and streamlined in their activities to ensure that quality human resource is employed and still be able to achieve the strategic objectives of the organisation.
- The directors, Chief Executive Officers and senior level officials should work towards developing and building their capacities, making all resources available since they are not working like sole proprietorship but always working with people.
- NGOs should help to manage change in the organisation and not be static in taking decisions. This is because when volunteers and interns come in, some of them might be good asset to the organisation. Again lot of NGOs in the various communities are not adaptive to technology, due to this current demands are not met which is very crucial to the organisation. In this case local NGOs should help furnish their organisation with required resources and executive officers should motivate its staff to stay longer in the organisation than enjoying the funds themselves without recognising the staff. This is because if employees are handled properly they might always come to that organisation with new ideas and input which will go a long way to help the organisation to succeed.
- Human resource development need to be introduced properly to the organisations as it helps maintain talents in workers due to the capacity trainings attended. Also HR manuals should be provided by the organisation with clear defined policies procedures to guide them in their decisions. This will help the organisation to provide excellent environment for staff to work with proper motivation being put in place.

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Correlational Relationship between School Location and Students' Academic Performance in English Language in Nigerian Secondary Schools

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Abstract- This study was to determine the correlational relationship between school location and students' academic performance in English language in secondary schools in Ogoja Local Government Area. It adopted a survey research design. The population of the study comprised all the 836 senior secondary two (SS2) students of the 2016/17 academic session in all the 46 public and private secondary schools in Ogoja Local Government Area. Through stratified random sampling, a sample of two hundred (200) students was drawn for the study. Out of this number, 124 representing 62% were males; while 75 students representing 38% were females. The instrument used for data collection was achievement test tagged English Language Achievement Test (ELAT) carved from 2015 English Language Mock Examination. The data obtained was analysed using independent t-test. The results revealed that there is a significant difference in students' academic performance in English language on the basis of school location. It was recommended that government should close the gap between the rural and urban location through the provision of social amenities to rural populace which will enhances better academic performance of students in their final examination like SSCE.

Index Terms- School location, academic achievement and English language.

I. Introduction

In recent time, the low level of students' academic performance in English in Nigerian schools, has been the concern of stakeholders and researchers in education. At senior secondary school level, students' poor performance cut across almost all the compulsory subjects in which English Language is inclusive. Many students' in Ogoja Local Government Area of Cross River State, Nigeria, complete their secondary education with poor grade or scores in English Language. As a result, many of these students had to reseat the same national examination, sometime severally. Still as they do that, very few become successful and have chances of continuing to higher studies.

The problem of poor performance of students' in English language in national examination has decrease the quality of education in Nigeria and also has received a considerable attention of scholars (Wilson, 2011, Omari, 2010 & Osaki, 2012). In these recent years, the performance of students in the Senior Secondary Certificate Examination (SSCE) in English language has been worst in the successive years (Adeymi, 2013). The release of this poor result has fuelled the beginning of fierce discussions and raging debates on the possible causes. In fact, these debates and discussions have often been ascribed to students' weakness in English language through which knowledge in school is transferred to learners. The blames of students' poor performance in English language has been attributed to the teachers of English due to poor teaching method (pedagogy). In the same manner, students themselves have been put to blame because of lack of attention and poor listening habit during the teaching process in the classroom.

Several studies have been conducted on the effects, relationship or influence of various factors such as personal, psycho-social academic, teachers and even social factors on such students; performance. Various and varied results have been the outcome of those research endeavors, yet some gaps still exist in the area of school variables such as school location, gender and school type on the English language performance of this same group of student at the senior secondary school level.

It is on this premise that the study intend to compare students' academic performance in English language by school locationin secondary schools in Ogoja Local Government Area. The problem of this study posed as a question is: What is the difference in students' academic performance in English language on the basis of school location?

School environment may be classified into urban, semi-urban and rural. This classification sometimes goes a long way to influence government distribution of social amenities like electricity, water, hospital and educational institution. It is a common knowledge that many of these social amenities are concentrated in urban areas than rural areas. Based on this, Owoeye (2011) carried out a study on school location and academic achievement of secondary schools students in Ekiti State, Nigeria (between 1990-1997). The study population was drawn from the results of the West African School Certificate Examination (WASCE) conducted between 1990 and 1997 in 50 secondary schools in both urban and rural area of the study. One validated instrument tagged:"students Location Questionnaire" (SLQ) ,was used for data collection. One hypothesis was formulated and tested at 0.05 level of significance. Data collected were analyzed using mean and t-test. The result showed that there was a significant differences between students' academic achievement of rural and urban secondary schools in senior school certificate examination (t-2,73, $p<0.05$). The study has proven that students in urban area had better academic achievement than their rural counterparts. It was recommended that government should bridge the gap between the rural and urban location by providing the rural dwellers with the social

amenities which will enhances better academic performance of students in their final examination like SSCE. The community should assist the government by providing taxis and buses to facilitate movement of teachers and students to their schools.

Again, Adepoju (2012) studied the motivational variables and academic performance of urban and rural secondary school students in Ibadan, Nigeria. The objective was to examine the degree of relationship among motivational variables and academic performance of students in secondary school certificate examination. One hundred (100) secondary school students were sampled for the study. It was found that there was an enhanced relationship of each of the motivation variables in respect to academic performance.

In another development, Mosha (2014) conducted a study of factors affecting students' performance in English Language in Zanzibar rural and urban secondary schools. The study employed qualitative and quantitative approaches. Data were collected using interview, classroom, and observation, questionnaire and documentary review. Result of the study reveals that students were highly motivated to learn English for future expectations such as local and international communication, academic advancement and employment prospects. However, student' performance was affected by shortage of English teachers and absence of teaching and learning materials.

In the same vein,Onoyase (2015) studied the academic performance among students in urban, semi-urban and rural secondary school in Oshimili South Local Government Area of Delta State, Nigeria. A survey design was employed in the study. Five hypotheses were formulated to guide the study. The researcher collected data on the senior school certificate examine results conducted by the West African Examination Council (WAEC) in the year 2001. The subjects selected for analysis were English Language, mathematics and biology. The others were chemistry and geography. Three out of six secondary schools in the study area were used for the study. Ninety out of two hundred and twenty students in the three secondary schools were used for the study representing 49.1 percent. One way analysis of variance (ANOVA) was used to analyzed the data. The study showed that; there was a significant difference in the academic performance among students in urban, semi-urban and rural secondary school in English Language, Mathematics, Biology, Chemistry and Geography.

Mehera (2004) also explored a study on the achievement of students in mathematics at secondary level with the objective to assess the students' achievement in mathematics, the nature of major learning environment, scientific attitude and attitude towards subject. The study sample stood at 600 students of urban and rural areas of Burdwan district in West Bengal. It was found that achievement in Mathematics was significant relatively to major learning environment. Urban schools, Better learning environment and better attitude towards mathematics were found significantly higher in urban school than rural school. No sex wise difference was found in achievement of students in mathematics.

Bratte (2000) found that students in urban schools are academically better than their counterparts in rural schools because urban schools have more infrastructural facilities required by children such as books and other learning materials. Some parents in the urban are also able to employ private teachers for their children at home after school hours. In the same vein, Onoyase (2015) maintained that, the reason why urban students performed well in academic than rural students is because, they do attract some amenities like pipe borne water, electricity, good roads and well equipped schools. The reason is able because rural schools lack good educational facilities for effective teaching and learning. On the same leg,Mofon (2001) stressed that many rural schools are in terrible state of despair and lacking basic learning facilities. The poor environment and poor infrastructural facilities contribute immensely to poor teaching and poor teaching and poor academic performance.

Ajaji (2006) found that there is a significant among academic performance of students in urban and rural secondary schools in mathematics. The differences in academic performance among the students may be due to the concentration of more qualified mathematics teachers posted to the urban secondary schools as against those on rural areas. Akiri(2008) summarized that, provision of education in rural areas is faced with difficulties and problems such as: qualified teachers refusing appointment in isolated villages; villagers refusing to send their children to school because they are dependent on them for help; parents heisted to entrust their daughters to male teachers: lack of roads , books and teaching materials.

Ojoawo (2006) studied the effects of differential distribution of resources on school performance in an examination and found that location of schools in Oyo State had significant effect on schools academic performance and there was significant difference in the performance between the students of rural and urban schools.

II. Purpose of the Study

The main purpose of the study was to determine the influence of school location on students' academic performance in English language in secondary schools in Ogoja Local Government Area

III. Research Question

What is the difference in students' performance in English language on the basis of school location?

IV. Statements of Hypothesis

HO: There is no significant difference in students' performance in English Language on the basis of school location

V. Methodology

The study adopted a survey research design. The population of the study comprised all the 836 senior secondary two (SS2) students of the 2016/17 academic session in all the 46 public and private secondary schools in Ogoja Local Government Area. Through stratified random sampling, a sample of two hundred (200) students was drawnfor the study. Out of this number, 124 representing 62% were males; while 75 students

representing 38% were females. The instrument used for data collection was achievement test tagged English Language Achievement Test (ELAT) carved from 2015 English Language Mock Examination. The data obtained was analysed using independent t-test. The results revealed that there is a significant difference academics performance in English language on the basis of school location.

VI. Presentation of Results

HO:There is no significant difference in students' academic performance in English language on the basis of school location.

To test this hypothesis, the independent variable was school location;while the dependent variable was students' academic performance. This was measured using twenty (20) objective items adopted from Mock, 2015 English language question paper.Since research interest was to determine whether there is difference in the students' performance in English language on the basis of school location. To this end, the independent variable was classified into two groups (urban and rural school location) on the basis of students' academic performance in English language. Therefore, the independent t-test was used to test the hypothesis at 0.05 level of significance. The results of the rest are presented on table 1.

Table 1

Result of independent t-test analysis of the difference in students' academic performance in English language on the basis of school location.

School location	no. of items	X	SD	df	t-cal	t-critical
Urban	20	14.66	2.69	198	3.05**	1.96
Rural	20	13.32	3.74			

*Significant at 0.05 level, df =198. T-critical = 1.96

From table 1 above, the calculated t-value was 3.05 greater than the critical t-value of 1.96 ($p<05$, df = 198). Since the calculated t-value was greater than the critical t-value. To this end, the null hypothesis was rejected and the study revealed that there is significant difference in students' academic performance in English language on the basis of school location.

VII. Discussion of Findings

The null hypothesis stated that, there is no significant difference in students' academic performance in English language on the basis of school. The findings of hypothesis one indicated that there is a significant difference in students' academic performance in English language on the basis of school location. This finding is in line with the finding of Bratte (2000) who found that students' in urban school performed very well in their academics than their counterparts in rural schools because the infrastructural facilities present in urban area tend to pull the elite of the society to such area. Such elite usually have the economic power and so are able to provide all the educational facilities required by their children in the school, example books and other learning materials. They are also able to employ private teachers for their children at home after school hours.

This findings is also consistent with the finding of Onoyase (2015) who maintained that, the reason why urban students' performed well in academic than rural students is because, they do attract some amenities like pipe born water, electricity, good roads and well equipped schools. The reason is also because rural schools lack good educational facilities for effective teaching and learning. In the same vein, Mofon (2001) stressed that many rural schools are in terrible state of despair and lacking basic learning facilities. The poor environment and poor infrastructural facilities contribute immensely to poor teetering and poor academic performance.

This finding also corroborate with the finding of Ajayi (2006) who found that there is a significant different among academic performance of students in urban and rural secondary schools in mathematics. The differences in academic performance among the students may be due to the concentration of more qualified mathematics teachers posted to the urban secondary schools as against those in rural areas. In the same manner, Boit (2012) asserted that higher qualified teachers prefer to serve in urban areas rather than rural areas and also that teachers do not accept postings to rural areas. This is because their conditions are up to the expected standard as their social life in the areas in virtually restricted as a result of inadequate amenities and facilities such as playground that are without equipment, libraries without books while laboratories are glorified ones. Also, Akiri (2008) supported that, the provision of education in rural areas if faced with difficulties and problems such as, qualified teachers refusing appointment in isolated villages; villagers refusing to send their children to school because they depend on them for help; parents' hesitation to entrust their daughters to male teachers; lack of roads, book and teaching materials. This would certainly influence the academic performance of student in rural schools

In the same manner, Boit (2012) asserted that higher qualified teachers prefer to serve in urban areas rather than the rural areas and also that teacher do not accept postings to rural areas. This is because their conditions are not up to the expected standard as their social life in the areas is virtually restricted as a result of inadequate amenities and facilities such as playground that are without equipment, libraries without books while laborites are gloried ones.

VIII. Conclusion

Based on the findings from the study, it was concluded that there is a significant difference in students' academic performance in English language on the basis of school location.

IX. Recommendation

Based on the findings from the study, it was recommended that Government should ensure that both urban and rural schools are provided with equal facilities so as to enhance the effective learning of English language.

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A study on the perception of the teacher trainees towards two year B.Ed. programme implemented in the teacher education institutions in Assam

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Abstract- Teacher education is that integral part of education system of a country which determines the success of whole process of education. Education is the powerful instrument of bringing chance. Education moulds the society, develops the nation. But it is the teacher who makes it possible to happen. The students are the future man-power. Teacher trains them up in such a way through the education that they are able to bring positive changes in the society. But this is possible when the teacher have the adequate power of training others. It is the teacher education program which equips the teacher with all those knowledge, skills helpful in bringing change among the students by the teachers. NCTE is the regulatory body of teacher education, performing functions and making decisions in all the aspects of teacher education including B.Ed, M.Ed, Integrated B.A/B.Sc/ B.Ed. etc. As per its regulation NCTE make B.Ed , which is an important program of teacher education ,a two year duration program. As a results all educational institutions in India providing B.Ed course have extended one more year for B.ed which was earlier one year duration course. In this paper, the investigator have tried to study the perception of the trainee for this new structure of B.Ed course. With 100 sample trainees the investigator has made a small study. The result reveals their mixed reactions.

Index Terms- Teacher Education, Two year B.Ed course, Teacher trainee.

I. Introduction

Teacher education or teacher training refers to the policies, procedure and provisions designed to equip the prospective teacher with the knowledge, attitudes, behaviour and skills they require to perform their tasks effectively in the classroom, school and wider community. The professionals who engage in this activity are called teacher educators. The importance of component teacher to the nation's school system can in no way be overemphasized. It is well known that the quality and extent of learner achievement are determined primarily by teacher competence, sensivity and teacher motivation. It is common knowledge too that the academic and professional standard of teacher constitute a critical components of the essential learning conditions for achieving the educational goal. The length of academic preparation , the level and quality of subject matter knowledge, the reportire of pedagogical skills the teacher posses to meet the needs of diverse learning situation, the degree of commitment to the profession, sensivity to contemporary issues and problems as also to learners and the level of motivation critically influence the quality of curriculum transaction in the classroom and thereby pupil learning and the larger process of social transformation. Teacher education is often divided into these stages---

- **Initial teacher training / education** - which is a pre-service course before entering the classroom as a fully responsible teacher
- **Induction** - this is the process of providing training and support during the first few years of teaching or the first year in a particular school.
- **Teacher development or continuing professional development (CPD)**- This is an in-service process for practicing teachers.

B.Ed –A bachelor of education falling under the category of **Initial teacher training** is an undergraduate professional degree which prepares students for work as a teacher in school, though in some countries , some additional work must be done in order for the students to be fully qualified to teach. This course can be pursued only after successfully completing graduation from a recognized university. The course enables the students to opt for a promising career in the field of teaching. Students are imparted practical training at the same time, are given theoretical knowledge in the field of teaching. For the course, the candidates are selected on the basis of their merit in the qualifying examination or performance in the B.Ed Entrance test held by concerned university or both.

NCTE—National Council for teacher education is a statutory body of Indian government which was set up under the National Council For Teacher Education Act 1993 in 1995 , to formally oversee standards, procedures and processes in the Indian education system. This council functions for the central as well as state governments on all the matters with regards to the Teacher Education and its Secretariat is located in the Department of Teacher Education and National Council of Educational Research and Training (NCERT).

It should a matter of importance that as per the new regulation notification no346(F.No51-1/2014/NCTE/N&S) , NCTE has launched two year B.Ed program and outlined the nature of experiences to be offered to the student-teacher to make them reflective practitioner. The course structure offers a comprehensive coverage of themes and rigorous field engagement with the child, school community. The program is comprised of three board interrelated curricular areas-1. Perspective in Education, 2. Curriculum and pedagogic studies 3.

Engagement with the field. All the courses include in-built field basedunit of study and projects along with theoretical inputs from an interdisciplinary perspective. Engagement with the field in the curricular components that is meant to holistically link all he courses across the program as well as it also includes special courses for enhancing professional capacities of the student teachers. The structure---

Perspective in Education Curriculum and pedagogical study

Engagement with field.

Assam and B.Ed Two Year Programme

As per the notification of NCTE, the various universities of Assam have implemented two years B.Ed programme in the affiliated B. Ed colleges from the academic session of 2015-17. In Assam there are 45 B.Ed colleges under the pioneer university of Assam- Gauhati University, of which there are 37 Private, 2 DIET and 6 Government colleges of Teacher Education. Along with these there are other colleges or institutions of Teacher Education under Dibrugarh University, Assam University and most recently Bodoland University. All these institutions have been implementing Two- Year B. Ed programme following the syllabus prescribed by the concerned University.

II. Objectives

To Study the perception of Teachers trainee towards two year B.Ed programme

III. Methodology

The methodology adopted for the study is descriptive in nature. For the present study 100 Sample trainee taken randomly from different B.Ed colleges of Assam of which 50 male trainee and 50 female trainee were selected for the study. Both Primary and Secondary sources were use for the study. For purposes of collection of Primary data a set of well structured Questionnaire was used. Five point Likert Scale having response mode of 'Strongly satisfied', 'Satisfied', 'Not sure', 'dissatisfied', 'Strongly dissatisfied', was use to evaluate the responses.

IV. Findings and Discussions

The set of self structured questionnaire was distributed to the hundred trainees. The questionnaire was set in such a order to seek responses of the trainees against four fundamental factors- Curriculum distribution, Economic Compatibility, Practicum and Availability of Resources. The following tables represents the responses of the trainees against the four factors, which helps to know their perception towards B.Ed programme.

Table No – 1 Perception of Trainees towards Curriculum distribution of B.Ed Two- Year Programme

Factor	Male trainee's Responses					Female trainee's Responses				
	SS	S	NS	DS	SDS	SS	S	NS	DS	SDS
Curriculum Distribution	8%	15%	7%	20%	-	10%	12%	10%	12%	6%

The above table represents that most of the male trainees are dissatisfied with the curriculum distribution of B.ed programme, only 8% of the male trainees are strongly satisfied. They state that the curriculum is well framed and it will help to achieve the goal of teacher education. As per the female trainees most of them are dissatisfied with the curriculum distribution.10% of them are satisfied with it.

Table No – 2 Perception of Trainees towards Economic Compatibility with Two- Year B.Ed Programme.

Factor	Male trainee's Responses					Female trainee's Responses				
	SS	S	NS	DS	SDS	SS	S	NS	DS	SDS
Economic Compatibility	0%	1%	5%	25%	20%	0%	3%	9%	23%	5%

The table no 2 helps us to know about the perception of the trainees towards Two-year B.Ed programme with reference to the economic compatibility. As both male and female sample trainees are taken from private teacher training colleges, the greater percentage of trainees are strongly dissatisfied with the economic compatibility of two-year B.ed programme. The reasone as they stated is that the fee structure is too high for two year. They have to pay a huge amount at the time of admission and there is no any provision of installment payment which creates so many problems for most of them.15% of the male trainees are strongly dissatisfied, 10% are dissatisfied with the fee structure. So as the female trainees. Most of them are dissatisfied with the economic compatibility of two year B.Ed programme.

Table No 3 Perception of trainees towards practicum part of two year B. Ed programme

Factor	Male trainee's Responses					Female trainee's Responses				
Practicum Part	SS	S	NS	DS	SDS	SS	S	NS	DS	SDS
	12%	10%	3%	10%	15%	5%	12%	4%	12%	17%

Table no 3 reflects the opinion of the trainees towards the practicum aspects of two year B.Ed proframme. It is observed that there is a mixed perception towards the practicum aspects. It is found that majority of the male trainees supports practicum as they believe learning by doing will provide them better experience of teaching profession. Regarding practicum, most of the female trainees show positive responses. 17% are strongly satisfied.

Table No-4 Perception of trainees towards Availability of resources for two-year B.Ed programme

Factor	Male trainee's Responses					Female trainee's Responses				
Availability of Resorces	SS	S	NS	DS	SDS	SS	S	NS	DS	SDS
	3%	5%	7%	20%	15%	3%	10%	6%	20%	11%

This table no 4 represents that both male and female trainees are somewhat dissatisfied with the availability of the resources for two year B.ed course like –building infracture, adequate numbers of books, (financial aid in terms of4months Internship) .The colleges from which the samples are selected are private.

Major findings: To reach the objective of the study, the major findings of the study are stated bellow which come out of the study-

- The teacher trainees show a mixed perception towards the Two –year B.Ed programme.
- The greater percentage of the sample trainees are dissatisfied with the curriculum distribution of the two year B.Ed program. Some of them stated that there are more theoretical paper in the first year and the papers included in the second year is more complex.
- The teacher education as an optional paper is point of dissatisfaction for most of them, whereas it should be the core paper as stated by them.
- The most of the trainees have negative perception towards the two year B.ed programme in respect to its economic compatibility. The fee structure is too high to afford for some trainees for one more year.
- Most of the trainees prefer one year B.ed programme to two year in respect of its durability and economic compatibility.
- Teaching for four months in school under the Internship programme without any remuneration has become hard for some of the trainees.
- Lack of warranty of getting involved in the desired profession after a two year long course is a also factor of disinterest to the progamme.

V. Suggestions

On the basis of the above discussion and findings, some suggestions are put forth to create positive perception among the trainees so that the actual goal of Two-tear B.Ed as prescribed by NCTE can be achieved-

- Collaborative efforts on the part of authorized body, teacher educational institution, teacher educator and the teacher trainees is needed.
- Government should provide financial aid to the teacher educational institutions so that it decreases the financial burden on the part of the trainees.
- Financial assistance from government or authorized body will help the institutions to improve physical structure which will be motivational and interesting for the trainees to pursue the program.
- Provision of stipend/ scholarship if can be made for the trainees then born teacher can be identified.
- More number of experimental school be established so that trainees can practice teaching in a peaceful and meaningful manner rather than hurried manner which is common to most trainees
- Teacher educators should be recruited in more numbers and they should be provided due recognition.

VI. Conclusion

Thus, on the basis of the above study it can be observed that due to high fee structure, most of the trainees have created a negative perception towards the course. Though interview it is observed that they have high expectation from the programme and they come to the course by their choice but extension of one more year creates economic hurdles for most of them. Teachers are the nation builders, to build the nation they must be well trained. Teaching is not a easy task. To train the trainees in teaching task needs lots of process, projects and time. Two-year is a ideal duration for preparing the student teacher who will involve in the student making process throughout their lives. If government pay kind attention to the teacher educational institutes then the trainees will take the programme with whole-heart. The number people of seeking B.Ed is more than number of Government Teacher education Colleges.

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Contribution of *i*-Tax System as a Strategy for Revenue Collection at Kenya Revenue Authority, Rift Valley Region, Kenya

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Abstract- This study aimed at examining the contribution of i-Tax system as a strategy for revenue collection at Kenya Revenue Authority, Rift Valley Region, Kenya. The study was guided by the following hypothesis: Ha1:There is a contribution of online taxpayer registration on revenue collection at KRA Rift Valley Region ;Ha2: There is a contribution of online tax return processing on revenue collection at KRA Rift Valley Region ; Ha3: There is a contribution of online compliance and monitoring activities on revenue collection at KRA Rift Valley Region.; Ha4: There is a contribution of electronic tax payments on revenue collection at KRA Rift Valley Region.The study was guided by Resource Based Theory. The study employed correlational research design. The target population was the Domestic Taxes Department employees at KRA Rift Valley Region. The study targeted 114 employees. Stratified random sampling technique was used to select 76 respondents for the study. A five-point likert scale structured questionnaire was used to collect primary data. A pilot test was conducted to assess validity of the research instruments whereas Cronbanch's coefficient alpha was used to determine reliability of the research instruments. Both descriptive and inferential statistics were used to analyze the data. Statistical significance of relationships among selected variables was determined using multiple regression analysis. Results obtained were presented using tables. The study established that online taxpayer registration, online tax return processing, online compliance and monitoring activities; and electronic tax payments have a significant contribution on revenue collection at KRA, Rift Valley Region. The study concluded that when all these iTax components were embraced, revenue collection, accounting for taxes paid, monitoring of taxpayers, service delivery to taxpayers and compliance improved. This study recommended that KRA management should focus on taxpayer facilitation through a robust system of customer relationships management, efficient complaints resolution and ensuring that more resources are invested in user friendly online tax systems in order to realize long term benefits.

Index Terms- *i*-Tax system, Kenya Revenue Authority, Rift Valley Region, Revenue Collection

I. Introduction

Governments and public authorities in general have to act on behalf of society at large, notably in providing key public services. Governments today are under an increasing pressure to improve the delivery of public services in cost-effective ways. Despite numerous challenges most governments have turned to e-government led solutions like e-filing (Ojha, Sahu & Gupta, 2009). Information technology developments offer considerable opportunities but also pose new compliance problems (International Monetary Fund, 2014).

According to Seelmann, Lerche, Kiefer & Lucante (2011), taxation is often the most important source of state revenue. However, many developing countries lack effective tax administration structures and processes. Technological innovations have not filtered through to the daily working reality of tax officials. Paperwork and loose leaf systems still dominate tax administration and prevent more effective tax processes. As a consequence, some developing countries capture as little as 40% of their tax potential. Efficient internal revenue collection is a major step towards self sufficiency and independence. Computerization of tax revenue authorities can contribute to the goal of good financial governance (Seelmann *et al.*, 2011).

i-Tax is the new system that has been developed by the Kenya Revenue Authority (KRA) to ensure online submission of tax returns and other taxation related transactions. It is a web-enabled application system that provides a fully-integrated and automated solution for administration of domestic taxes (KRA, 2015). It is meant to simplify revenue collection in Kenya by allowing taxpayers to simply update their tax registration details, file tax returns, generate electronic payment slips and make status enquiries with real-time monitoring of their ledger accounts (KRA, 2015).Technically, iTax is a completely integrated modular system for taxation with an open source database, which can handle all types of taxes. iTax supports the revenue authority in registration, assessment, collection, accounting, debt management, auditing, tax monitoring and reporting (Seelmann *et al.*, 2011).

The public sector has long been subjected to criticisms for, among others, inefficiency, lack of flexibility, ineffective accountability and poor performance. Such criticisms have paved the way for administrative reforms and reorganizations seeking to address various administrative ailments and enhance the efficiency and performance of public bureaucracies (Langfield-Smith, 1997). The Monterrey Consensus (UN Conference on Financing for Development, 2002) highlighted the importance of mobilizing domestic financial resources in order to eradicate poverty, achieve sustained economic growth and promote sustainable development. The revenue structures of most developing countries have not been as productive as desired. Too often the growth in revenue has failed to catch up with

government spending pressures, a situation that has occasioned huge imbalances between the demand and supply of public budgetary resources. These countries have then had to reform their tax structures, with the general objectives of revenue adequacy, economic efficiency, equity and fairness, and simplicity.

Over the years, Kenyan taxpayers have been filing tax returns manually every time they are due. This form of tax system has its many problems like tax evasion and tax avoidance, errors in data capture of tax payments and tax return details occasioned by manual processing of returns and long queues experienced when filing tax returns at KRA offices, leading to low revenue collection and consequently the inability of the government to meet its obligations to its citizens (KRA, 2012).

Online tax filing system is fairly a new system being implemented in phases by Kenya Revenue Authority. The system is meant to enhance revenue collection, reduce paper work and long queues during the time of tax returns filing process. It is also meant to take the tax return process to the taxpayers with the hope of increasing efficiency and effectiveness in revenue collection and flag out inconsistencies in tax returns (KRA, 2012).

To improve domestic tax services, KRA introduced iTax system in 2011, a web-based system intended to deliver services to taxpayers effectively and efficiently. This is also intended to improve revenue collection and enable convenient and improved taxpayer compliance. The iTax portal enables taxpayer registration, filing of tax returns and other key compliance functions such as issuance of tax compliance certificates, refunds, waivers and tax exemptions. A taxpayer can also update his tax registration details and monitor the account in iTax system. The KRA's iTax system has for months provided effective service to its clients. The system provides an integrated view of a taxpayer, making it easier for taxpayers to access various tax administration services from anywhere, update their registration details, file returns, pay their taxes through mobile payment services (such as M-Pesa, Airtel Money and others), enquire about tax status, apply for Tax Compliance Certificates and lodge refund claims online in real time, just to name a few (KRA, 2015). In addition, the KRA is now able to identify taxpayers who have traded within the period 2014/2015 and who have not filed returns.

The KRA announced it had hit the Sh1 trillion revenue mark for 2014/2015 fiscal year (KRA, 2015). Some of the services that have been effectively delivered to customers include registration of taxpayers, streamlining of the reporting of data and tax receipts. There are a number of methods employed by tax agencies to capture tax returns and payment data electronically. Additionally, electronic methods are increasingly being used for administrative functions, such as business tax registration, and name and address changes for both businesses and individuals (Seelmann, 2011).

The KRA is the principal government revenue collection agency and accounts for over 95% of government ordinary revenue (KRA, 2015). Kenya Revenue Authority Rift Valley Region operational headquarters is based in Generation house, Nakuru town. The region has stations in Eldoret, Nakuru, Kitale, Lodwar, Maralal, Naivasha, Narok and Kericho towns. The region also runs four revenue programmes namely; compliance, taxpayer services, taxpayer recruitment and registration and debt management. These programmes use iTax system to facilitate their operations in terms of taxpayer registration, tax return filing, and electronic tax payments through electronic slips, issuance of debt demand notices, processing of waivers and issuance of tax compliance certificates. The region also has iTax centres with staff trained on iTax system. iTax centres serve as a front office for dealing with challenges faced by taxpayers in their encounter with the iTax system. The assist the taxpayers in PIN application, amendment of registration details, filing of tax returns, tax compliance certificate application and application of tax waivers. The region has adopted iTax system in all the programmes but there are still revenue gaps. It is therefore evident that iTax system being the only electronic platform for domestic revenue collection at Rift Valley Region when fully adopted can aid the region in achieving its revenue collection targets.

1.2 Statement of the Problem

Despite the increasing need to raise the level of revenue collection and enforcement so as to provide public services, developing countries still face the challenges of low tax compliance. This leads to frequent tax reforms aimed primarily at closing short-term revenue gaps (Bird & Zolt, 2003).

Revenue system modernization improves the ability of an organization to collect more revenue with minimal costs. An electronic system for filing and paying taxes, like the iTax system, if implemented well and used by most taxpayers, benefits both tax authorities and taxpayers.For tax authorities, electronic filing lightens the workload and reduces operational costs – such as the costs of processing; storing and handling tax returns (Gekonge & Atambo, 2016). To meet the 2014/15 target of a record Sh1.18 trillion, KRA had to raise collections by over 20 per cent through new efficient measures that heavily relied on the introduction of iTax system (KRA, 2015).

Gidisu (2012) did a study on the automation system procedure of the Ghana Revenue Authority on the effectiveness of revenue collection using a case study of Customs Division. Gidisu (2012) established a positive impact of automation system usage and the cost of tax administration, automation and effectiveness of revenue collection.

In Germany, J. Seelmann *et al.*, (2011) did a study on the benefits of a computerized integrated system for taxation (iTax). They found out that iTax system has cost saving and service improvement effects induced by e-Government. The KRA sixth corporate plan is guided by the authority's ability to leverage technology to enhance service delivery and promote compliance. The success of KRA in its core mandate of revenue collection largely hinges on the efficacy and efficiency of the newly introduced iTax system in increasing tax compliance and sealing tax leakages occasioned by tax evasion. Electronic tax system was introduced by Kenya Revenue Authority to increase financial collection, administration, avail services to the tax payers all the time from anywhere, reduce costs of compliance and improve tax compliance. However, tax compliance levels remain low and tax collections are below the targets set by Kenya Revenue Authority (Atambo and Gekonge, 2016). This study therefore sought to establish the contribution of iTax

system as a strategy for revenue collection at Kenya Revenue Authority, Rift Valley Region.

1.3 Hypotheses of the Study

The study was guided by the following hypothesis:

Ha_1: There is a contribution of online taxpayer registration on revenue collection at KRA Rift Valley Region

Ha_2: There is a contribution of online tax return processing on revenue collection at KRA Rift Valley Region

Ha_3: There is a contribution of online compliance and monitoring activities on revenue collection at KRA Rift Valley Region.

Ha_4: There is a contribution of electronic tax payments on revenue collection at KRA Rift Valley Region

II. LITERATURE REVIEW

Theoretical review

The Benefit Theory was initially developed by Knut Wicksell in 1896 and Erik Lindhal in 1919. According to this theory, the state should levy taxes on individuals according to the benefits conferred on them. The more benefits a person derives from the activities of the state, the more he should pay to the government. This theory is based upon the assumption that there is an exchange relationship or quid pro quo between the tax payer and the government. The Government confers some benefits on the tax payers by performing various services or providing them with social goods. In exchange for these benefits individuals pay taxes to the Government. Further, according to this theory, equity or fairness in taxation demands that an individual should be asked to pay a tax in proportion to the benefits he receives from the services rendered by the Government. Conversely, critics contend that according to this theory, the state should levy taxes on individuals according to the benefit conferred on them. The more benefits a person derives from the activities of the state, the more he should pay to the government. However, there are some difficulties in application of this theory. The most crucial problem faced by benefits theory is that it is difficult to measure the benefits received by an individual from the services rendered by the Government (Luoga & Makinya, 2012)

Frank P. Ramsey (1927) developed a theory for optimal commodity sales taxes in his article "A Contribution to the Theory of Taxation". The problem is closely linked to the problem of socially optimal monopolistic pricing when profits are constrained to be positive, known as the Ramsey problem. He was the first to make a significant contribution to the theory of optimal taxation from an economic standpoint, and much of the literature that has followed reflects Ramsey's initial observations (Gentry, 2003).Optimal taxation theory is concerned with the designing and implementation of a tax system that reduces inefficiency and distortion in the market under given economic constraints. Though inequality will always exist within even the most efficient markets, the goal of taxation is to eliminate as much inefficiency as possible and to raise revenue to fund government expenditures. With any tax, there will be an excess burden, or additional cost, to the consumer and the producer. Whenever the consumer purchases the taxed good or service, and the higher elasticity, or responsiveness, of the demanded product, the greater the excess burden is on either the consumer or producer. Those individuals or corporations who have the most inelastic demand curve pay the brunt of the excess burden curve. However, the tradeoff of placing larger taxes on inelastic goods is that the higher tax will lead to lower quantity exchanged and thus a smaller deadweight loss of reduced revenue (Mankiw, Weinzierl & Yagan, 2009).However, this theory has criticized for being of little practical policy relevance, due to a lack of robust theoretical results. Much of the optimal tax literature building on Mirrleess'(1971) contribution has been highly technical and abstract, and for many years this body of theory seemed to offer few robust results (Sorensen, 2010).The theory of optimal taxation has yet to deliver clear guidance on a general system of history-dependent, coordinated labor and capital taxation for a realistically-calibrated economy. Instead, it has supplied more limited recommendations (Gentry, 2003).

The expediency theory of taxation by Buehler in 1936 states that every tax revenue collection system must pass the test of practicability, which must be the only consideration when the government is choosing a revenue collection system. Proposition is that the economic and social objectives of the government should be treated as irrelevant, since it is useless to have a tax which cannot be levied and collected efficiently. This theory is relevant to the study in that iTax system is expected by KRA to enhance revenue collection by creating an enabling technological environment that facilitate efficient assessment and revenue collection process.Equally,the expediency theory has been criticized for the proposition that the economic and social objectives of the government should be treated as irrelevant is not practical as there are pressures from economic, social and political groups. Every group tries to protect and promote its own interests and government is often forced to reshape tax structure to accommodate these pressures (Bhartia, 2009). In addition, the administrative set up may not be efficient to collect the tax at a reasonable cost of collection. Taxation provides a powerful set of policy tools to the authorities and should be effectively used for remedying economic and social ills of the society such as income inequalities, regional disparities, unemployment, cyclical fluctuations and so on (Bhartia, 2009).

The expediency theory of taxation is therefore relevant to the present study in that, it seeks to explain influence of administrative set up, such as efficient electronic payment system, in revenue collection by KRA.

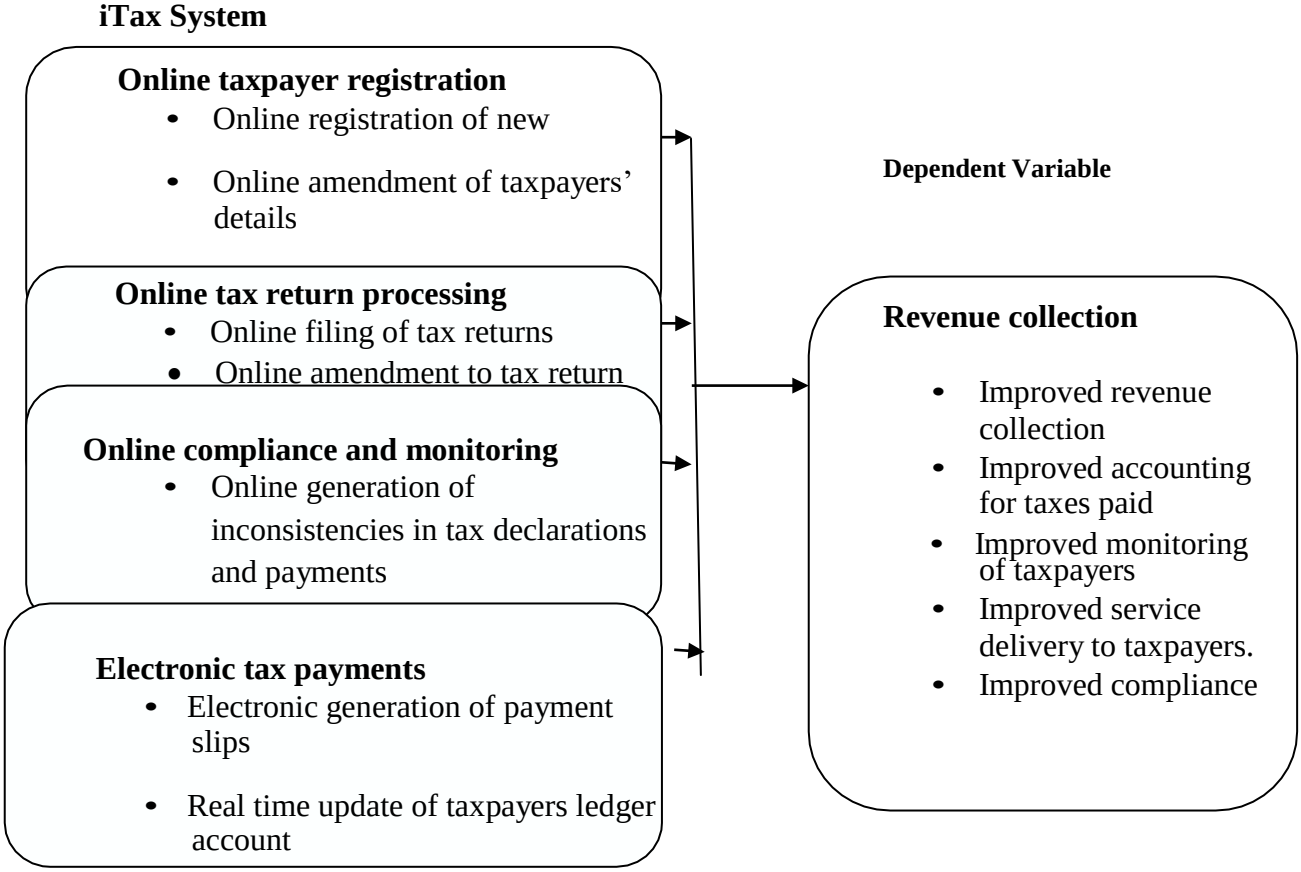
III. THEORETICAL FRAMEWORK

The study was guided by Resource Based Theory advanced by Barney. According to this theory, a firm is equivalent to a broad set of resources that it owns (Barney, 1991). The Resource Based Theory suggests that the resources possessed by a firm are the primary determinants of its performance, and these may contribute to a sustainable competitive advantage of the firm (Hoffer & Schendel, 1978; Wenerfelt, 1984). According to Barney (1991), the concept of resources includes all assets, capabilities, organizational processes, firm attributes, information and knowledge controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness.

The Resource Based Theory suggests that valuable firm resources are usually scarce, imperfectly imitable, and lacking in direct substitutes (Barney, 1991; Peteraf, 1993). Firms need to seek a strategic fit between their internal characteristics (strengths and weaknesses) and their external environment (opportunities and threats) (Barney, 1991). Considerable emphasis has usually been given, however, to a firm's competitive environment and its competitive position. In contradistinction to that external emphasis, the resource-based theory embodies a different approach, which stresses the internal aspects of a firm.

Conceptual Framework

Figure 1: Conceptual Framework



Source: Researcher (2016)

The conceptual framework above shows the relationship between the independent variable and the dependent variable. The independent variable is the iTax system while the dependent variable is the revenue collection. The components of iTax include online taxpayer registration, online tax return processing, online compliance and monitoring and electronic facilitation of payments through E- slips whereby banks have been integrated with a payment gateway system thus enabling taxpayers make payments conveniently via mobile banking, cash, cheque and RTGS. The components of revenue collection include improved revenue collection; improved accounting for taxes paid, improved monitoring of taxpayers and improved service delivery to taxpayers. Improved revenue collection is as result of widening the taxpayer base through recruitment and registration, quick and accurate processing of tax returns and faster and secure platforms for payment of taxes and sealed loopholes for tax evasion and tax avoidance schemes.

IV. Methodology

This study adopted a Correlational research design where data were collected on two variables namely iTax system and revenue collection. The target population encompassed 114 employees working under compliance, debt, taxpayer recruitment and registration, policy unit programmes and iTax support centre of the domestic taxes department at KRA Rift Valley Region (KRA, 2017). The researcher used both structured and unstructured questionnaires to collect primary data from the respondents. Stratified Radom sampling was used to constitute the sample population. Stratus were formulated based on the

KRA offices within the Rift-Valley region, afterwards a random sampling was carried out within each constituent regional office

FINDINGS

Contribution of iTax System on Revenue Collection

Table 1: Contribution iTax System on Revenue Collection

Correlations

		Revenue Collection	Online taxpayer registration	Online Tax Return Processing	Online Compliance and Monitoring Activities	Electronic Tax Payments
Revenue Collection	Pearson Correlation	1				
	Sig. (2-tailed)					
Online taxpayer registration	Pearson Correlation	.619**	1			
	Sig. (2-tailed)	0.000				
Online Tax Return Processing	Pearson Correlation	0.314	-0.093	1		
	Sig. (2-tailed)	0.381	0.477			
Online Compliance and Monitoring Activities	Pearson Correlation	.412**	-0.076	-0.192	1	
	Sig. (2-tailed)	0.010	0.562	0.138		
Electronic Tax Payments	Pearson Correlation	.646**	0.310*	-0.131	0.079	1
	Sig. (2-tailed)	0.010	0.015	0.313	0.547	
	N	61	61	61	61	61

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

Source: Researcher (2017)

From *Table 1* above, the correlation coefficient r is 0.619 and p-value 0.000, which was less than 0.05. This showed that there was a significant relationship between online taxpayer registration and revenue collection at KRA Rift Valley Region. Pearson correlation coefficient of 0.619 showed a positive correlation between online taxpayer registration and revenue collection in KRA. This implies that online taxpayer registration contributes to revenue collection at KRA Rift Valley Region.

There was a significant relationship between online tax return processing and revenue collection in KRA (correlation r=0.314 and the p-value was 0.01). Pearson correlation coefficient of 0.314 showed a positive correlation between online tax return processing and revenue collection at KRA Rift Valley Region.

There was a significant relationship between online compliance and monitoring activities and revenue collection (r=0.412 and p-value=0.01). Pearson correlation coefficient of 0.412 showed a strong positive correlation between online compliance and monitoring activities and revenue collection at KRA Rift Valley Region.

There was no significant relationship between online tax return processing and online taxpayer registration (r = -0.093 and p-value =0.477). Pearson correlation coefficient of -0.093 showed a weak negative correlation between online tax return processing and online taxpayer registration.

The study results showed that there was a significant relationship between electronic tax payments and revenue collection at KRA Rift Valley Region (r=0.646 and the p-value was 0.000). A Pearson correlation coefficient of 0.646 showed a strong positive correlation between electronic tax payment and revenue collection at KRA Rift Valley Region. ANOVA and regression analysis was done to estimate the relationships between the iTax System and Revenue Collection.

Table2: ANOVA Model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.836[a]	0.802	0.798	0.0798	111.676	0.000[b]

Source: Researcher (2017)

The ANOVA model indicated that the correlation coefficient was 0.836 which indicates a degree of correlation. The total variation in revenue collection was 80.2% explained by iTax System (R Squared=0.802).

The study results further revealed that the ANOVA model predicted revenue collection significantly well (p=0.000[b]). This indicated the statistical significance of the regression model that was run and that overall, the regression model predicted the revenue collection at KRA Rift Valley Region.

Relationship between iTax System and Revenue Collection

Table 3: Relationship between iTax System and Revenue Collection

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.369	0.224		1.648	0.000
Online taxpayer registration	0.263	0.024	0.534	10.744	0.000
Online Tax Return Processing	0.17	0.026	0.319	6.604	0.012
Online Compliance and Monitoring Activities	0.233	0.024	0.476	9.876	0.000
Electronic Tax Payments	0.248	0.026	0.485	9.737	0.002

a. Dependent Variable: Revenue Collection

Source: Researcher (2017)

From the regression equation, online taxpayer registration was the most important variable to revenue collection contributing 53.4 percent to revenue collection followed by electronic tax payment with 48.5 per cent. Online compliance and monitoring activities and online tax return processing contributed 47.6% and 31.9% to revenue collection respectively.

The regression equation further revealed that there was a significant relationship between online taxpayer registration and revenue collection (p=0.000); there was a significant relationship between online tax return processing and revenue collection (p=0.012); there was a significant relationship between online compliance and monitoring activities and revenue collection (p=0.000) and that there was a significant relationship between electronic tax payments and revenue collection (p=0.002).

Test of Hypotheses

Hypothesis testing allows determination of inferences about population parameters using data from a sample (Uriel, 2013). Multiple regression analysis was used to test the hypotheses. The multiple regression model from this analysis is shown as follows;

$Y = 0.369 + 0.534X_1 + 0.319X_2 + 0.476X_3 + 0.485X_4 + 0.224$.

Ho_1: There is no contribution of online taxpayer registration on revenue collection at KRA Rift Valley Region

The study findings indicated that there was a significant relationship between online taxpayer registration and revenue collection (p=0.000). This implies that online taxpayer registration significantly contributes to revenue collection at KRA Rift Valley Region. Therefore the null hypothesis is rejected.

Ho_2: There is no contribution of online tax return processing on revenue collection at KRA Rift Valley Region.

The study results showed that there was a significant relationship between online tax return processing and revenue collection (p=0.012). The p-value of 0.012 was less than 0.05. This reveals the significant contribution of online tax return processing on revenue collection at KRA Rift Valley Region. Therefore the null hypothesis is rejected.

Ho_3: There is no contribution of online compliance and monitoring activities on revenue collection at KRA Rift Valley Region.

The study findings indicated that there was a significant relationship between online compliance and monitoring activities and revenue collection (p=0.000). The p-value of 0.000 was less than 0.05. Pearson correlation coefficient of 0.616 showed a strong positive correlation between online compliance and

monitoring activities and revenue collection. This implies that as the compliance and monitoring activities become enhanced, revenue collection significantly improves at KRA Rift Valley Region. Therefore the null hypothesis is rejected.

Ho_4: There is no contribution of electronic tax payments on revenue collection at KRA Rift Valley Region.

The study results revealed that there was a significant relationship between electronic tax payments and revenue collection (p=0.002). The p-value of 0.002 was less than 0.05. This implies that electronic tax payments significantly contribute to revenue collection at KRA Rift Valley Region. Therefore the null hypothesis is rejected

V. Discussion of the Findings

Online Taxpayer Registration and Revenue Collection

The study results as shown in Table 5 showed that there was a significant contribution of online taxpayer registration on revenue collection at KRA Rift Valley Region**.** This implies that through online taxpayer registration iTax system has led to accurate capture of taxpayer's basic information**;** taxpayers data captured through iTax system has assisted KRA to staff itself accordingly and actively plan its core tax administration function**.** Through online taxpayer registration, KRA is able to widen its taxpayers' base and consequently increase its revenue collection.

Online Tax Return Processing and Revenue Collection

The study findings showed that there was a significant contribution of online tax return processing on revenue collection. Through adoption of online tax return processing, taxpayers are able to accurately, conveniently and timely submit returns to KRA. iTax system has increased the number of taxpayers filing their tax returns. Online submission of tax data has improved taxpayers records management through iTax system database. An inaccurate taxpayer database will inevitably lead to ineffective compliance programmes.

Online Compliance and Monitoring Activities and Revenue Collection

The study results also revealed that there was a significant contribution of online compliance and monitoring activities on revenue collection at KRA Rift Valley Region. This implies that efficient online compliance and monitoring activities through iTax system has led to close monitoring of taxpayers through readily available data for trend analysis. In addition, online compliance and monitoring activities has led to easy flagging out of inconsistencies in data declared by taxpayers and enhanced voluntary compliance. Furthermore, improved compliance with tax laws has led to improved revenue collection.

Electronic Tax Payments and Revenue Collection

The study findings indicated that there was a significant contribution of electronic tax payments on revenue collection. This implies that by embracing electronic tax payments KRA is able to accurately reconcile and validate taxes paid. Electronic tax payments of taxes have improved taxpayer's tax accountability, reduced loopholes for tax evasion and timely payment of taxes due. In this regard, online electronic payments of taxes through iTax system have improved revenue collection atKRA Rift Valley Region

VI. Recommendation

The Kenya Revenue Authority should use effective measures to mobilize and motivate tax payers to register online for applicable tax heads in order to widen the tax base and enhancement revenue collection. Elaborate civic education should be conducted at the research area and beyond to ensure that the general public is aware of the new tax system, how to use it and if not able to, tax payers should be advised where they can get assistance.

Kenya Revenue Authority and treasury should develop a payment gateway that integrates iTax system and other payment systems such as Integrated Financial Management System (IFMIS) in order to improve tracking of tax payments and seal possible tax evasion loop holes.

Kenya Revenue Authority should enhance internet connectivity in the rural areas to foster growth in online tax registration, tax return filing and online tax remittance. This can be done by building strategic alliances with telecommunication firms.

KRA management should focus on taxpayer facilitation through a robust system of customer relationships management, efficient complaints resolution and ensuring that more resources are invested in user friendly online tax systems in order to realize long term benefits.

VII. Suggestions for Further Research

- Similar studies can be done in other regions in the country and the results of the findings be compared for more accurate generalization.
- There is need for further research on the contribution of online taxpayer registration and revenue collection.
- Finally, a further study is necessary to investigate the factors affecting effective implementation of online tax systems as a strategy for enhancing revenue collection in Kenya

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Important of Supply Chain Management

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Abstract- A supply chain, as opposed to supply chain management, is a set of organizations directly linked by one or more upstream and downstream flows of products, services, finances, or information from a source to a customer. Supply chain management is the management of such a chain.Supply chain management is a cross-functional approach that includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end consumer. As organizations strive to focus on core competencies and become more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other firms that can perform the activities better or more cost effectively.

Index Terms- Supply, chain, management, organization, efficient.

I. Introduction

Supply change management is a highly-detailed system used by small and large organizations alike to get products to consumers, from obtaining raw materials, manufacturing and delivering the final product to the customer. A well-organized supply chain management system involves optimizing operations functionality to be fast and efficient.

Today, more than ever before, supply chain management has become an integral part of business and is essential to any company's success and customer satisfaction. Supply chain management has the power to boost customer service, reduce operating costs and improve the financial standing of a company, but how does this work?

What is Supply Chain Management, and Why is it Important

Organizations increasingly find that they must rely on effective supply chains, or networks, to compete in the global market and networked economy. In Peter Drucker's (1998) new management paradigms, this concept of business relationships extends beyond traditional enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple companies.

In recent decades, globalization, outsourcing, and information technology have enabled many organizations, such as Dell and Hewlett Packard, to successfully operate collaborative supply networks in which each specialized business partner focuses on only a few key strategic activities (Scott, 1993). This inter-organisational supply network can be acknowledged as a new form of organisation. However, with the complicated interactions among the players, the network structure fits neither "market" nor "hierarchy" categories (Powell, 1990).

Traditionally, companies in a supply network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance (Mintzberg, 1979).

What is Supply Chain Management?

Supply chain management in not only a process served to generate a cost reduction in the budget or a mission to create greater operational efficiencies within an organization. While these are a part of the whole ecosystem, modern supply change management encompasses the strategic alignment of end-to-end business processes to realize market and economic value, as well as giving a firm the competitive advantage over their business rivals.

In recent times, the dawn of the digital age has brought wholesale transformation to the world of commerce. Only twenty years ago, these processes were arduous, labor intensive, time consuming and disorganized. It now may seem like ancient history, delivery times have gone from two weeks to a month down to a turnaround of hours in some cases. Automated systems and high-speed communication have paved the way for supply chain management and its increased demand.

Why is Supply Chain Management So Important?

Today, more than ever before, supply chain management has become an integral part of business and is essential to any company's success and customer satisfaction. Supply chain management has the power to boost customer service, reduce operating costs and improve the financial standing of a company, but how does this work?

The Interconnected Supply Chain

Essentially, the world can be viewed as one large supply chain. Consumers and producers are constantly communicating with each other, and a product goes through many hands before reaching its destination. Supply chain management deals with major issues such as the growth of multinational corporations, partnerships, global brand expansion, and outsourcing.

Everything that affects the world affects supply chain management, from fluctuating gas prices to environmental concerns. SCM is the single most important business discipline in the world today, and has only gotten more interconnected. The importance of a well-run supply chain cannot be overstated. According to a report from Allianz SE, business interruptions (BI) account for higher proportions of property loss than 10 years ago. From 2010 to 2014, claims from 68 countries were at $2.4

million on average – all because of the increasingly interconnected supply chain.

Integrated and Cooperative Logistics

SCM is necessary for the foundation of all societies. Supermarket operations for example, deal with a wide variety of producers, and are essential to providing goods to consumers. If a supermarket industry does not have a good supply chain management branch, this can affect a wide variety of citizens who need a supermarket to survive. An effective supply chain that can meet the needs of both producers and consumers is one that takes an integrated approach towards management.[1]

Better Supply Chain Better Business

Supply chain management has a huge impact on business. Good SCM can directly improve customer service. The right product and the correct quantity must be delivered in a timely manner, to appease both producers and distributors. Consumers want to be able to know the location they must go to obtain the goods that they want.

Consumers also want a high standard of customer support. If goods are not distributed on time, supply chain management branches of a company have to assure them that they will get their products as soon as possible. SCM also has a huge impact on the bottom line of a company. Large corporations value good supply chain managers because they improve the efficiency of plants, warehouses, and transportation vehicles in a supply chain. Cash flow is directly increased because the delivery of a product is in a timely manner, and consumers can purchase their goods. Supply chain processes are also changing to meet customer demand and expectation.

Many researchers have recognized supply network structures as a new organisational form. In general, such a structure can be defined as "a group of semi-independent organisations, each with their capabilities, which collaborate in ever-changing constellations to serve one or more markets in order to achieve some business goal specific to that collaboration" (Akkermans, 2001). Supply chain management is also important for organizational learning. Firms with geographically more extensive supply chains connecting diverse trading cliques tend to become more innovative and productive.[2]

Supply chain management (SCM) is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible. Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

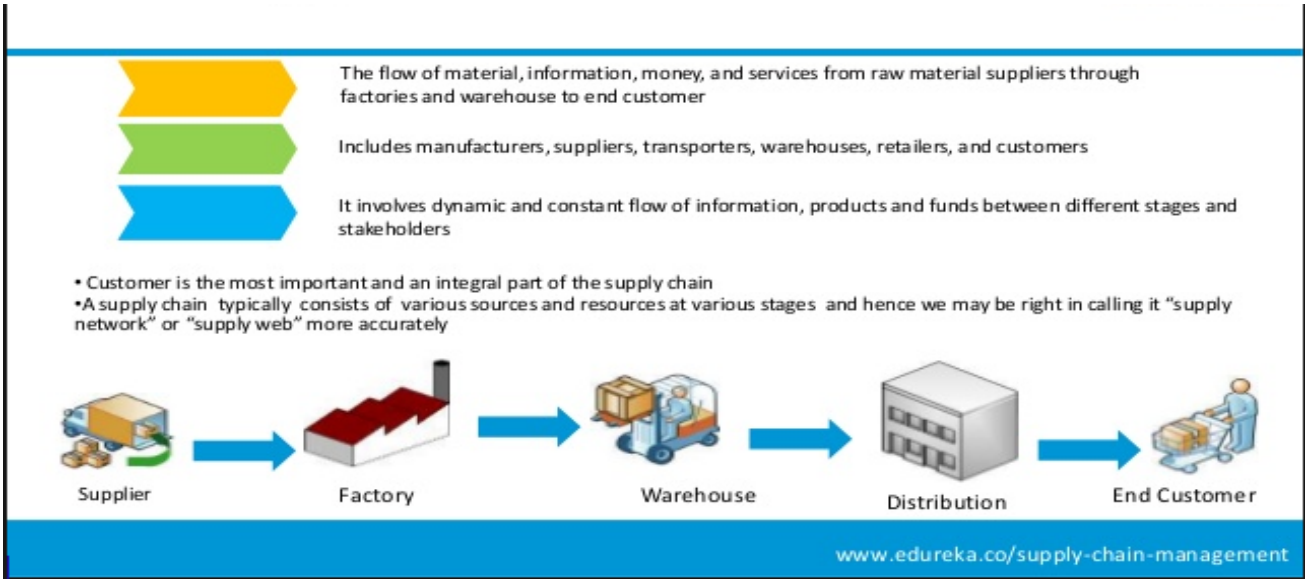
II. Supply Chain

A supply chain is the connected network of individuals, organizations, resources, activities and technologies involved in the manufacture and sale of a product or service. A supply chain starts with the delivery of raw material from a supplier to a manufacturer, and ends with the delivery of the finished product or service to the end consumer. SCM oversees each touch point of a company's product or service, from initial creation to final sale. With so many places along the supply chain that can add value through efficiencies or lose value through increased expenses, proper SCM can increase revenues, decrease costs and impact a company's bottom line. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing managerial control of daily logistics operations. Less control and more supply chain partners lead to the creation of the concept of supply chain management. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

[1]Michael Wilson | Mar 14, 2017

[2]Todo, Y.; Matous, P.; Inoue, H. (11 July 2016). "The strength of long ties and the weakness of strong ties: Knowledge diffusion through supply chain networks"

A SUPPLY CHAIN



In the 21st century, changes in the business environment have contributed to the development of supply chain networks. First, as an outcome of globalization and the proliferation of multinational companies, joint ventures, strategic alliances, and business partnerships, significant success factors were identified, complementing the earlier "just-in-time", lean manufacturing, and agile manufacturing practices.[3] Second, technological changes, particularly the dramatic fall in communication costs (a significant component of transaction costs), have led to changes in coordination among the members of the supply chain network (Coase, 1998).

Supply chain activities aren't the responsibility of one person or one company. Multiple people need to be actively involved in a number of different processes to make it work.

Winning the SCM "game" requires supply chain professionals to play similar roles. Each supply chain player must understand his or her role, develop winning strategies, and collaborate with their supply chain teammates. By doing so, the SCM team can flawlessly execute the following processes:

- Planning – the plan process seeks to create effective long- and short-range supply chain strategies. From the design of the supply chain network to the prediction of customer demand, supply chain leaders need to develop integrated supply chain strategies.
- Procurement – the buy process focuses on the purchase of required raw materials, components, and goods. As a consumer, you're pretty familiar with buying stuff!
- Production – the make process involves the manufacture, conversion, or assembly of materials into finished goods or parts for other products. Supply chain managers provide production support and ensure that key materials are available when needed.
- Distribution – the move process manages the logistical flow of goods across the supply chain. Transportation companies, third party logistics firms, and others ensure that goods are flowing quickly and safely toward the point of demand.
- Customer Interface – the demand process revolves around all the issues that are related to planning customer interactions, satisfying their needs, and fulfilling orders perfectly.

The concept of Supply Chain Management (SCM) is based on two core ideas:

- The first is that practically every product that reaches an end user represents the cumulative effort of multiple organizations. These organizations are referred to collectively as the supply chain.
- The second idea is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their "four walls." Few businesses understood, much less managed, the entire chain of activities that ultimately delivered products to the final customer. The result was disjointed and often ineffective supply chains.

The organizations that make up the supply chain are "linked" together through physical flows and information flows.

Physical Flows-Physical flows involve the transformation, movement, and storage of goods and materials. They are the most visible piece of the supply chain. But just as important are information flows.

Information Flows-Information flows allow the various supply chain partners to coordinate their long-term plans, and to control the day-to-day flow of goods and materials up and down the supply chain.

Seven Principles of SCM:

More than ten years ago, a research study of 100+ manufacturers, distributors, and retailers uncovered some widely used supply chain strategies and initiatives. These ideas and

[3]MacDuffie and Helper, 1997; Monden, 1993; Womack and Jones, 1996; Gunasekaran, 1999

practices were distilled down to seven principles and presented in an article in Supply Chain Management Review, a magazine widely read by SCM professionals.

Principle 1

Segment customers based on the service needs of distinct groups and adapt the supply chain to serve these segments profitably.

Principle 2

Customize the logistics network to the service requirements and profitability of customer segments.

Principle 3

Listen to market signals and align demand planning accordingly across the supply chain, ensuring consistent forecasts and optimal resource allocation.

Principle 4

Differentiate product closer to the customer and speed conversation across the supply chain.

Principle 5

Manage sources of supply strategically to reduce the total cost of owning materials and services.

Principle 6

Develop a supply chain-wide technology strategy that supports multiple levels of decision making and gives clear view of the flow of products, services, and information.

Principle 7

Adopt channel-spanning performance measures to gauge collective success in reaching the end-user effectively and efficiently.

Though they are more than a decade old, these timeless principles highlight the need for supply chain leaders to focus on the customer. They also stress the importance of coordinating activities (demand planning, sourcing, assembly, delivery, and information sharing) within and across organizations.

III. Conclusion

In the 21st century, supply chain management professionals are expected to possess the knowledge and capabilities to support the improved efficiency, effectiveness and profitability of modern businesses. For large organizations, the ability to incorporate performance trade-offs across multiple functional areas, both internal and external, is critical. Meanwhile, small and mid-sized businesses must be able to deliver a unique value proposition in an increasingly competitive marketplace. As a result, supply chain management professionals are growing in importance across business types, industry sectors and global regions.For progressive business leaders, the need for supply chain management knowledge and skills has never been greater.

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Antimicrobial Finish on Cotton Fabric with Amla Juice

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Abstract- Amla is an amazing gift of nature . It has good antimicrobial property . I treated cotton fabric with amla juice by pad batch method in acidic condition . The antimicrobial activity on the cotton fabric was evaluated against AATCC 147 method .
. I found there is antimicrobial activity on the fabric after doing test . The aim of the project was to check the antimicrobial activity of cotton fabric after application of amla juice in the fabric.

Index Terms- Antimicrobial Finish , Amla , Nicotanic Acid , Curing ,Cotton

I. Introduction

Textiles have always played an important role in the evolution of human culture by being at the forefront of both technological and artistic development. The protective aspects of textile have provided the most textile ground for innovative developments. Hygiene has acquired importance in recent years. Odour has become an important factor. Unpleasant odour can arise from the acquisition of a variety of compounds produced in bodily fluids such as perspiration. Consumers are looking for solutions to odour and microbial problem and the unique benefits
provided by antimicrobial finish.
Microorganism growth is another factor that has resulted in development of antimicrobial finish. Microbial infestation poses danger to both living and non-living matters. Microorganisms cause problems with textile raw materials and processing chemicals, wet processes in the mills, roll or bulk goods in storage, finished goods in storage and transport, and goods as the consumer uses them. Obnoxious smells form the inner garments such as socks spread of diseases, staining and degradation of textiles are some of the detrimental effects of bad microbes. The consumers are now increasingly aware of the hygienic life style and there is a necessity and expectation for a wide range of textile products finished with antimicrobial properties.

The inherent properties of the textile fibers provide room for the growth of microorganisms. Besides, the structure of the substrates and the chemical processes may induce the growth of microbes. Humid and warm environment still aggravate the problem. Infestation by microbes cause cross infection by pathogens and development odour where the fabric is worn next to skin. In addition, the staining and loss of the performance properties of textile substrates are the results of microbial attack. Basically, with a view to protect the wearer and the textile substrate itself antimicrobial finish is applied to textile materials.

Antimicrobial textile products continue to increase in popularity as demand for fresh smelling, skin friendly, high performance fabrics goes on. Modern performance fabrics are required in many specialist applications, sports textile is one example. These need to exhibit high degrees of performance in terms of longevity and durability, and by imparting antimicrobial properties to the fabric. These properties can be improved as well as increasing the comfort and hygiene factor making them more pleasant to wear. Odour can be neutralized and skin problems caused by microbial growth reduced thus emphasizing the hygiene nature of the treated product.

I tried in my research work to find out the antimicrobial property in cotton fabric after treating the fabric with amla juice. There are two kind of antimicrobial finish in the fabric. They are anti fungal finish and anti bacterial finish. In my research work I did the antibacterial finish on the cotton fabric.

Amla:

Amla scientifically known as **Phyllanthus emblica** which has antimicrobial property . According to ayurveda there are 2 varieties of amla :
1.Vanya (wild)
2. Gramya (cultivated)

Chemical composition of amla:

The fruit contains

1. Gallic acid
2. Albumin
3. Ascorbic acid (vitamin C)
4. Proteins
5. Carbohydrates
6. Phosphorus
7. Nicotinic acid
8. Tannic acid
9. Cellulose and other minerals
10. It contains moisture
11. Fats
12. Calcium
13. Iron 1.2 mg
14. A seed contains stable oil

Figure 1: Amla

Fruit Traditional medicine:

In traditional Indian medicine, dried and fresh fruits of the plant are used. All parts of the plant are used in various Ayurvedic / Unani medicine herbal preparations, including the fruit, seed, leaves, root, bark and flowers. According to Ayurveda, amla fruit is sour and astringent in taste, with sweet, bitter and pungent secondary tastes .Its qualities are light and dry, the post digestive effect is sweet and its energy is cooling .

According to Ayurveda, amla balances all three doshas. While amla is unusual in that it contains five out of the six tastes recognized by Ayurveda, it is most important to recognize the

effects of the "virya", or potency, and "vipaka", or post-digestive effect. Considered in this light, amla is particularly helpful in reducing *pitta* because of its cooling energy. It also balances both Pitta and *vata* by virtue of its sweet taste. The *kapha* is balanced primarily due to its drying action. It may be used as a *rasayana* to promote longevity, and traditionally important to enhance digestion , treat constipation , reduce fever , purify the blood , reduce cough , alleviate asthma , strengthen the heart , benefit the eyes , stimulate hair growth ,enliven the body ,and enhance intellect .In Ayurvedicpolyherbal formulations, Indian gooseberry is a common constituent, and most significantly it is one of the primary ingredients in an ancient herbal *rasayana* called *Chyawanprash*. This formula, which contains 43 herbal ingredients as well as clarified butter, sesame oil, sugar cane juice, and honey, was first mentioned in the CharakaSamhita as a premier rejuvenative compound.
In Chinese traditional therapy, this fruit is called *yuganzi*, which is used to treat throat inflammation.

Antimicrobial Element in Amla :

The component nicotanic acid ($C_6H_5NO_2$) is responsible for the antimicrobial activity of amla .The chemical structure of nicotanic acid is given below :

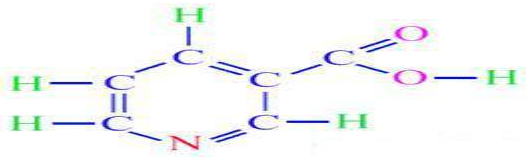

Figure 2 : Nicotanic Acid

II. EXPERIMENTAL PART

Antimicrobial Finish with Amla **:**

Table 1:Necessary Element Used

Substance	Chemical	Equipment
1. 100% Scoured & Bleached Cotton Plain Woven Fabric. (150 GSM)	1. Amla Juice 2.Amoniam Hydroxide 3. Acetic Acid 4. Water	1.Beaker 2.Pipet

Table 2: Description of Machines

Machine	Manufacturer
1.Balance	Labtec
2.Rota dyer	Labtec
3.Woven Dryer	Labtec
4.Padder	Labtec
5.Curing Machine	Labtec

Antimicrobial Finishing Process:

Preparation of amla juice:

1. At first I washed the amla with fresh water to remove the dust.
2. Then the amla were again washed with distilled water.
3. After removing the water, the amla were cut into small portion and blended amla without seeds.
4. Extraction of the amla juice was done by filtering.
5. Check the concentration of liquor.
6. Then the juice was kept in the clean bottle.

Figure 3: Amla Juice

Pretreatment of fabric:

The fabric was treated with 2g/L acetic acid at 70 ^{0}C for 15 minutes with water in rota dyer in 5.5 pH. The liquor ratio was 1:20. The material was given a cold wash for 5 minutes. The pH was maintained at 7 .

Process sequence of application of amla juice in the cotton fabric:

1. At first I took 150 ml amla juice in a beaker.
2. Then I checked the P^H of the liquor. The P^H was 2.5 which is not suitable to apply in the fabric.
3. Then I added 50 ml water with amla juice .
4. Then I added NH_4OH to maintain P^H level 5-5.5 because the amla juice P^H level was 2.5. It was acidic for this reason we used ammonium hydroxide to maintain P^H 5-5.5.
5. Then I took fabric samples of 12 gm.
6. Then I kept the fabric in the liquor for 30 min in the room temperature.

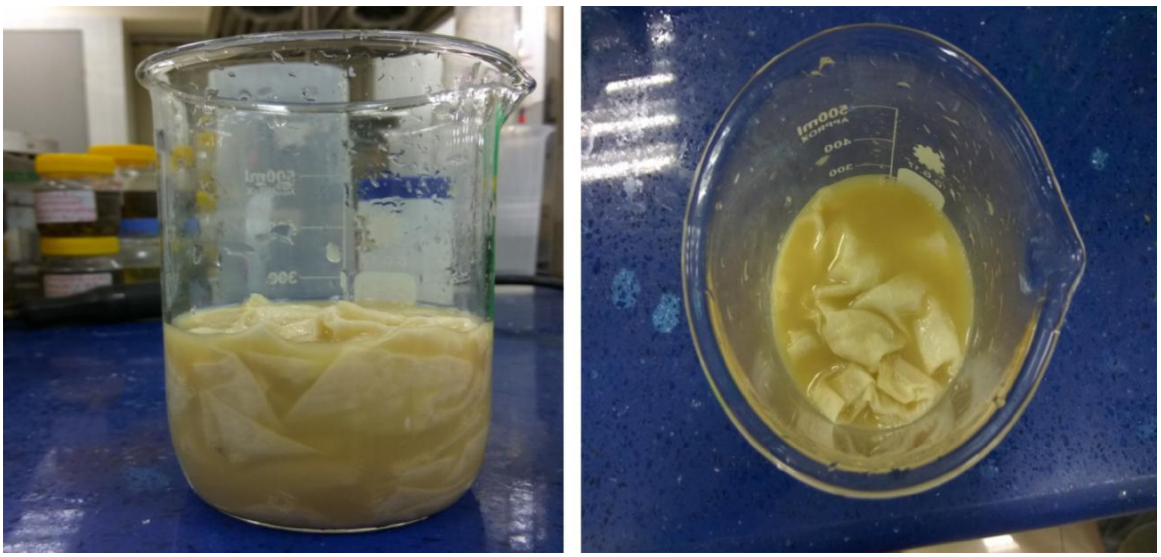

Figure 4: Cotton Fabric in Amla Juice (Side & Top View)

7. Then the samples were padded by the padder to maintain pick up percentage 90%.
8. Then the samples were dried in 60^0c temperature for 30 min.

After Treatment:

1. Then I cure the samples. We cured the fabric sample for 2 min in 120^0c temperature.
2. Then I cooled the samples in room temperature. After that I packed the sample in poly.

Fixation Mechanism (Possible Result) :

In the presence of ammonium hydroxide, cellulose create bond with nicotinic acid in high temperature and eliminate water molecule. And nicotinic acid fixed with cotton fabric surface and then the fabric will show antimicrobial property.

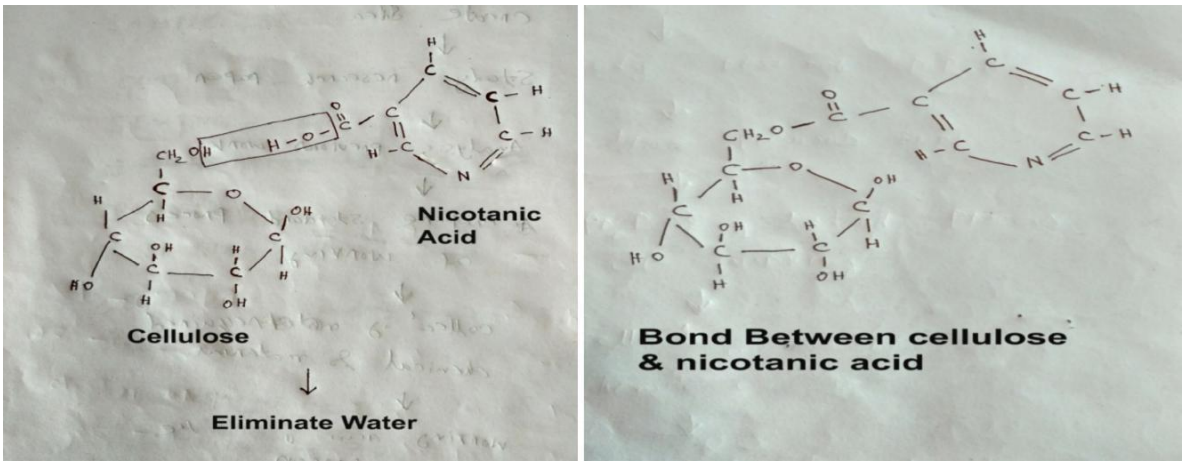

Figure 5 : Bonding

.

III. Result and Discussion

Test Method

I used AATCC 147 Parallel Streak Test method to evaluate the antibacterial test result. The AATCC 147 is a fast, qualitative means to measure the ability of an antimicrobial textile to inhibit the growth of microorganisms. The method offers options as to what microorganisms to test against, depending on the study sponsors testing objectives and products end use. I used for my test one kind of bacteria. I used Gram Positive Bacteria: **S.aureus** . The process of testing is given below :

- The test microorganism is prepared, usually by growth in a liquid culture medium. Per the method, representative microorganism is specified, *S. aureus* .
- Prior to initiating the test, sterilized molten growth agar is poured into sterile petri dishes and allowed to solidify completely before inoculating.
- The suspension of test microorganism is then standardized by dilution in sterile distilled water.
- Using a sterile inoculating loop, one loop full of the diluted inoculum suspension is used to streak 5 consecutive streaks, spaced evenly apart, without refilling the loop, onto the solidified growth agar. This allows for 5 parallel streaks varying in concentration.

- Samples, which have been cut to be rectangular in shape and measuring 25 x 50 mm, as recommended by the method, are evenly placed across the five parallel streaks.
- A parallel untreated test sample is also cut and tested alongside Treated Test Samples.
- Gentle pressure is placed on the samples onto the agar in order to ensure contact of the entire test sample and the inoculated agar.
- Treated and Untreated (Control) Samples, on the inoculated agar, are then incubated at the microorganism specific temperature and incubation period, to ensure optimal growth.
- All microbiological assays run at Prime Asia Testing Laboratory are performed with the necessary parallel controls to provide adequate comparisons at both the start of the test as well as after the contact time.
- Post incubation, the plates are removed from the incubator and measurements on either side of the samples, if present, are averaged and a method specified formula is used to calculated its the Zone of Inhibition.
- Then I observed the growth of bacteria on the surface of the fabric.

Test Result

Anti-bacterial Test Result is evaluated by the photograph of Amla Juice Treated Cotton Fabric . Which is given below :

For Untreated Sample:

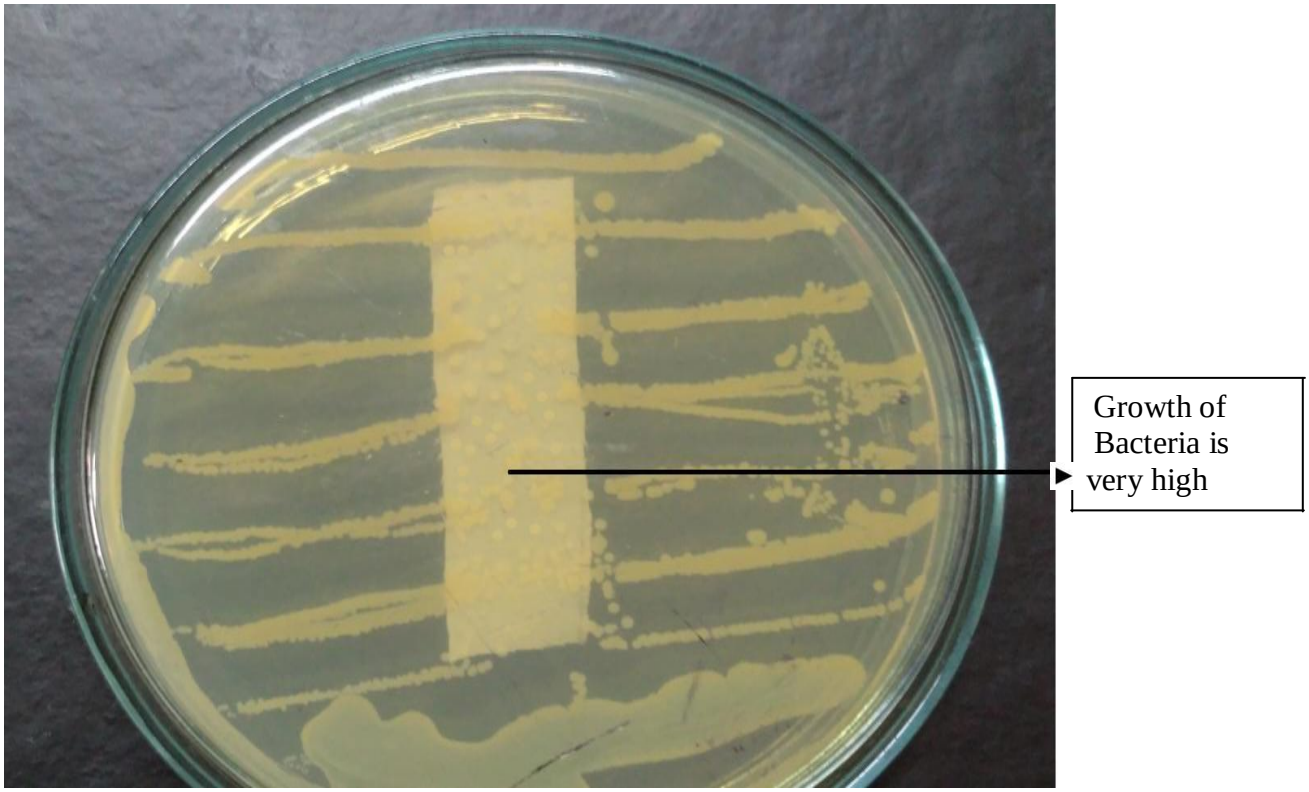

Figure 6: Untreated Fabric

For Treated Sample:

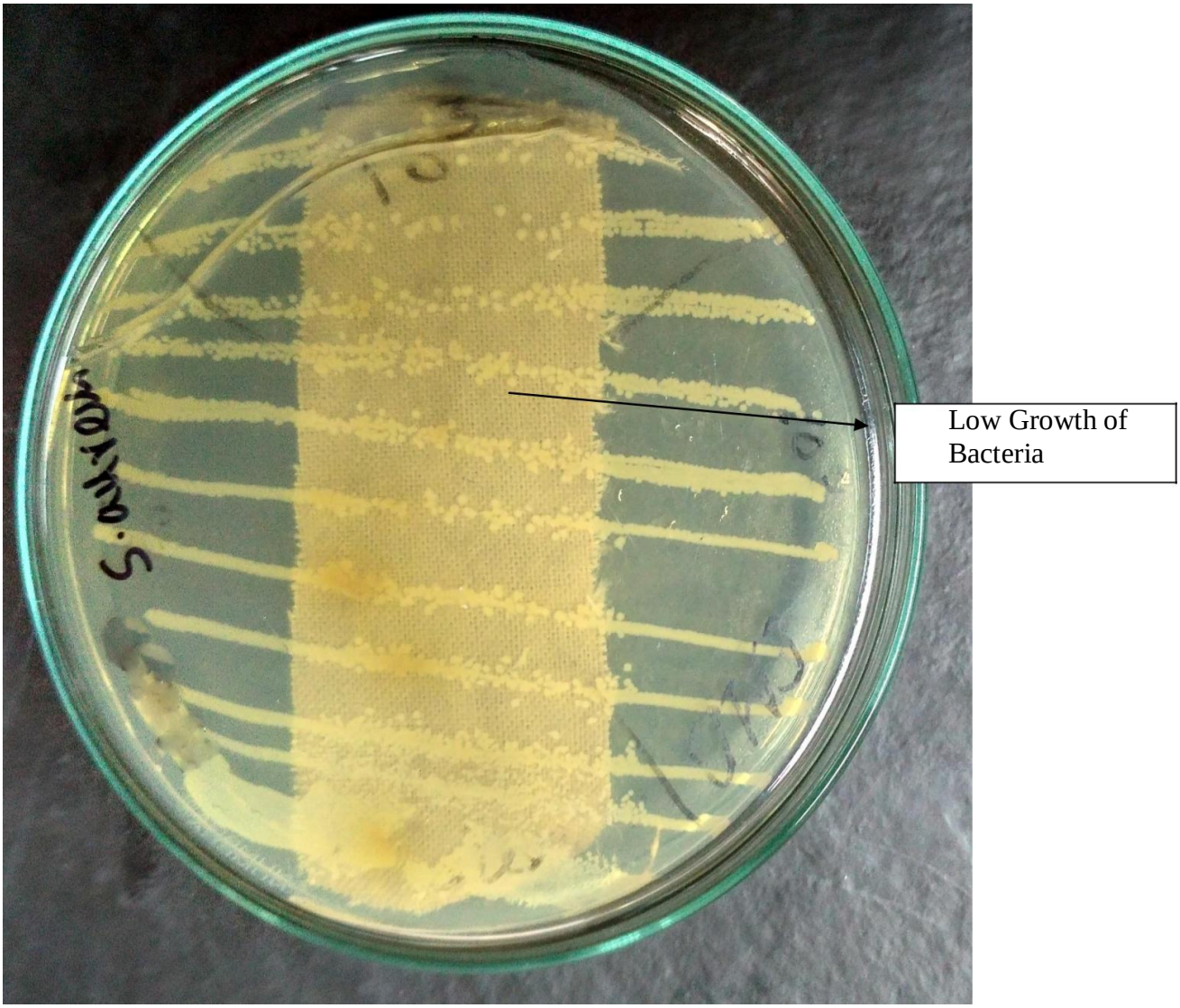

Figure 7: Amla Juice Treated fabric in S. auries

Test Observation :

- In untreated sample, growth of S.auries was very high. For this reason untreated scoured & bleached woven fabric cannot easily protect from the activity of S.auries. So it has no antibacterial activity.
- The anti bacterial property for amla juice treated fabric was good. Because I saw that the growth of microorganism in the fabric surface was very low. We can say that amla juice treated cotton fabric has a good anti bacterial property against gram positive bacteria.

Test Sample :

Figure 8: Amla Juice Treated Cotton Fabric

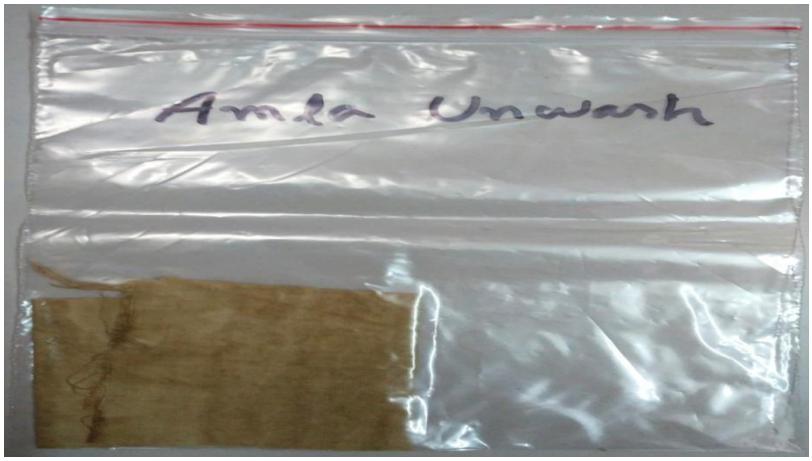

Figure 9: Amla Juice Treated cotton sample (Packed)

IV. Conclusion

In our nature we can find many natural fruit which have antimicrobial property .Amla is one of them . In my research work I worked with amla juice it has a good possibilities for antimicrobial finishing for cotton fabric. We can use the amla juice treated cotton fabric for one time use finished product . Like we can make antimicrobial musk from amla juice treated cotton fabric . We can make antimicrobial finished hand gloves from amla juice treated cotton fabric .In the Research work, antimicrobial finish on cotton fabric with amla juice, we learn many things. This research work has given a new idea in finishing on scoured & bleached cotton fabric for antimicrobial activity by using Amla juice. Amla juice treated fabric shows good antimicrobial activity than untreated fabric. There is a vast resource of natural antimicrobial agent, which can be used for imparting useful antimicrobial property to textile substrates. The finding of this study suggests that the treated fabrics can be used for textile application.

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The Relationship between Mother's Knowledge About Early Development Stimulation of Toddlers Aged 3-24 Months And Inspection Results By Pre-Screening Questionnaire of Development (KPSP) in the Village of Ngadiluwih, Kediri Indonesia

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Abstract- *Village Ngadiluwih is one of the 7 villages in Kediri District who has five toddlers with KPSP irregularities. The purpose of this research was to develop the questionnaire Investigation results of developments (KPSP) in the village of Ngadiluwih. Research methods design using cross sectional with a total population of 93 toddlers. This sampling using Proportionate Stratified Random Sampling, obtained 49 mothers who had a Toddler aged 3-24 months the respondents. This research used the form of a questionnaire about the mother 's knowledge of 3 - 4 months and KPSP 3 - 4 months ages. The research found that the mother's knowledge about the early development of the stimulation of a toddler aged 3-24 months mostly have a good knowledge of 87.75% and from the examination of the majority obtained KPSP toddler aged 3-24 months as having a dubious development as much as of 48.97%. This research uses statistical tests of Spearman Rank correlation with the value* $\rho = 0.084$ ($\rho > 0.05$)*, Because the number of samples was over 30, it was compared to their significance and obtained* $t_{count} = 0.577$ *and* $t_{table} = 2{,}01$ *so* t_{count} *(0.577)* $< t_{table}$ *(2.01). It can be concluded that there was no significant correlation.*
The KPSP in the village of Ngadiluwih was the main source of information on the development of KPSP in the village of Ngadiluwih.

Index Terms- Toddler aged 3-24 months, KPSP examination, knowledge, early stimulation.

I. Introduction

Activities of stimulation, early detection of growth disorders and development of comprehensive and coordinated childhood are organized in the form of partnerships between families (parents, caregivers and other family members), community (cadres, community leaders, professional organizations, non-governmental organizations, etc.). The indicators of success in guiding the growth and development of children not only increase the health and nutrition status of children but also the mental, emotional, social and independence of children develop optimally (MOH, 2006: 1-2).

The midwife as a health counselor plays a role in giving counseling about the growth and development of children properly. Enabling the existence of groups of maternal and child health enthusiasts (KPKIA) to implement KPSP as well as to demonstrate, and create learning classes for under-five mothers in preparation for implementation of KPSP, because on the basis of growth and development in childhood have certain characteristics that will normally be passed The age limit for each stage is not rigidly passed by the child (Nursalam, 2005).

Based on secondary data study that has been done, according to the health profile of East Java province in 2006, the number of children under five reaches 3,931,200 with coverage of Early Growth Detection of 1.807.945 (45.99%) (Dinkes Jatim, 2006).

From the preliminary study data in the work area of Kediri Regency Health Office in 2013, the total number of all under-fives with 104,211 Early Drowsiness (DDTK) coverage is 8,951 (12,18%) with target to reach 90% that is 2010 target of all Toddlers number (DHO, 2013). Based on data obtained from Health Office of Kediri Regency there are 36 deviations of pre-screening questionnaire of development of children under five in Kediri District Health Center which is work area of Pare Puskesmas as many as 19 Balita, Ngadiluwih Public Health Center as many as 5 Balita, 5 Purwoasri Puskesmas, Tarokan 4 Balita, Sambi 1 Balita Health Center, Adan-adan 1 Pita and 1 Puskesmas Pohjarak Health Center (DHO, 2013).

Researchers found that from 36 children under five KPSP deviations there are 5 KPSP deviations in the work area Puskesmas Ngadiluwih. The puskesmas is the second largest after the working area of Pare Puskesmas. Of 5 irregularities KPSP , it is found that irregularities occurred on gross motor skills in a vulnerable younger than 1 year were spread across 3 villages, namely 1 Toddler

Village Bangle, 1 Toddler in Desa Purwokerto and the largest in the village Ngadiluwih there are 3 toddler, Based on this background the author Intend to conduct research entitled "Knowledge of Mother's Relationship about Early Stimulation Development of Toddler with Result of Inspection of Growth Questionnaire (KPSP) at Toddler in Ngadiluwih Village Ngadiluwih Sub-district of Kediri Regency"

The objective of the research was to know the relationship between mother knowledge about early stimulation of under five development and result of examination of pre-screening questionnaire of development in toddler

II. METHOD

This research uses correlation approach of Analytical Survey Cross Sectional (Nursalam, 2013: 162-163). Researchers looked for relationships of mother's knowledge about the early stimulation of early childhood development as an independent variable and the results of KPSP as independent variables at the same time (one time). The population in this study is the mother who has Toddlers aged 3-24 months in the village that is some 93 Ngadiluwih Toddler on 7 IHC. Sample in this study were mostly mothers with toddlers 3-24 months of age in the village of Ngadiluwih in Kediri. In this study, the sampling technique used is Proportionate Stratified Random Sampling For a sampling of each Posyandu done by coating using a lottery scrambles written Toddlers name and raffled an appropriate amount on each IHC. In this study, the independent variable mothers' knowledge of early stimulation Toddler development. In this study, the dependent variable is the result of pre-screening questionnaire examination of their rapidly developing n. This analysis using correlation *Spearman Rank*, this test is used to determine whether there is a relationship between two variables ordinal scale.

III. RESULT

The research found descriptive data includes characteristic of the samples and presented in the following tables below and be statistically as well.

Table 1 Distribution Frequency age of the women who have 3-24 Months Toddler

NO	AGE	N	%
1	>20	0	0
2	20-35	38	77,55
3	<35	11	22,44
		49	100

From the table above can be concluded that most Respondents aged 20-35 years ie 77.55% (38 people).
Based on the education of mothers who have children aged 3-24 months can be seen in the table below:
Table 2 Frequency Distribution of Mother education with toddlers ages 3-24 months

NO	EDUCATION	N	%
1	Elementary	4	8,16
2	Junior High School	21	42,85
3	Senior High School	18	36,73

4	Diploma	1	2
5	Undergraduates	5	10,2
		49	**100**

From the table above, it can be concluded that most of respondents junior high education that is equal to 42% (21 people)

Based on the work of mothers who have children aged 3-24 months can be seen in the table below:
Table 3 Frequency Distribution mothers work Toddlers aged 3-24 months

NO	TYPE OF EMPLOYMENT	N	%
1	Household	40	81,63
2	Private work	6	12,24
3	Teacher	3	6,12
		49	**100**

From the table above can be concluded that most Respondents work as housewives as much as 81,63% (40 people).
Maternal knowledge about early stimulation of development of children aged 3-24 months in Ngadiluwih Village is presented in the following table:

Table 4 Frequency Distribution of Capital Knowledge about development early stimulation Toddlers ages 3-24 months

NO	KNOWLEDGE	N	%
1	Good	43	87,75
2	Fair	6	12,24
3	Poor	0	0
		49	**100**

From the table above can be concluded that most Respondents have good knowledge that is equal to 87.75% (43 people)
The examination of KPSP in children aged 3-24 months in Ngadiluwih Village will be presented in the following table:
Table 5 Frequency Distribution Inspection Results KPSP in Toddlers Age 3-24 months

NO	CLASSIFICATION	N	%
1	In Accordance	15	30,61
2	Dubious	24	48,97

3	Irregular	10	20,4
		49	**100**

From the table above it can be concluded that most toddlers 3-24 months of age examined in Ngadiluwih KPSP experience dubious development is equal to 48.97% (24 people).

Results of research on the relationship of mother's knowledge about early stimulation of development of children aged 3-24 months with result of examination of KPSP in Ngadiluwih Village will is presented in the following table:

Table 6 Relationship of Knowledge Capital about Stimulus Outcome of Early Development of Toddlers aged 3-24 months with KPSP Inspection Results

NO	**Parent Knowledge**	**Child Development**			
		In Accordance	**Dubious**	**Irregular**	**Total**
		n	**n**	**n**	**n**
1	Good	13	20	10	43
2	Fair	2	4	0	6
3	Poor	0	0	0	0
					49

Based on the above table we can see that respondents who have good knowledge and have children aged 3-24 months with the results of questionable KPSP examination amounted to 20 people.

Results were then tested using *Spearman Rank* correlation *test.* Then results was obtained, $\rho = 0.084$, as the number sample more than 30, Where the table does not exist, then the significance test use manual formula. Based on the results of the calculation of *Spearman Rank* with error level of 5% (0.05) of the obtained results t = 0.577. Then t arithmetic compared t table with dk = n-2, obtained t arithmetic (0,577) <t table (2.01), then H0 is accepted and H1 is rejected means no relationship of mother knowledge about early stimulation of development of Toddler age 3-24 Month with the result of KPSP examination in Ngadiluwih Village.

IV. DISCUSSION

Based on the results of research in table 4.4, mothers who have good knowledge of 87.75% (43 people), while the rest are knowledgeable enough that is equal to 12.24% (6 people). From the results of this study found that the mother's knowledge about early stimulation of development of Toddlers in the village Ngadiluwih District Ngadiluwih Kediri most of the respondents are knowledgeable.

A good mother knowledge about early stimulation of child under five development in Ngadiluwih Village is influenced by various factors one of them education, it can be seen from the result of research that is the respondents of junior high education equal to 42,85% (21 people), high school education Amounted to 36.73% (18 people), undergraduate education By 10.2% (5 people), educated elementary school 8.16% (4 people), and the rest are Diploma level that is 2% (1 person). Although in this study most of the respondents are well knowledgeable with junior high school education, it does not mean that education can be used as a reference as the only factor that can affect one's knowledge. Education does affect a person's attitude in receiving information from outside, but many factors can influence knowledge apart from education, such as work, age, interests, experience and culture.

In this research, the knowledge of mother is said to be good because the factor which also influence the mother knowledge is age, from this research data got 77,55% (38 respondents) aged 20-35 years that is at reproductive age. According to Hartanto and Lubis in Zahro (2009) age 20-35 years in women is the reproductive age and are in the recommended childbirth. Reproductive age is very influential on knowledge about child development and child care practices. This is in accordance with Huclok in Wawan and Dewi (2011) which states that the more age, the maturity and strength of a person will be more mature in thinking and working, apart from the age of respondents knowledge can be obtained from experience factors.

According to Simanjuntak (2011), experience is an event experienced by a person in interacting with his environment which is obtained through health counseling provided by health officials or cadres through events held in Ngadiluwih village area such as Posyandu park activity on every 12th day in every month and counseling directly given by the cadres through home visits.

Information gained through counseling provided by health professionals is very influential on the knowledge of mothers because health workers are role models of society and have more knowledge about how to stimulate early development of toddlers is good and true. This is in accordance with Harlock's statement in Kosegaran (2012) that knowledge can also be obtained through education, self-experience, and others.

Nevertheless, in this study there are still a small number of respondents who have enough knowledge that is equal to 12.24% (6 people), from 6 Respondents there are 83.3% (5 people) with junior high education and 16.6% (1 person) with High school education. This is because the respondent can not answer the statement on the questionnaire about the number 10 regarding the application in the early stimulation of the development of children under five aspects of KPSP include coarse motion, fine motion, speech and language, and socialization and independence.

From the above things the researcher believes that not all respondents who have low education also have low knowledge. Good knowledge is not influenced by the factors of education alone but also can be influenced by various factors, namely age and experience, because if only education is used as a reference in the care of children without experience, the stimulation provided by the mother in the less adequate and the toddler can not develop optimally.

Based on the results of the study, KPSP screening showed that there was a classification of under-five children who had the appropriate development of 31.61% (15 people), doubted 48.97% (24 people) and the remaining 20.4% (10 people) had deviations.

Research in Rural Ngadiluwih obtained less than half of the respondents Toddler progressing dubious in terms of rugged and socialization independence movement compared with growth in accordance with KPSP. The occurrence of dubious developments due to several factors: the child is not cooperative when examined by the officer, the examiner is less approach to the child so that the child is afraid when done KPSP examination, this situation does not mean the child is in a dangerous condition. This study is in accordance with Amrullah's (2013) study which found more than half of respondents, 40 children (62,5%) from total 64 respondents who experienced dubious development due to lack of fulfillment in children, including the need to play

Similarly, Ariani (2012) who argues that children who experience developmental delays may fail in school, this may be due to environmental factors that can interfere with growth and handling. From the above matters, the researcher argues that the role of parents, especially mothers, has a very important role in providing early stimulation of development in Toddlers because it is a facilitator that has an impact on the development of children to achieve optimal development according to the age stage.

The lack of knowledge of mother's knowledge about early stimulation of child under age 3-24 month development with result of examination of KPSP happened due to various factors, one of them internal factor that is still many mothers who are less aware of the development that must be achieved by their children in each age. In this research, mother knowledge is said to be good because of experience and information that have been obtained from health officer especially midwife at activity of Taman Posyandu which held every 1st day in every month in Ngadiluwih village about ways to do stimulation interesting, but in practice mother still can not apply directly to their children, so many found the development of toddlers who doubt.

This is in accordance with the opinion of Mubarok in Simanjuntak (2011) stated that factors that affect one's knowledge is the experience by a person and information received by someone to gain new knowledge. In this study, although the knowledge of mothers mostly been said to be good but in examination KPSP it is still there. Respondents who experienced dubious development 48.97% (24 people) and deviant development of 20.41% (10 people) of 49 toddler respondents studied. This is not just a toddler is indeed a setback from the development that should, but influenced by various factors that can affect the examination of KPSP, among others, when the child's research looks shy, and prefer to play alone so do not want to follow the steps - the step of inspection Done by the examiner, the lack of approach done by the examiner so that the child is afraid during the examination.

Weaknesses are also present in this study: screening is performed only once, should be re-examined to avoid bias examination. Screening should be combined with diagnostic tools other development problems remembering less diagnostic value KPSP causing underdetection, there is a possibility of false negative results were correct. Subjects that are considered dubious in the assessment of the results of the KPSP should be re-examined 1-2 weeks later after the first examination to ensure the existence of developmental

delays. KPSP not the only tool that can be used to assess a child's development because KPSP itself translated from PQD (Parent Developmental Screening Test), developed from DDST (Denver Developmental Screening Test), whereas the gold standard used DENVER II which is a revision of the DDST (Ariani, 2012).

This study is in accordance with research conducted by Hidayati in Kosegaran (2013) which examines the relationship between mother's knowledge about the development of children with psychomotor development of children aged 3-5 years with no relationship. The absence of a relationship does not mean that the mother's knowledge does not affect the development of the child, it could be a mother who has a good knowledge about the development of children but has children with abnormal psychomotor development, or mothers whose knowledge about the development of children is not good but have children with normal psychomotor development

From the results of this study, the researcher believes that there is no correlation between mother's knowledge about early stimulation of child under age 3-24 month with result of KPSP examination can be caused in conducting KPSP inspection only in one examination when this should be done after 2 weeks according to the age of the child to ensure the child's development is appropriate or indeed the child is actually experiencing irregularities so that further intervention can be done if the problem occurs.

V. CONCLUSION

Almost all mothers have a good knowledge about how to stimulate early development of toddlers, the mother knows every process of development that must be achieved by the child according to the age of the child.

Almost all children under five years of KPSP examination have experienced dubious developments

There is no correlation between mother's knowledge on early stimulation of infant development aged 3-24 months with result of questionnaire of pre-screening of development (KPSP) in Ngadiluwih village.

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Open Reamed Interlocked Intramedullary Nailing of Long Bone Fractures of the Lower Limb Using Surgical Implant Generation Network (SIGN) Nails: Radiographic Results and Clinical Outcomes at a Minimum of 12 Months Follow-up

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Abstract: In developing countries such as the Philippines, many patients rely on humanitarian aids to meet the expense of treatment for long bone fractures of the lower limb. In this descriptive cross-sectional study, we reviewed the midterm and long term outcomes (radiographic and clinical) of patients who were recipients of free implants from SIGN Fracture Care International, who have undergone open reamed interlocked intramedullary nailing of long bone fractures of the lower limb using the SIGN intramedullary nails with a minimum of 12 months follow-up. Radiographic results were scored using the Radiographic Union Scale for Tibial fractures (RUST) score and Functional outcomes were determined using 3 different patient-reported outcome measures. A total of 139 patients were included in the study of which, 100 (71.9%) patients involved the femur and 39 (28.1%) involved the tibia. The RUST mean score was 10.33 (SD 1.31) indicating good radiographic union. Mean scores for the Modified Harris Hip Score (mHHS) was 96.82 (SD8.45); 98.04 (SD 1.97) for the Lower Limb Core Function Scale and 1.69 (SD 1.60) for WOMAC. Average scores of these tools suggested good to excellent functional outcome. Using the Spearman's rho test for correlations, a significantly high positive correlation between the radiographic results and clinical outcomes were demonstrated. These results suggestedhigh radiographic union rates and good functional outcomes.

Index Terms: Intramedullary nailing, Long Bone Fractures,Femur, Tibia,Surgical Implant Generation Network (S.I.G.N.), Radiographic results, Functional Outcome

I. INTRODUCTION

Thetibial and femoral shafts are considered the most common sites of long bone fracture [1]. The treatment methods for these fractures evolved from nonoperativetechniques such as splinting and traction to operative treatment. Closed reduction and cast immobilization have previously been regarded as the standard treatment for low-energy tibial shaft fractures, while intramedullary nailing has been generally accepted as the treatment method of choice for femoral shaft fractures. However, during recent decades, the use of intramedullary locking nails (IMLN) has become more popular [2].

Intramedullary nailing is considered to be the optimum treatment for fractures of the longbones of the lower limbs and various studies have been published describing the functional outcome of both reamed and unreamed nailing [1].Many studies have also shown that the outcome of treatment of a tibial shaft fracture with locked intramedullary (IM) nailing is superior to that of cast treatment.

Various economic analyses of management strategies for tibia and femur shaft fractures suggest that reamed intramedullary nailing is the treatment of choice [3]. However, impoverished people in developing countries couldn't always afford these surgical implants. In most institutions in our country, orthopaedicsurgeons provide management strategies that are not the standard of care, because oftentimes, patients are financially constrained and are unable to undergo interlocked intramedullary nailing.

SIGN Fracture Care is an orthopaedic humanitarian aid organization treating impoverished people in developing countries. SIGN supplies surgical implants and training to orthopaedic surgeons at no cost. Our institution has been identified as one of the more than 200 hospitals throughout 50 developing countries to receive these surgical implants since 2011. This Study will review the outcome of patients who have underwent open reamed interlocked intramedullary nailing of long bone fractures of the lower limb using Surgical Implant Generation Network (S.I.G.N.) Nails.

Evidence from numerous medical literature showthat closed reamed interlocked intramedullary nailing of long bone fractures provides the best outcome in terms of union rates (97-98%) and complication rates. Because of this, the popularity of performing an open reduction has dwindled through the years. However, the results of this investigation may provide substantial evidence to support the continued use of an implant (SIGN nails) which requires an open reduction instead of a closed technique, among patients who simply

could not afford to purchase what is considered the ideal implant of choice.

II. REVIEW OF LITERATURE

A. Intramedullary nailing

Orthopedics is a dynamic field of surgery, and in no area of orthopedic endeavor is this better seen than in the management of a fractured long bone such as the tibia and femur. It is undeniable that most fractures of the tibia will heal if treated by non-operative means. Basic concepts of bone healing would tell us that if immobilized long enough, all fractures will eventually heal [1].

It was a common orthopedic practice during the early 1930's that all major tibial fractures are treated with skeletal traction for 3 weeks, followed by a weight-bearing plaster cast until healing is complete. However, Watson-Jones and Coltart in 1943 did an investigation on causes of slow union of fractures on 804 fractures of the shafts of the tibia and femur which clearly showed that traction had a deleterious effect on the rate of union. In addition, many studies have compared cast management with the IM nailing of tibial shaft fractures, and functional outcome after IM nailing is better compared with cast treatment [5]. There were clearly more malunions and delayed unions with cast treatment than with IM nailing, and also patients' durations of sick leave were shorter after IM nailing [5]. Furthermore conservative treatment with long-leg casting has been shown to result in prolonged joint immobilization, restricted ambulation, and extended rehabilitation requirements to regain a preinjury level of function [6].

Decades of literature work has definitely changed our attitude in the management of long bone fractures. From conservative management, Orthopedic surgeons have been increasingly advocating surgical management for the treatment of tibial and femoral shaft fractures even at the beginning of the last century. Hey Groves (1992) introduced IM nailing of long bones, which was popularized by Kuntscher in the 1940s [4]. Intramedullary nailing has evolved since then to become the treatment of choice for the stabilization of tibial and femoral shaft fracture [4].

Intramedullary nailing is considered to be the optimum treatment for fractures of the long bones of the lower limbs and various studies have been published describing the functional outcome of both reamed and unreamed nailing.

Numerous complications have been defined including infection, compartment syndrome, deep-vein thrombosis, thermal necrosis of the bone with alteration of its endosteal architecture, failure of the metalwork and malunion and nonunion of the fracture [2]. One of the most common problems associated with tibial primarily, and retrograde femoral nailing secondarily, is chronic anterior knee pain [2]. Its incidence has been reported to be as high as 86%. It may be present even in patients who have an intact knee as with antegrade femoral nailing. Its aetiology is unclear, but a multifactorial origin has been suggested [2]. These various complication can pose a serious handicap to the patient and consequently affecting his day-to-day activities and employment opportunities.

Various modifications in the technique of intramedullary nailing were developed to address the identified causes of these complications. In a study by Zirkle et.al.in 2009, he described the operative technique of tibia and femur nailing using the Surgical Implant Generation Network (S.I.G.N.) nail. He used hand reaming to avoid thermal necrosis of the bone with alteration of its endosteal architecture which is often afforded by the use of power reaming in the preparation of the intramedullary canal [21].

Various reports of SIGN success in trauma patients was related to the speed of surgery (no frequent C-arm imaging) and the use of hand reamers [21].Hand reaming is much safer than power reaming. Thermal necrosis is avoided by hand reaming, and the bone from the flutes of the reamer can be introduced into the fracture site [23].Furthermore, reaming allows a larger nail to be introduced. The interlocking screws can be inserted quickly using SIGN technique. A larger nail that has interlocking screws placed obviates the need for a second surgery and decreases the possibility of nonunion and infection [21]. These claims however are currently not reinforced by evidence as literature review on the long term functional outcome of patients who underwent SIGN surgery showed very scarce resources.

B. Clinical assessment tools

The Harris Hip Score HHS was developed for the assessment of the results of hip surgery, and is intended to evaluate various hip disabilities and methods of treatment in an adult population. The original version was published 1969 [7].The domains covered are pain, function, absence of deformity, and range of motion. There are 10 items. The score has a maximum of 100 points covering pain, function, absence of deformity, and range of motion. The HHS score gives a maximum of 100 points. Pain receives 44 points, function 47 points, range of motion 5 points, and deformity 4 points. The higher the HHS, the less dysfunction. A total score of <70 is considered a poor result; 70–80 is considered fair, 80–90 is good, and 90–100 is an excellent result [7].

The WOMAC (Western Ontario and McMaster Universities) index is used to assess patients with osteoarthritis of the hip or knee using 24 parameters. It can be used to monitor the course of the disease or to determine the effectiveness of anti-rheumatic medications [12].It measures five items for pain (score range 0–20), two for stiffness (score range 0–8), and 17 for functional limitation (score range 0–68) (Quitanaet.al, 2006). The test-retest reliability of the WOMAC varies for the pain, stiffness, and function subscales. When used in clinical studies, the WOMAC pain and function subscales perform comparably or better than other tests in being responsive to change from experimental interventions, but this varies for the different subscales and types of intervention [14].

The Lower Limb Instruments developed by The American Academy of Orthopaedic Surgeons (AAOS) was made through a process of literature review, consensus-building, and field-testing. It is an outcomes assessment instrument designed for the efficient collection of outcomes data from patients of all ages with musculoskeletal conditions in the lower extremity [17]. The Lower Limb Core Scale consists of seven items addressing pain, stiffness and swelling, and function, performed at an acceptable level. Comparative analysis of this scale was shown to be moderately to strongly correlated with other measures of pain and function, such as physician ratings, the SF-36, and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) [17].

The Radiographic Union Scale for Tibial fractures RUST is a novel radiographic assessment for tibial shaft fractures. This scoring system was developed since radiographic assessment of tibial fracture healing continues to pose significant challenges to both routine fracture care and clinical research [18].Orthopaedic surgeons fail to achieve sufficient agreement on fracture healing when using conventional radiographic measures such as their general impression or the number of cortices bridged by callus. Moreover, the extent to which radiographic assessment of healing corresponds to patient-important outcomes is largely unknown. In an attempt to improve the assessment of radiographic outcomes of patients with tibial shaft fractures, recent studies have explored this novel radiographic assessment tool [18].

In a study by Whelan et.al. (2010) they evaluated the newly developed Radiographic Union Score for Tibial fractures (RUST). In this investigation they reviewed 45 sets of tibial shaft fractures treated with intramedullary fixation. Seven orthopedic reviewers independently scored bony union using RUST. Intraclass correlation coefficients (ICC) with 95% confidence intervals (CI) measured agreement. Overall agreement was substantial (ICC, 0.86; 95% CI, 0.79-0.91). There was improved reliability among traumatologists and overall intraobserver reliability was also substantial (ICC, 0.88; 95% CI, 0.80-0.96) [19].

III. MATERIALS AND METHODS

This is a descriptive cross-sectional study designed to evaluate the radiographic results and clinical outcomes of patients who have undergone open reamed interlocked intramedullary nailing of long bone fractures of the lower limb using Surgical Implant Generation Network (S.I.G.N.) nails at a Level III Trauma Center after a minimum of 12months follow up.

A. Study Population

All patients admitted with fracture/s of the long bones of the lower extremities (Tibia and Femur) and have undergone Open Reamed Interlocked Intramedullary Nailing using Surgical Implant Generation Network (S.I.G.N.) Nails at this institutionwith a minimum of 12 months follow-up were included in this study.Patients werealso included if any of the following criteria are met: 1) age not less than 18 years old; 2) the medical records are retrievable from the SIGN Surgical Database; 3) the data are encoded by the institutions SIGN Program from March 2011 to December 2015; 4) a follow up at a minimum of 12 months from date of operation is done for evaluation of functional and radiographic outcomes.

A total of 139 patients wereemployed in this study based on the computed sample size for frequency in a population using the OpenEpi Version 3, Open source calculator--SSPropor. To avoid type I and type II error, a 95% confidence level was set for the sampling size. An exacting degree of significance level was employed (set at 0.05) since the outcome of this evaluation has important consequences. Below is the table showing the distribution of patients who have undergone the procedure being investigated from the year 2011 up to 2015.

Table 1. Patients who have undergone Open Reamed Interlocked Intramedullary Nailing using Surgical Implant Generation Network (S.I.G.N.) Nails at a Level III Trauma Center from 2011-2015

Year	Census
2011	47
2012	70
2013	84
2014	73
2015	39
TOTAL	**313**

B. Description of the Study Procedure

Records of patients with long bone fractures of the lower limb that have undergone open reamed interlocked intramedullary using Surgical Implant Generation Network (S.I.G.N.) nails at this institution performed during the period of March 2011 to December 2015 were reviewed in this study.

Demographic profile of patients who satisfied the inclusion criteria were gathered and analyzed. Patients' fractures were classified according to whether Close or Open. Open fractures were further classified using the Gustilo-Anderson Classification system for open fractures. Depending on the fracture type, single, double or triple antibiotic therapies (cefazolin, gentamycin, penicillin G) applied in subjects with open fractures was classified accordingly as listed. Distribution of fracture types according to the classification systems was also analyzed.

A common post-operative protocol was employed among patients with long bone fractures of the lower limb who have undergone open reamed interlocked intramedullary

using Surgical Implant Generation Network (S.I.G.N.) nails. On the first postoperative day, patients began knee and hip exercises. Patients treated with static interlocked intramedullary nailing were allowed immediate partial to full weight-bearing. Follow up were done at 2weeks, 1month, 3months, 6months and annually thereafter post-operatively. Radiographs were taken on each clinic visit and details of the follow up were encoded at the SIGN surgical database.

Patients who have met the criteria for a minimum of 12 months post-operative follow up were then included in the assessment of radiographic and functional outcomes after having undergone the procedure being investigated. These patients were given various validated questionnaires to be answered during the recent post-operative follow-up. The following validated functional outcome questionnaires were used in this study:

a. Modified Harris Hip Score (mHHS)
b. American Academy of Orthopaedic Surgeons (AAOS) lower limb core function score
c. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

The Modified Harris Hip score is a patient-report, 7-item version of the Harris Hip Score. It consists of all HHS items except those on hip range of motion and deformity. It covers two domains, pain and function. The pain scale consists of seven descriptions of pain ranging from "none or ignores it," to "totally disabled, crippled, pain in bed, bedridden." A numerical value is assigned to each statement and the patient receives a score based on the statement chosen. Scores range from zero to 44. The higher the score, the less subjective pain the patient feels. A score of 44 is assigned if the patient indicates pain is absent, moderate but tolerable pain receives a score of 20 and disabling pain receives a score of zero.

The function domain includes a number of scales with corresponding number of items for which scores are assigned according to the response reported by the patient. A higher score is better. The different scales assessed in the function domain include Functional Activities (Shoes/socks scale, Stairs scale, Sitting scale and Public transportation scale) and Gait (Limp scale, Support scale, and Distance walked scale).

The American Academy of Orthopaedic Surgeons (AAOS) lower limb core function score is a downloaded Microsoft Excel program. The patient answers on the questionnaires which are then encoded on the program with subsequent generation of the standardized and normative scores for each sample population. The treatment outcome represents the standardized score, and the degree of functional outcome with reference to the general population represents the normative score. Higher standardized scores (on a scale of 100) indicate better outcomes and with a mean Normative Score 50. Thus, a patient scoring above 50 on a particular scale is above the general population's average, while a patient scoring below 50 on a scale is below the general healthy population's norm.

The Lower Limb Core Scale questionnaire consists of seven questions. The answer for each questions are rescaled to derive the mean score, from which standardized scores and normative scores are computed, and subsequently compared to the standardized and normative scores of the general population assessing the functional outcome of the operative intervention to the involved lower limb of the patients.

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measure clinically-significant, patient-relevant symptoms in pain, stiffness, and physical function in patients with osteoarthritis (OA) of the hip and/or knee following intervention. The questionnaire consists of 24 items with 3 subscales: pain (5 items), stiffness (2 items), and physical function (17 items). It uses descriptive adjectives: none, mild, moderate, severe, and extreme, which are translated to a numerical, ordinal scale (0-4). The pain, stiffness, and physical function subscales are summed to a maximum score of 20, 8, and 68, respectively. A global score is most commonly calculated by adding the 3 subscale scores and is reported as a percentage from the highest possible score of 96. Lower scores indicate lower levels of dysfunction.

Radiographs of patients on each follow up were collected and encoded in the SIGN surgical database. Radiographs at 12 months follow-up and beyond were scored using the RUST score. Table 2 shows the factors assessed and the corresponding scores for the RUST score.

Table 2. Radiographic Union Scale for Tibial fractures

Cortex	Fracture line visible, no callus Score = 1	Visible fracture line and callus Score = 2	No fracture line visible callus Score = 3	Total score Min: 4 Max: 12
Anterior				
Posterior				
Lateral				
Medial				

The RUST score assesses the presence of bridging callus and that of a fracture line on each of 4 cortices seen on 2 orthogonal radiographic views (medial and lateral cortices on the anteroposterior X-ray, anterior and posterior cortices on

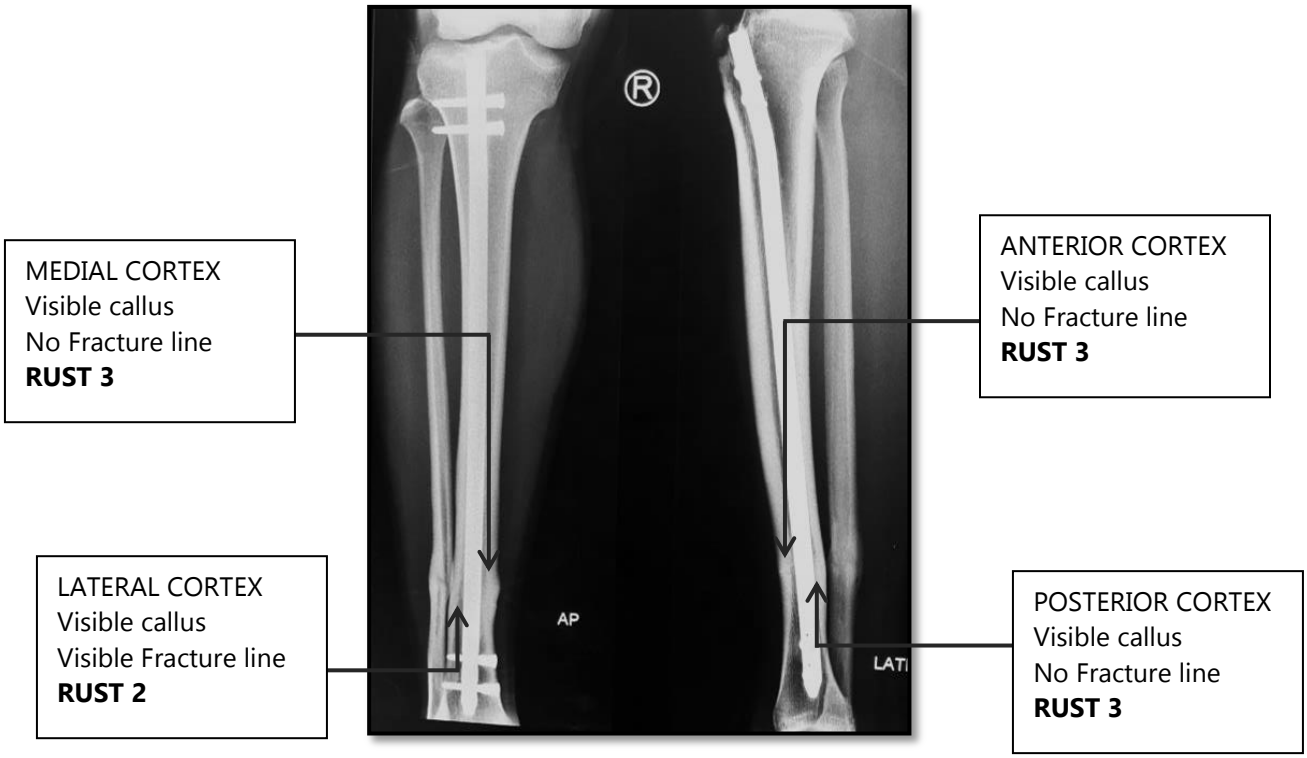

Figure1. Anteroposterior and lateral views of the right Tibia-fibula of a SIGN patient at 34th month post-operative follow-up showing the scoring of Radiographic Union Scale for Tibia Fractures of 11.

the lateral X-ray). Each cortex receives a score of one point if it is deemed to have a fracture line with no callus, two points if there is callus present but a fracture line is still visible, and three points if there is bridging callus with no evidence of a fracture line.The individual cortical scores are added to give a total for the set of films with 4 being the minimum score indicating that the fracture is definitely not healed and 12 being the maximum score indicating that the fracture is definitely healed. Radiographic fracture union was defined when bony callus was evident on at least 3 cortices in standard AP and Lateral views and with RUST score ≥ 7.

C. Data Processing and Analysis

Baseline demographic profile wasdescribed using frequency count distribution. Clinical variables being investigated were detailed using frequency count distribution and measures of central tendency.To determine the correlation between radiographic and clinical outcomes, the Spearman's rho test for nonparametric correlations was used.Differences between groups were considered significant if the probability of chance occurrence was ≤ 0.05.

D. Ethical Consideration

This study utilized an informed consent form to be filled up by patient and/or responsible representatives prior to enrollment of the patient to the study. A letter of permission addressed to the Hospital Director thru the hospital's Institutional Review Board was sent prior to commencement of the investigative period.The identity of patients was kept strictly confidential and no information revealing the identity of any individual was included in the final report.

IV. RESULTS

From the 313 total number of long bone fractures of the lower limb who have undergone open reamed interlocked intramedullary using Surgical Implant Generation Network (S.I.G.N.) nails and have met the inclusion criteria, we computed the necessary sample size for frequency in the population and a total of 139 (44.41%) was subsequently enrolled in this study. Records of these patients were then retrieved from the SIGN surgical database. Of the 139 patients, 100 (71.9%) involved the femur and 39 (28.1%) involved the tibia. Among the patients included in the study, 115 (82.7%) were males and 24(17.3%) were females with mean age of 41 years (range 18 to 64years). Most of the patients were closed fractures with 114 (82.0%) cases of the sample and 25 (18.0%) cases were open fractures. (Table.3)

Table 3. Demographic profile of patients with long bone fractures of the lower limb who have undergone open reamed interlocked intramedullary using Surgical Implant Generation Network (S.I.G.N.) nails performed at a Level III Trauma Center during the period of March 2011 to December 2015

	Number of Patients (N=139)	% from total number of patients
SEX		
MALE	115	82.7
FEMALE	24	17.3
AGE (years)		
< 21	17	12.2
21- 30	82	59.0
31- 40	18	12.9
41- 50	13	9.4
> 50	9	6.5
Type of Long Bones		
Femur	100	71.9
Tibia	39	28.1
Type of Fracture		
Close	114	82.0
Open	25	18.0

The identified cases of open fractures were further classified using the Gustilo-Anderson classification system. There were 6 (4.3%) cases classified as Type I, 8(5.8%) cases each under Type II and Type IIIA open fractures while 3(2.2%) cases were classified as Type IIIB open fractures. (Table.4)

Table 4. Distribution of open fractures according to Gustilo-Anderson Classification

Gustilo-Anderson Classification of Open Fractures	Number of Patients (N= 139)	% from total number of patients
I	6	4.3
II	8	5.8
IIIA	8	5.8
IIIB	3	2.2
IIIC	0	0

The average follow-up period for the sample population was at 40 months post-operatively with a range of 12 months (minimum requirement for determining the midterm to long term functional outcome) up to 68 months. Out of the 139 patients included in the study, all had good radiographic union with Radiographic Union Scale for Tibial fractures (RUST) mean score of 10.33 (SD 1.31) with a range of 8-12 RUST score. One hundred patients (71.9%) had RUST scores of 10-12 denoting that radiographic reviews showed no fracture line and with visible callus on at least three or all four cortices. Thirty-nine patients (28.1%) had scores ranging from 7-9 using the parameters - visible callus and presence of fracture line, while none were reported with RUST score of 4-6 which would indicate that no fracture healing occurred post operatively. (Table 5)

Table 5. Distribution of Radiographic Union Score for Tibia (RUST)

RUST	Number of Patients (N= 139)	% from total number of patients
4-6 (fracture not healed)	0	0
7-9 (w/ fracture healing)	39	28.1
10-12 (fracture healed)	100	71.9

Mean score for the Modified Harris Hip Score (mHHS) was 96.82 (SD 8.45). Distribution of Modified Harris Hip Scores for patients who underwent the procedure being reviewed in this study revealed good to excellent functional outcome with 135 (97.1%) getting mHHS scores of 91-100. (Table 6)

Table 6. Distribution of Modified Harris Hip Scores (mHHS)

Harris Hip Score	Number of Patients (N= 139)	% from total number of patients
<70 (Poor)	0	0
70-80 (Fair)	0	0
81-90 (Good)	4	2.9
91-100 (Excellent)	135	97.1

The mean standardized score for the Lower Limb Core Scale was 98.04 (SD 1.97). All 139 patients included in the study had a Lower Limb Core Scale which was above the normal population's average set at 50 indicating a good clinical outcome. (Table 7)

Table 7. American Academy of Orthopaedic Surgeons (AAOS) lower limb core function scores

Lower Limb Core Function Score	Number of Patients (N= 139)	% from total number of patients
0-50	0	0
51-100	139	100

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The mean WOMAC global score was 1.69 (SD 1.60). The distribution of WOMAC global scores of patients as shown in the table below, revealed all 139 patients having WOMAC scores below 50. Lower scores in WOMAC indicates better outcome in terms of pain, stiffness and function subscales. (Table 8)

Table 8. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) mean scores for subscales (N=139)

WOMAC Score	Number of Patients (N= 139)	% from total number of patients
0-50	139	100
51-100	0	0

The results of the radiographic assessments for all patients included in this study were correlated against the results of the three self-report assessment tools used to describe the clinical outcome. The succeeding tables below show the cross tabulation of clinical and radiographic scores. Of the 100 (71.9%) patients who had a RUST score of 10-12, all demonstrated an AAOS LLC standardized score above 50 and a WOMAC global score of below 50. However, only 99 of the 100 patients with RUST score of 10-12 reported excellent scores (91-100) formHHS. (Table 9,10 and 11)

Table 9. Cross-analysis of RUST Scores with mHHS

RUST		mHHS Modified Harris Hip Score			
		<70 (Poor)	70-80 (Fair)	81-90 (Good)	91-100 (Excellent)
Radiographic Union Score for Tibia	4-6	0	0	0	0
	7-9	0	0	3	36
	10-12	0	0	1	99

Table 10. Cross-analysis of RUST Scores with AAOS Lower Limb Core Function Score

RUST		American Academy of Orthopaedic Surgeons (AAOS) Lower Limb Core function	
		0-50	51-100
Radiographic Union Score for Tibia	4-6	0	0
	7-9	0	39
	10-12	0	100

Table 11. Cross-analysis of RUST Scores with WOMAC Score

RUST		Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)	
		0-50	51-100
Radiographic Union Score for Tibia	4-6	0	0
	7-9	39	0
	10-12	100	0

Using the Spearman's rho test for correlations, the radiographic results and clinical outcome of patients who have undergone open reamed interlocked intramedullary nailing of long bone fractures of the lower limb using Surgical Implant Generation Network SIGN nails were determined accordingly. The results showed that there is a significantly high positive correlation between the radiographic results and clinical outcome as represented on the table below. (Table 12)

Table 12.Correlation between the radiographic results and clinical outcome of patients who have undergone open reamed interlocked intramedullary nailing of long bone fractures of the lower limb using Surgical Implant Generation Network SIGN nails

		RUST
mHHS	Correlation Coefficient	.841**
	Sig. (2-tailed)	.000
	N	139
AAOS-LLC	Correlation Coefficient	.809**
	Sig. (2-tailed)	.000
	N	139
WOMAC	Correlation Coefficient	.856**
	Sig. (2-tailed)	.000
	N	139

**Sig at p < .01

Significant positive relationship was observed between the results of Radiographic union score for tibia Fractures (RUST) and Modified Harris Hip Score (mHHS) (***r***=.841, ***p***<.01), Radiographic union score for tibia Fractures (RUST) and American Academy of Orthopaedic Surgeons (AAOS) lower limb core function score (***r***=.809, ***p***<.01), and Radiographic union score for tibia Fractures (RUST) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) (***r***=.856, ***p***<.01).

V. DISCUSSION

The primary goal in the management of long bone fractures of the lower limb is to achieve union in order to enable weight-bearing in the early postoperative period. Also achieving the normal length and alignment of the bone and providing functional movement angle to the knee and hip are of utmost importance [19]. The requirements of an ideal union have been incorporated in the development of various techniques of osteosynthesis. These would include providing mechanical stability, avoiding any separation among the

fractured parts, reformation of the endosteal vascular continuity, maintenance of the integrity of the periosteal tissue and allowing a certain stress on the fracture line. With these principles in mind, we are able to make correct decisions as to what treatment modality is best suited for a fracture, particularly that of the lower extremity.

Intramedullary nailing osteosynthesis has evolved since it was introduced in the 1940's. An advantage of this technique is that it affords correct alignment of fracture fragments providing a stable fixation while allowing functional weightbearing. It also doesn't limit the movements of the adjacent joints and thus enables early weightbearing [5].

In our institution, open reamed interlocked intramedullary nailing has been in the forefront of our armamentarium in the management of long bone fractures of the lower extremities. With the commencement of the SIGN Fracture Care International Program in our institution on March 2011, we have afforded this treatment modality to the most impoverished of patients, those who could barely find the money for any form of internal fixation for their fractures. Although the gold standard for treatment of femur and tibia shaft fractures is closed intramedullary nailing, performing an open reamed interlocked intramedullary nailing to these patients is still suitable.

In this study, we reviewed the long term radiographic results and functional outcomes of our patients who were recipients of the free implants from the SIGN Fracture Care International Program. Using the RUST scale, we have reported good union rates accounting for all 139 patients included in the sample population, with rust scores ranging from 8 to 12. The good union rate may be attributed to a feature of this technique which uses hand reaming for the preparation of the intramedullary canal. By doing so, we are able to preserve the endosteal vascular continuity thus promoting union and subsequently avoiding the complications which are often times afforded by power reaming [20].

There have been a limited number of studies about evaluating the functional outcomes after treatment of diaphyseal femur and tibia fractures. In our study, multiple outcome measures including Modified Harris Hip Score (mHHS), American Academy of Orthopaedic Surgeons (AAOS) lower limb core function score, and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) were utilized. Average scores of these instruments suggested very good or good functional results.

Following locked intramedullary nailing; deep infection or osteomyelitis prevalence has been reported as less than 1% in literature [20]. Even though treated with open reduction, none of the patients in our study showed deep infection or osteomyelitis. Even those who were treated after an open fracture (18.0%) did not develop such complications as none were apparent on the results of the functional outcome assessment tools employed in this study.

In literature, it is reported that early IM nailing osteosynthesis can be performed in Gustilo type I, II and IIIA open fractures which are debrided and irrigated in the first 8 hours following trauma [22]. In our study, although we failed to define the average interval from trauma to operation for open fractures we acknowledged that the major factor causing the extension of this period was the financial or bureaucratic procedures for the material supply. This problem was amply addressed by the provision of intramedullary nails from the SIGN Fracture Care International Program, thus allowing early IM nailing and consequently contributing for the low account of infection and other complications.

VI. CONCLUSIONS

Results of our study show that open reamed interlocked intramedullary nailing osteosynthesis using Surgical Implant Generation Network (S.I.G.N.) nails may be a treatment of choice for long bone fractures of the lower limb in adults owing to its high union rates, low complication risks and good functional results.

Furthermore, the use of Radiographic Union Score for Tibia (RUST) in the assessment of radiographic results is reliable and correlates well with the clinical outcomes as reported using the three validated, patient-reported outcome measures specifically the Modified Harris Hip Score (mHHS), American Academy of Orthopaedic Surgeons (AAOS) Lower Limb Core Function Score, and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

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The principal author of this study however, has not received or will not be receiving benefits for personal or professional use from SIGN Fracture Care International. Although it has been declared that the company is associated to the subject of the research paper, the research findings included in this study may not necessarily be related to the commercial interests of SIGN Fracture Care International.

The terms of this arrangement have been reviewed and approved by the Institution's Ethics Review Committee, in accordance with its policy on objectivity in research.

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Phytochemical Screening of Tubers and Leaf extracts of *Sagittaria sagittifoliaL.*:Newsa (Arrowhead)

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Abstract: The present investigation deals with the preliminary phytochemical estimation of bio-functional partsi.e.Leaves and Tubers. Aquatic starchy tuberous plant Sagittariasagittifolia L. belonging to family Alismataceae, commonly known as Arrowhead. The biofunctional parts were extracted with five different organic solvents viz. Ethanol, Methanol, Acetone, Petroleum Ether, Chloroform and Distilled Water for their primary and secondary phytochemicals and their active constituents like Tannin, Saponins, Flavonoids, Phenols, Steroids, Glycosides, Protein, Amino-acids, Starch, Reducing sugars and Alkaloids. The results show the 31.1±0.08 extract of leaf and 35.7±0.15extract of tuber shows higher extractive value. The presence ofmaximum phytochemicals viz. glycosides, steroids, tannins, saponins, terpenoids, flavonoids, carbohydrates, alkaloids, and phenols in ethanol while minimum presence in acetone followed by aqueous.Thesephytochemicalsare useful in medicinal and therapeutic system as well as in traditional and modern medicinal system.

Key Words: *Sagittariasagittifolia*. Phytochemicals, Extractive value, Therapeutics.

Introduction

Edible aquatic plants constitute an additional source of food and vegetable. They have high medicinal properties. *Sagittaria sagittifolia* L., a beautiful fresh water ethno-nutraceutical plant growing on the side bank of watershed, river, ponds, nullas and muddy substrata. The plant belongs to family Alismataceae native of Asia and Europe, commonly known as Arrowhead and Newsa an indigenous plant of North Eastern Terai Region of U.P. India. The people of the area have significant relationship with plant for various uses as food, vegetable, medicine, and nutraceuticals. [2] The plant is regarded as one of the best Ethno-nutraceutical plant because it possesses various therapeutic properties in their biofunctional parts leaves and tubers. Pharmacologicaly the plant is also used as anti-microbial, anti-inflammatory, antitumor, antiscorbutic, diuretic, anti-oxidant, immunomodulatory, antidiorrhoreal, antiseptic, anthelmintic and antiviral activity. [9] The aim of this study was examined the Physicochemical and preliminary phytochemical screening of leaves and tubers of *Sagittaria sagittifolia* L. in different organic solvents. The extractive valuewas also be calculated. The extraction procedure mainly uses for the separation of medicinally active portion of plant parts by using selective organic solvents, then obtained extract are mixture of phytochemical in form of liquid or precipitate.

Therefore, the Phytochemical analyses of biofunctionaly active plant parts are important and have commercial interest in both research institute and pharmaceutical industries for manufacturing new compounds, drugs, nutraceuticals and medicines for treatment of various human ailments and diseases.


Fig 1- Habit of *Sagittaria sagittifolia* L.Fig 2-Tubers of *Sagittaria sagittifolia* L.

Materials and Methods

Collection of plant materials

The fresh plant parts of *Sagittariasagittifolia* L. were collected from different sites of water bodies in an around Gorakhpur district U.P. India and the plants were identified in the Department of Botany, DDU Gorakhpur University Gorakhpur. The fresh materials of leaves, stem and tubers were washed under running tap water, and dried under shade then pulverized into fine powder with the help of mechanical blender.

Preparation of plant Extracts

Hot water extraction

Twenty gram of dried powdered plant material was taken in a beaker and 200 ml of distilled water was added then the mixture was heated on water bath with continuous stirring at 30°-40°C for 20 minutes. The water extract was filtered through filter paper and filtrate was used for the phytochemical analysis.

Solvent Extraction

The crude extract of *Sagittariasagittifolia*L. plant parts (leaves and tubers) were prepared by Soxhlet extraction method. Twenty gm powdered plant material was uniformly packed into a thimble and extracted with 200 ml of 90 percent organic solvents (Ethanol, Methanol, Acetone,

Aqueous, Chloroform and Petroleum Ether) separately about 48 hours or till the solvent in siphon tube of an extractor become colorless. After that the extract was filtered through a paper filter (Whatman, no.1) and evaporated under reduced pressure and controlled temperature (45-50°c) by the rotatory evaporator to make more concentration and it was stored in dark glass bottle at 4°c for further analysis. [5]

Extractive value of plant sample

The extractive value or the yield percentage of the plant sample is calculated before and after extraction process using the formula-

Percent Extractability = (W1/W2) X 100

W1= Net weight of powder in gram after extraction

W2= Total weight of powder in gram taken initially for extraction

Phytochemical Screening (Qualitative)

Stock solution was prepared from 100 mg of each of the crude extract (Ethanol, Methanol, Acetone, Aqueous, Chloroform and Petroleum Ether), dissolved in 10 ml of their own mother solvent. The obtained stock solution was subjected to preliminary phytochemical analysis through proper standard method [3].

Estimation of moisture

Initially the amount of 5 gm of powdered sample of *Sagittariasagittifolia* L. (Leaves and Tubers) was taken in dry and pre-weight, Petri plate in triplicate. The sample was uniformly spread in petri-dish, weight and transfer place into the oven for 8 hours at 105^{0}C. After drying place, the dice into desecrator, cool and reweight the dish and its dried sample.

Calculation

Moisture % = W1-W2/W1 X100

W1= Weight (g) of sample before drying

W2= Weight (g) of sample after drying

Estimation of Ash Content

Estimation of ash content of dried sample Leaf, Tuber of *Sagittariasagittifolia* L. was carried out through standard method of AOAC.

Statistical analysis:

The experiments were performing in three determination(Triplicates) and the results were expressed as mean ± S.D. (n=3).

Results and Discussion:

The Phytochemical and bioactive compounds of *Sagittariasagittifolia* L. were tested and summarized in table 3.

Extractive values

The Extractive values of Crude extract of leaves and tubers of *Sagittariasagittifolia* L. in different organic solvents (Ethanol, Methanol, Acetone, Aqueous, Chloroform and Petroleum Ether) are given in table 1. The highest extractive yield was found in the ethanol extract of tubers and methanol extract of leaves.

Physico-chemical Analysis

The physico-chemical parameters like moisture content, loss on drying, total ash, water-soluble, acid- soluble extractive values were carried and recorded in table 2.

Preliminary Phytochemical Screening

The Phytochemical screening of crude extract of leaves and tubers were carried out in different organic solvent. The result revealed the presence of phytochemical like Tannin, Saponins, Flavonoids, Phenols, Steroids, Glycosides, Protein, Amino-acids, Starch, reducing sugars and Alkaloids on the basis of colorations and precipitation on chemical reaction and summarized in table 2 and 3

Table 1: Extractive value of *Sagittariasagittifolia*L.

S.No.	Type of Extract	Yield (% W/W)	
		Leaf	**Tuber**
1	Ethanol	29.1±0.13	35.7±0.15
2	Methanol	31.1±0.08	30.7±0.06
3	Acetone	26.1±2.41	29.1±0.13
4	Petroleum Ether	15.75±0.09	14.5±0.10
5	Chloroform	25.9±0.06	20.89±0.07
6	Distilled Water	21.65±0.11	27.18±0.13

Values are means of three determination ± S.D. (n=3)

Table 2: Physicochemical Parameters of *Sagittariasagittifolia* L.

S.No.	Name of Parameters	Values (%) W/W

		Leaf	Tubers
1	Colour of Powder	Greenish	Creamish
2	PH(5% w/v aqueous solution)	5.7	6.3
3	Moisture content	9.07±0.10	8.39 ± 1.75
4	Total ash	4.29±0.16	2.82±0.03
5	Water soluble extractive	3.16±0.04	1.23±0.04
6	Acid soluble extractive	0.13±0.02	0.40±0.01

Table 3: Phytochemical Analysis of Extract of *Sagittariasagittifolia* L.

Phytochemical	Chemical test	Leaf extract				Tuber extract			
		Aqueous	Ethanol	Methanol	Acetone	Aqueous	Ethanol	Methanol	Acetone
Glycosides	Keller Killiani	-	+	+	-	-	+	+	
Steroids	Liebermann	-	+	-	+	-	+		+
Tannins	Ferric chloride	+	+	+	-	-	-	+	
Saponins	Foam	+	+	+	+	+	+		+
Terpenoids	Salkowski	+	+	+	-	-	+	+	
Flavonoids	Alkaline reagent	-	+	+	-	+	+	+	+
Protein	Ninhydrin	+	+	-	-	+	+	+	+
Carbohydrate	Benedict's	+	-	+	-	+	+	+	+
Alkaloids	Mayer's	-	+	+	+	-	-	-	-
Phenols	Ferric chloride	+	+	+	+	+	+	+	+

+= presence - =Absence

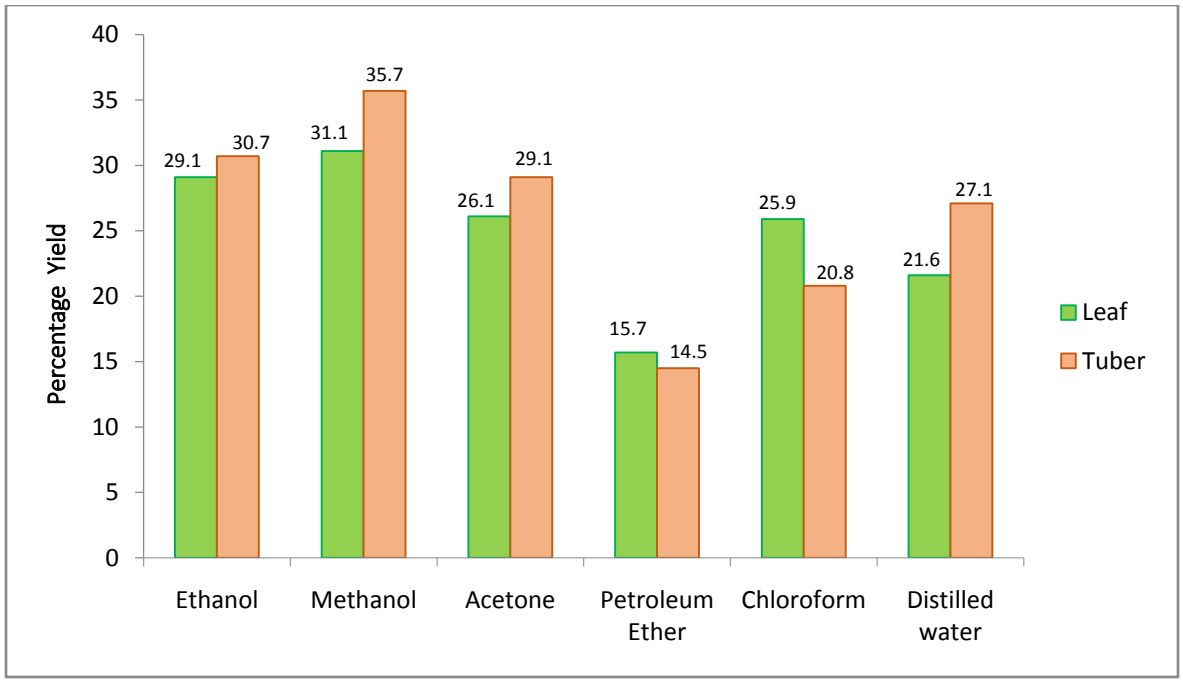

Fig 3- Percentage yield different extracts of leaves and tubers of *Sagittaria sagittifolia* L.

Conclusions

Phytochemical are naturally occurring non-nutritive part of plant chemicals that have protective and defensive properties. The intake of phytochemical in dietary purposes may promote the health benefit and protective against many diseases like cardiovascular and chronic diseases. [8] The qualitative phytochemical screening of leaves and tubers of *Sagittaria sagittifolia* L. were performed initially with different solvents to detect out the nature and presence of secondary metabolite in their extract.The present study revealed the presence of Steroids Terpenoids, Tannin, Phenols, Saponins, Alkaloids, Glycosides, Flavonoids, Protein, Amino acids, and Starch in leaves and tubers (Table-3). The presence of these phytochemicals indicate the *Sagittaria sagittifolia*L. having potential source of Therapeutic medicine. The study suggested that this plant is needed to explore and their utilization in field of Medicine and Pharmaceutical science more beneficial.

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Significance of Information and Communication Technologies (ICTs) in providing Good Information Services to the Society in Nigeria

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Abstract

The International Telecommunication Union (ITU) estimates the worldwide ICT market in 2002 to be almost $2.1trilion, which they segmented as Telecon Services (39%), Software services (31%), and Hardware(30%). This comes to nearly 6.6% of the gross World Product. Surprisingly, in developing countries. ICTs share in GDP is not low. ICT can be considered to be built on the 4Cs: Computing, Communication, Content and (human) Capacity. The recent World Summit on the Information Society(WSIS) focussed extensively on 3C's: Communication, Content and Capacity building and less so, on Computers. They concluded that when considering the use of ICT for development, conventional wisdom is that even if the hardware is free (e.g donated), Communication, software and training make ICT expensive. Finally, this paper explores into ICT situation in Nigeria. It highlights the various activities of the government in relation to ICT development and progress recorded so far.

Keyword: *Computer, Information Communication Technology(ICT),Internet, E-mail, Mobile phone.*

Introduction

There is wide spread research interest in Information and Communication Technologies (ICTs). According to Crede & Mansell (1998), ICTs are crucially important for sustainable development in developing countries. Thiuone (2003) notes that for the past two decades most developed countries have witnessed significant changes that can be traced to ICTs. These multi-dimensional changes have been observed in almost all aspect of life: economic, education, communication, and transportation. In a technology-driven society, getting information quickly is important for both the sender and receiver. ICTs have made it possible to quickly find and distribute information. Thoiune (2003) indicates that many initiatives have taken at the international level to support Africa's efforts to develop a communication infrastructure and, these efforts are designed to enable African countries, including Nigeria , to find faster ways to achieve durable and sustainable development.

Helmut (1998), cited by Akpore (1999), states that of the technological changes that have influenced our lives in recent years, Information Technology (IT) has had the greatest impact. This will continue at least until the end of the first half of the century, when other major technological breakthroughs in the area of new materials, biotechnology, or energy, may provide entirely new ways of living.

An information society is one that makes the best possible use of ICTs. Martin (1995) supports this view by describing it as a society in which the quality of life, as well as prospects for

social change and economic development, depends increasingly upon information and its exploitation. In such a society, living standards, patterns of work and leisure, the education system, and marketplace are all influenced by advances in information and knowledge. This is evidenced by an increasing array of information-intensive products and services (Martin, 1988).

Annan (2002) notes that the information society is a way human capacity can be expanded, built up, nourished, and liberated by giving people access to tools and technologies, with the education and training to use them effectively. There is a unique opportunity to connect and assist those living in the poorest and most isolated regions of the world. The information society or information age is a phenomenon that began after 1950, which brings challenges as the researchers seek to integrate and expand the universe of print and multimedia sources. The two terms are often used to describe a cybermetic society in which there is a great dependence on the use of computers and data transmission linkages to generate and transmit information.

The African Information Society (AIS) document (2005) argues that Africa should build, by the year 2010, an Information Society in which every man, woman, child, village, public and private sector has secured access to the use of computers and telecommunication media. The objective is to provide every African with the possibility of using the communication and data processing services available everywhere else, just like any other citizens of the world.

Roles of Information Communication Technology

One of the identified agents through which the world will constantly experience change is technology. In the business of trying to make information available in the right form to the right user both at the personal and organization levels, and at the right time, the bid to cope with great flood of information has led to the need for a more sophisticated way of handling information faster and better.

According to Ayankoha (1991), Information Technology is ''the use of man-made tools for the generation, collection, communication, recording, re-management and exploitation of information. It includes those applications and commodities, by which information is transferred, recorded, edited, stored, manipulated or disseminated''. Hawkrige (1883), describes Information Technology as a revolution which has penetrated almost all fields of human activity, thus transforming economy and social life. UNDP (2001) asserts that even if sustainable economic growth facilitates the creation and diffusion of useful innovations, technology is not only the result of growth but can be used to support growth and development. ICTs are credited with the ability to transform, and deep and significant changes are expected from their spread used in Africa. From this stand point, Africans can take maximum advantage of the new technologies even if major challenges remain. These challenges include adapting ICTs to local conditions and uses in developing countries, and allowing each country understands those innovations and adjust them to their own development needs.

Therefore, development in Nigeria depends on the country's capacity to create wealth to significantly reduce poverty and to raise its capacity to create wealth at a sustainable level. In June 1996, the United Nations Commission on Science and Technology Development (UNCSTD) was in collaboration education, health, income, governance, and technology (Crede and Mansell, 1998). If we consider these five as key indicators of development for Nigeria, ICTs can be socially beneficial only if they contribute to poverty eradication (higher income), improved health and education, better use and more equitable sharing of resources, and raising participation in the decision-making processes (and in this regard, access to information is crucial).

ICTs have been the basis for human existence from time immemorial and this has driven man to continuously seek ways to improve the processing of information and communicating such

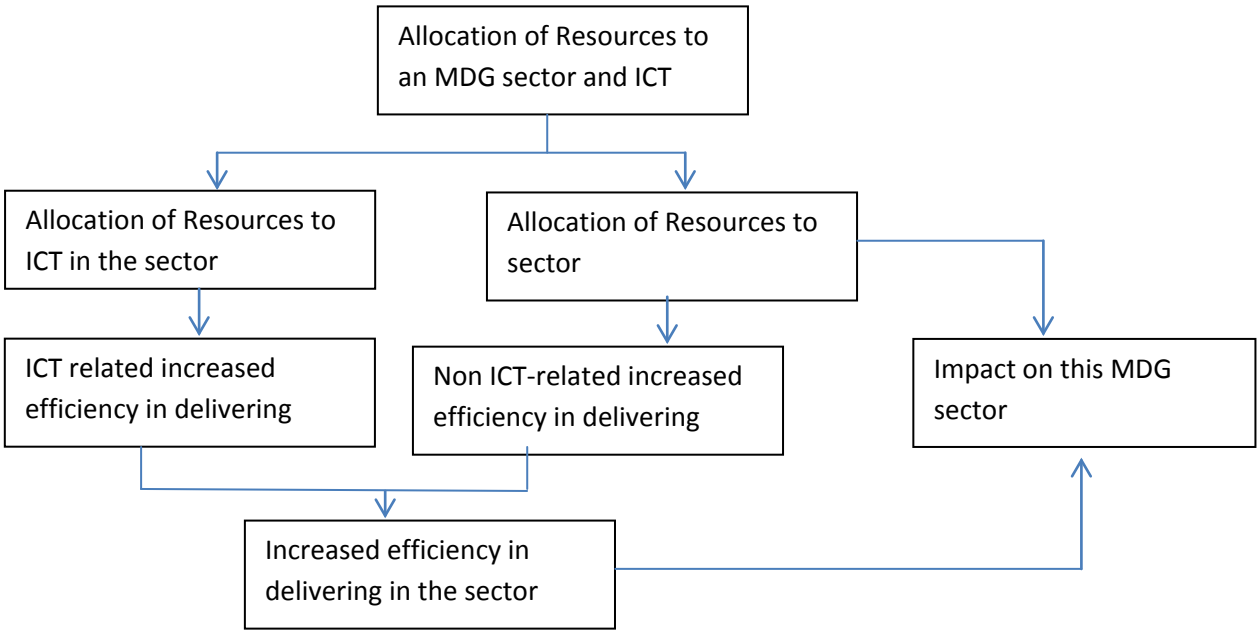
information to one another irrespective of distance and on a real-time basis (Ndukwe, 2002). Surviving in the information age depends on access to national and global information networks. ICTs are the bedrock for the survival and development of any nation in a rapidly changing global environment, and it challenges us to devise initiatives to address a host of issues such as reliable infrastructure, skilled human resources, open government, and other essential issues of capacity building (Federal Republic of Nigeria, 2001).

At the heart of technology lies two main branches of technology: computing and telecommunication. The technologies covered are the computer system, Internet/electronics mail (e-mail), mobile phone, and fax machine.

ICT and Development

Information and Communication Technology (ICT) is viewed as both a means and an end for development. With roughly two-third of the world economy based on services and the rise of India, Philippines and other nations as global IT players, many developing countries such as Nigeria have accepted ICT as a national mission. Even within manufacturing and industry, ICT has an increasingly important role to play. During 1995- 2002 when the US economy posted impressive overall growth, nearly one-third of the growth in productivity was attributable to ICT. While the growth rate of ICT even in developing countries is impressive, the base upon which these apply is very low.

John Dely(2003) in a series of articles, discusses point by point how ICT can work to meet the eight goals identified with the 18 targets set by the MDGs. Similar options are indicated in World Bank publications such as the different estimates on the growth and role of ICT, both within ICT sectors and in ICT consuming sectors. These estimates are from the 2003 Economic report of the President and the growth of productivity after 1973-1995 after accounting for cyclical business effects and in the World Telecommunication Development Report 2003as shown in the chart below:



Sources: ICT and Development Resource Allocation and Impact in MDG Sector

As the above chart shows, ICT will not directly realize the Millennium Development Goals (MDGs). Rather, its role should be seen best as an enabler, primarily spanning several dimensions:

- Efficiency and competitiveness;

- New business model and opportunities; and
- Transparency and empowerment.

Moreover, ICT is not an effortless or inexpensive proposition, but its benefits typically far outweigh the costs, and the scale of investment required is often much lower than that of development (such as providing electricity or water and sanitation). "The issue is whether we accept that the poor should, in addition to the existing deprivation of income, food and health service etc, also be further deprived of new opportunities to improve their livelihood". (Weigel and Waldburger, 2004)

ICT's value towards the MDGs is in gathering, storing, and analysing information with greater and greater accuracy and granularity. This enables tailoring development efforts to suit specific social, economic, gender, age, and geographic conditions and requirements.

Hence, when considering the success of development project and initiatives, both ICT-based and otherwise, in addition to the obvious issue of financing, political economy issues (including legal framework/ rule of lava sanctity of contracts, labour and other regulations, etc) are equally or sometimes more important.

Here are some of the equipment's required when selecting the ICT infrastructure:

Computers

Computers were originally used by scientists for calculating numbers, and have since become useful in offices and industries. In recent times, simplified models that can be used by almost everybody have become common in schools and homes for accomplishing many varied task and applications (Madu 2000).

Fapohunda (1999) lists the uses that computers are now commonly put to: writing letters and reports, printing books, newspapers, and magazines, drawing pictures and diagrams, to solve problem in statistics, mathematics and handing financial records, controlling traffic lights, flying aeroplanes, making and playing music and video, sending messages e. t. c.

Internet

The Internet is a global collection of many types of computers and computer networks that are linked together. It is increasingly becoming the solution to much information problems, information exchange, and marketing (Adesanya, 2002). Eseyin (1997) describes the Internet as a mixture of many services with the two most commonly used being electronic mail (e-mail for short) and the World Wide Web (www). It plays a significant role in education, health, political processes, agriculture, economy, businesses and newsgroups. Woherem (2000) states that with Internet connectivity, one can do business all over the world without physical contact with the buyer or the need for a business intermediary.

E-mail

Electronic mail is the exchange of text message and computers files transmitted via communications networks such as the Internet (Nwosu, 2004). Fapohunda (1999) sees the e-mail system as the equivalent of postal mailing services, with the biggest difference being the time and cost involved. And not only written data, but all sorts of information in the form of video, audio, or photographys, can be sent via e-mail. Oketunji (2000) describes e-mail as an increasing popular method of communication, especially in the workplace.

Mobile phones

Bitner (1989) defines mobile phones as a telephone system that can move or be moved easily and quickly from place to place. Mobile phones were once gadgets that only the rich and busy executives could afford. Mobile phones are now the ICT that is reshaping and revolutionizing communication globally. According to Marcelle (2000), the availability of this new technology has been reshaping the material basis of the society as well as bringing about a profound restructuring of economics, political and cultural relations among the states. Nigeria is not an exception.

According to Tiemo (2006), the importance of information cannot be overemphasized. People need information to plan and carry out their decisions more than 90percent of Africa's population could greatly benefit from information on better choice of food, safe water and basic nutrition, child care, family planning, immunization, prevention and control of endemic diseases. The combination of modern communication devices could play significant roles in the collection and dissemination of global information. Oji-Okoro (2006) supported this view by stating that mobile telephone usage by individuals enables them to communicate with loved ones, clients and business associates. For large businesses, it is a means of providing a service that leads to an increase in profits. For governments, revenues are gained through taxes and duties. As a tool for sustainable livelihoods, mobile telephones provide employment for many who could have been idle.

Fax machine

Telefacsimile systems permit the transaction of images (photos, printed images, maps, drawings) and their reproduction on paper at a remote receiver. Facsimile (fax) is not a new service however, advances in digital imaging technology and microelectronics have caused a sharp drop in prices with a significant increase in capacities (O'Brien, 1996). ''Long distance copying'' might be an appropriate nickname for this telecommunication process. Any document, whether it is handwritten which contains pictures, diagrams, graphs, charts or typed text can be transmitted at a great speed for relatively low cost. The fax system is widely available as most organizations have at least one fax machine.

ICT AND DEVELOPING COUNTRIES

The birth and the growth of the internet were in the United State and this has led, mostly, to large distortion in connectivity between the developed and developing nations. However, economiy remain the obvious overcoming reason for the continuation of the divide. Data from the Cooperative Association for Internet Data Analysis (CAIDA) show that the Internet is overwhelmingly concentrated in a few locations. An exception is East Asian developing countries, notably South Korea and China. In last few years, these countries have been aggressively building next generation networks using the next generation of Internet Protocol (IP).

ICT AND NIGERIAN SITUATION

Advances in ICT are phenomena in the Western Europe and United State of America, which are centres of industrial and ICT revolution. The situation in Nigeria is a far cry from what obtains in the advanced nations. Nigeria is however, coming along but at lower pace. As observed by Adediji(2001), "We hop rather than leap, automation wise". Consequently, Nigeria is still trapped among the group of nations categorized as information poor societies. Low-level technology, inadequate planning, poor implementation, lack of expertise, under-funding and high costs of equipment occasioned by unfavourable exchange rates are major factors militating against ICT revolution and development of virtual library in Nigeria. Although Nigeria is not relenting in her efforts to be part of the global village, a lot still needs to be done in order to achieve a breakthrough in ICT. Ayodele (2001) sheds more light on this thus:

> *The developing countries and Nigeria for that matter have been caught on the backwardness called digital divide i.e. we have been left behind by some ten*

> *years and in a revolution that is moving at the speed of light, to say ten years is a lot. Thank God, we have a vibrant knowledge thirsty citizenry whose only handicap is lack of opportunity. Thanks to ICT, the world has been made a global village. Given the right learning environment, the materials to help bridge the digital divide is at our fingertips.*

However, the Federal Government saw the situation as a challenge and has risen to the occasion by putting in place policies and measures that will bridge the digital divide and transform Nigeria into a key player in the global village for socio-economiy advantage. Recognizing the importance of ICT as an indispensable tool in national development, the Federal Government of Nigeria has accorded ICT development a national priority. This has found expression in the policy document tagged "National Policy for Information Technology", which contains national IT policy guidelines for the country. In the preamble, the Federal Government observed that:

> *Information Technology (IT) is the bedrock for national survival and development in a rapidly changing global environment and challenges us to device bold and courageous initiatives to address a host of socio-economic issues such as reliable infrastructures, skilled human resources open government and other essential issues of capacity building. . . It is for this reason that every progressive country has national IT policy and an implementation strategy to respond to the emerging Global reality and thus avert becoming a victim of digital divide. A developing nation like Nigeria that aspires to participate effectively and be a key player in the emerging information age needs to have in place a highly efficient information technology system driven by a vibrant national IT policy. . .(FGN,2001).*

The size of ICT Industry

Available official statistics shows that there were 14,800 ICT companies of varying sizes and activities in the country as at 2003, while the population of computers stood at 2,855,555. Out of this figure ,672,700 were in homes and the rest in offices. Also, virtually all organizations sampled engaged in multiple types of activities. For instance, the companies in computer sales and services also claimed to provide consultancy services. Virtually all the establishments who engaged in computer sales also assembled unbranded computer system (clones).

Table 1: Distribution of Establishments by Types

Types of Establishments	**Distribution (%)**
Telephone / Tele-centre Services	45
Computer Sales and Services	36
Computers Assembly(Formal and Informal)	22
Cyber café Services/ISP's	21
Web Design	21
Software (Sales and Services)	19
Web Hosting	11

Source: Adapted from NITDA ICT baseless study, 2003

Table 2: Distribution of ICT Establishments by Zone

Zones	**Distribution(%)**
Special Lot (Lagos & Abuja)	26
South- South	26.7
South – East	14.6
South – West	13.2

North – West	7.3
North – Central	7.0
North – East	5.2

Source: Adapted from NITDA ICT baseless study, 2003

The South – South had the highest number of ICT companies with a slight edge over special lot. This could be attributed to the presence of oil companies and oil operations in the zone, which is propelling economic activities. The North – East had the least population of ICT companies.

The above survey shows that, the ratings are somewhat consistent with the findings of NITDA in 2003. The situation remains the same with minor changes. Cyber cafes still remain the most popular means of Internet access. But Internet connectivity via VSAT link is widely gaining ground. Again, the GSM phones remain the most widely used means of communication in Nigeria.

Slow Internet development in Nigeria has attributed to high cost of bandwidth, computers, Internet infrastructures and unreliable power supply (Ndukwe, 2006). These challenges are being tackled head on. Several measures have been embarked upon to stimulate Internet penetration and high quality services so that Nigerian are able to enjoy improved quality services.

Nonetheless, internet/ telephony has continued to witness expansion while the Nigerian Government is addressing issues arising from the analysis.

In a related development, a study carried out by C. M. C on Internet in Nigeria and published in the Punch newspaper of Tuesday, 30th March, 2004, revealed:

- About three million Nigerians were having access to internet services. This was considered small when benchmarked with 150 million populations of Nigerians.
- The use of Internet in Nigeria had been largely elitist as it is mostly used by the urban working class and students.
- Also, Internet usage was mostly shared in offices at no direct cost to authorized users and cyber centres where people pay to use.
- The usage of Internet at home was minimal.
- The Internet subscribers had various options open to them. These included the use of radio waves, wireless dial up, VSAT access supplied by ISPs, network operators or cyber café. Generally, subscribers did not have a good understanding of VSAT technology.

Finally, the survey acknowledged the fact that the Internet industry in Nigeria has recorded some progress when compared to 90% when only few people in the country were connected to it. This has been attributed to the liberalization, deregulation and privatization embarked upon by the Federal Government. About the same time, the *Guardian Newspaper* in a publication, titled "Why Internet Connectivity is Low?" published on 6th of April, 2004 painted another picture of Internet market in Nigeria. It reported that:

- Poor Internet Market had become a major source of concern to end users in the country.
- More and more people especially corporate organizations were opting for Very Small Aperture Terminal (VSAT) in place of dial up and radio connectivity. But this option was not only expensive but also difficult to acquire.
- The situation according to the option of the Cyber café operators hindered those who want to connect to the much cherished technology.
- Consequently, end-users were asking for access rates that were not only affordable but realistic adding that if the rates were realistic, the much talked about rural-urban drift would be controlled. This would create an enabling environment and replicate what

Global System of Mobile Communication (GSM) had done for voice communication and this would lead to internet revolution in the country. It should be noted that the use of mobile phones has increased tremendously.

Summary and Conclusion

It has been commonly accepted and proven that information and communication technology (ICT) is the engine of the 21st century and beyond; as it will chart the economic, religious, cultural, legal and social life of nations, particularly that of developing countries (Ukodie, 2004). Hence, according to Nkereuwem (1996), the importance of Information and Communication Technology for sustainable development, has long been recognized by developing countries. ICT has impacted on different sectors of the Nigerian economy. The application of ICT has emerged as the most radical development of the 21st century. It facilitates speedy information transmission, high level decision making, reduces cost in resources/organizational management and as well opens vast opportunities for information sharing among individuals, companies and governmental institutions. It is a truism that Information and Communication Technology (ICT) is very indispensable to Nigerian sustainable development drive. Today, ICT has been successfully integrated in the process of state administration, leading to a view concept of e-government. The potential benefit of ICT to sustainable development in Nigeria has been accepted as an imperative paradigm.

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Review on the Detection of Fuel Adulteration through Sensor based Techniques

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Abstract- The scope of the article is to review various types of fuel adulteration detection sensors using various sensors based techniques. Petrol and diesel are major fuels used for transport and electricity generation globally. Now a day's huge number of consumers are facing the fuel adulteration threat. Adulterants are added to these base fuels with other inexpensive boiling point range hydrocarbons containing more or less similar composition leading to modify and degrade the base fuel quality. These adulterants are added by the business vendors for their monetary profits. Sensing such adulterant in fuels is a principal task in the interest of the end consumer. We believe that this is first literature reviewing the sensor based techniques to estimate the adulteration in fuel samples.This review summarizes the various fuel adulterated sensors design and their function in detecting adulteration in fuel samples.

Index Terms- Fuel adulteration, Petroleum Products,Hydrocarbons, Sensors.

I. Introduction

Petroleum is a fossilized mass existing beneath the earth's surface as geological formations. Its raw form is known as 'crude oil' that mostly contains organic compounds and hydrocarbons. Its elemental composition by weight is usually distributed among carbon (83-85%), hydrogen (10-14%), nitrogen (0.1-2%), oxygen (0.05-1.5%), sulfur (0.05-6%) and organometallic compounds (vanadium, nickel, lead, arsenic, and other trace metals[1]. The important hydrocarbons groups existing in the crude oil are naphthene's (cycloalkanes), paraffin (alkanes), and aromatics, whereas olefins (alkenes) are formation, occurs during the processing of crude. Petroleum processing industry categorized into three different sectors; 1) upstream 2) midstream and 3) downstream. Exploration of the crude oil carried out by upstream and midstream sector involves in transportation of crude oil from the exploration site to the refinery site. Crude oil refining into various products such as petrochemicals is significant activity in the downstream sector. Various types of hydrocarbon fuels and valued components are produced through the petrol refinery process. A variety of finished products such as aviation fuel, liquefied petroleum gas, petrol (gasoline), diesel, kerosene, lubricants, asphalt, and waxes etc are obtained. Hydrocarbon fuels obtained from refining streams before being supplied to the market for their use are mandatory to comply with regulatory requirements which are in agreement with the global norms. Petrol and diesel are automobile fuels extensively used worldwide for transport. Being a low boiling hydrocarbons mixture, petrol is suitable for spark ignition engines where an electrical spark ignites the mixture of fuel vapors and air[2]. Petrol is a petroleum-derived product containing a mixture of liquid aromatic and aliphatic hydrocarbons, ranging between C4 to C12 carbon atoms with the 30-225 °C boiling range. It is primarily a mixture of naphthene's, paraffin, olefins, and aromatics. Some additives such as methyl ethers and aliphatic alcohols are also required for improving its octane number[3]–[7].

Diesel fuel is extensively used across several sectors such as in the automobiles, household appliances, agricultural equipment, etc. Diesel is combusted in a compression-ignition engine in which ignition of the fuel that is injected into the combustion chamber is caused by the high temperature which gas achieves when greatly compressed[2].The hydrocarbons types in the diesel fuel are typically similar to the petrol however the carbon number and molecular weight are higher. The usual boiling range of diesel is within 180-370 °C whilst carbon number range lies within C10-C19. Similar to the petrol, thedifference in the nature and composition of diesel fuel is usually accounted due to the difference in the refining processes[8]. The requirement for the energy is rising at a rapid pace in the developing world setting a thrust on the usage of fossil fuels. International Energy Agency (IEA) has accounted for, in general, the worldwide energy supplies, gross consumption of fuel across various sectors and predicted requirements in the future[9]. Worldwide, the transportation is considered a substantial energy demanding sector, requirements of which are mostly met through fossil fuels[10].

The petroleum products have been exploiting in transportation, power generation as fuel, universally in everyday life. The consumption is escalating every single year to the tune of nearly 4%. The business person who vends the transportation fuels are adopting fraudulent practices for their profit by adding low-priced hydrocarbon additives to the base fuel. This kind of practices are triggering environmental pollution. The pollutants exiting as exhaust tail pipe is posing an immense threat both to the human health as well as environment. To check, control the adulterants both in gasoline and diesel there shall be flawless mechanism both atstatutory level as well as laboratory level. On board fuel adulterant detection sensors offer easy and quick detection of adulterants present in the fuel sample than the expensive and tedious laboratory methods. Various fuel adulteration detection sensors have been designed and fabricated to evaluate the fuel adulteration[11]–[13]. In addition, computational techniques also have been employed to detect the fuel adulteration. One such method to evaluate the fuel adulteration is Artificial Neural Network(ANN)[14].

II. Fuel Adulteration

The crude oil may vary with the place to place and shall have alkanes (straight and branched chain from about C1 to C4) (low boiling fraction), cyclo alkanes or naphthenes, and aromatic hydrocarbons. The main fractions of the petroleum are Gas (52CC−) light Naptha (795−C°C), medium Naptha (79°-121°C), heavy Naptha (121°-191°C), kerosene (191°-277°C), distillate fuel oil (277°-343°C), gas oil or lube stock (343°-566°C), residuum (566°C +)[15].

Fuel adulteration means introduction of a foreign constituent into petrol and diesel, illegally or unauthorized with the result that the product does not correspond to the requirements and specifications of the Bureau of Indian Standards specifications number IS 2796 and IS 1460 for petrol and diesel respectively or any other requirement notified by the Central Government from time to time. Adulteration involving the addition of organic solvents, such as alkanes that are straight and branched from about C1 to C4,light aliphatic (C4-C8),heavy aliphatic (C13-C15), and aromatic hydrocarbons ,especially, benzene, toluene,xylenes, hexane, complex hydrocarbon mixtures, mineral spirits,kerosene, rubber solvent, petrochemical naphtha, diesel, and thinner have been used to carry out the adulteration[16].

2.1. Extent of Adulteration

The studies obtained from the Indian Oil Corporation revealed that 8.3% samples which are tested are adulterated. This encourages the dealers and the businessmen to go for the intelligent mix in the fuel. Thus, reaping profit at around rupees 25000 a day.

2.2. Approach for fuel adulteration detection

a. For petrol:

The parameters like density, distillation, stability (Existing gum, Potential gum), hydrocarbon composition (aromatic, Vol%, olefins, Vol%, Benzene, Vol%, sulphur, ppm), octane number (Research, Motor), multifunctional additives-dosage are conducted for petrol[2], [5], [8], [11], [12], [14], [16]–[19].

b. For diesel:

The parameters density, flash point, distillation, sulphur, total sediment, polycyclic aromatics (+2 rings), cetane index, cetane number, multifunctional additives dosage, cetane improver presence are selected for test[2], [4], [5], [8], [11], [12], [14]–[19].

2.3. Consequences of adulteration:

Fuel adulteration induces economic losses to the end consumer, higher emissions, decrease in the rated efficiency of the engines apart from the damage to the engine parts. Emissions of the tail pipe in the form of carbon monoxide(CO), hydrocarbons (HC), oxides of nitrogen (Nox), particulate matter(PM), may lead to toxic substances in theair. These toxins bring about carcinogenic pollutants,which are air toxins like benzene and polyaromatic hydrocarbons(PAH's) pollutants. Moreover, the use of biomass as domestic fuel lead to indoor air pollution[20].

Petrol Adulteration: The solvents that are within the same boiling point ranges such as toluene, xylene, and other aromatics when added to the petrol will not show much perceive variation. These solvents when added in higher quantity lead to enhanced HC, CO, Nox emissions, air toxins[21].

Diesel adulteration: - Kerosene is often blended with diesel due to the low-temperatureoperability (particularly for cetane number and viscosity) of the fuel and upon increased blending would lead to more sulfur emission. There will be a noticeable change in color in case of heavy oil blending in diesel[21].

III. Fuel Adulteration detection sensors

Difficulty in the composition of petroleum-derived fuels and their potential adulterants leads to a challenging situation where compliance and implementation of standard norms are not easy. Widely approved and adopted standard methods such as EN, ATSM, and ISO that encompass a variety of properties for testing fuels. There is no particular technique is precisely designed to assess the adulteration of fuel while most of these techniques are equally applicable to assess the adulteration of petrol and diesel fuels.

Due to price hike in petroleum products, adulteration is being observed everywhere. Suppliers could have profit about 10-15% by mixing petrol and various constituents. There are several sensors were designed to define theconcentration of adulteration in fuel samples.

2.4. Fuel Adulteration detection sensor using IR sensor/imaging processing

Jersha V and his co-workers have been described automatic fuel adulteration detection and reporting system. In this fuel adulteration detection technique, a sample of the fuel is heated to a temperature which is equal to the boiling point of the kerosene and petrol. In thecase of petrol, it is being heated to a temperature equal to the boiling point of petrol and in thecase of diesel, it is being heated to a temperature equal to the boiling point of kerosene. So that any one of the constituent fuel gets evaporated and another constituent fuel is left in the in thesample. For instance, in thecase of diesel adulterated with kerosene, the constituent fuel left would be diesel. Similarly, in thecase of petrol adulterated with kerosene, the constituent fuel left would be kerosene. From this study amount of the fueladulteration can be detected. The quantity of the left-out sample after heating the adulterated fuel is detected by using two different techniques. The first technique employs Infrared (IR) sensors and the second technique employs camera based Imaging system for detection of sample level. At theend two techniques were compared and image processing technique has been given better results than IR detection technique[11].

2.5. *Fuel Adulteration detection sensor using Micro-controller(ARM)*

S.D. Kale et.al had described a micro-controller based technique for determination of adulteration concentration in thesample. In this technique, fuel adulteration has done by investigating various parameters such as viscosity and density are which are determined by experimental setup and whereas parameters such as temperature and humidity determined by using sensors. The determined test results were compared with standard references using ARM micro-controller which provides anoutput on LCD screen[22].

2.6. *Fuel adulteration detection sensor based on nonporous silicon micro cavity*

An optical sensor has been developed to estimate the amount of adulteration in fuel sample using a porous silicon microcavity which is fabricated using electrochemical anodization method. Reflectance quantities are used to estimate the concentration of kerosene which is the most frequently used fuel adulterant for diesel and petrol. The principle behind the sensing is based on the change in the effective refractive index of the silicon microcavity due to the fuel introduction into the pores leads to modification in the reflectance spectrum of the structure. This sensor also can be used for the detection of adulteration in both in diesel as well as petrol. The process of this sensor is reversible; thus, thesensor can be reusable[13].

2.7. *Simulation based fuel adulteration detection sensor*

Rajan Dey et.al developed a device design using TSM BAW micro acoustic sensor with dual density-viscosity sensing and integrated temperature sensor in COMSOL Multiphysics v4.2 and analysed both AT and SC cut quartz resonators for comparison, and found that there is a shift in frequency response of the resonator whenever the density and viscosity are changing, this change in the resonant frequency is analysed to detect the amount of adulteration [23].

2.8. *Fuel Adulteration detection sensor using highly sensitive electrical meta-material sensor*

Vaishali R and her co-workershave developed a device which works based on the electric meta material concept, i.e. complementary split-ring resonator (CSSR), operating at 2.47GHz (The industrial, scientific, and medical radio band – ISM band). This device is used to detect the kerosene adulteration in petrol. The sensor is a CSRR circuit, which exhibits sub-wavelength resonance having high sensitivity and Q-factor. Further, a Polydimethylsiloxane(PDMS) based sample cavity is designed for micro-quantity sensing to make the device more precise, sensitive and selective. A device operating at 2.47 GHz is hence proposed for adulteration of kerosene in petrol, varying up to 30 per cent. Unadulterated samples (Standard samples) were derived from the Company operated Company owned petrol pump, and the adulterated samples were made in the laboratory for precise calibration. Systematic variations in the resonance frequency and magnitude were examined with adulterated fuels. The sensing measurements were done on Vector Network Analyser (VNA). The sensing was rapid and the recovery was almost instantaneous; ensuring a sensitive and accurate device for detection of adulteration in petrol[24].

2.9. *Fuel adulteration detection sensor using long period fiber grating technology*

Vandana M et.al depicted the capability of long-period fiber grinding (LPFG) sensor innovation to distinguish the nearness of 10% contaminant in automotive fuels utilizing LPFG method while the conventional advances can identify nearness of about over 20% of the same. LPFG technique involves the shift in the transmission spectra of the different proportions of the fuel and this shift is an index of the fuel quality[17].

2.10. *Biofuel blending sensor using a microfluidic viscometer*

Sanket G et.al employed computational and the comparative experimental analysis of a micro fluidic device that examines the amount of blending by observing the interaction between the two fluid surfaces. Acrylic material with the help of well-established micro-fabrication technique. The viscosity of the different bio-diesel mixes can be utilized to demonstrate the part of bio-diesel in the fuel. The interface move is a direct result of the more prominent inhabitancy rate of a liquid having ahigher viscosity in the channel[25].

2.11. *Fuel adulteration detection sensor using turnaround point long period fiber gratings in B/Ge doped fiber*

Sanjay K et.al recommended the utilization of turnaround-point long-period fiber gratings for wavelength encoded thelocation of adulteration in fuels, they have exhibited CO2 laser composed correct TAP-LPGs in B/Ge doped filaments for fuel adulteration recognition with high affectability of 0.96nm/% change of lamp fuel in gas. A normal grinding affectability of 1635 nm/RIU for SRI in the range 1.397 to 1.4372 has been illustrated**.**

2.12. *Fuel adulteration detection sensor using silicon oxynitride based evanescent optical waveguide sensor*

Aradhana D et.al designed and fabricated a silicon oxynitride based Evanescent Optical wave guide sensor (EOWS) as the core layer on silica-silicon wafer and its operation for quick and easy detection of adulterants in petrol encompassing geometry of composite planar waveguide. The embedded waveguide of core width ~ 50 μm and length ~ 10,000 μm was fabricated using Reactive Ion Etching (RIE) and Plasma Chemical Vapour Deposition (PECVD) techniques. The vital aim of this sensor is to incorporate an abrupt choice to the time-consuming existing adulteration detection techniques which usually needs some time to give the consequence. Experimental results and theoretical predictions at wavelength 632.8nm are investigated and displayed using Simple Effective Index Method(SEIM), which established that the sensitivity of the proposed (EWOS) is 20 times more than that of asymmetric wave guide structure and nearly 40 times more than that of existing planar wave guide sensors. thereby allowing rapid detection of adulterant constituents in petrol without using any chemicals[26].

2.13. *Optical sensor for determining adulteration in a fuel sample*

An optical sensor has been developed to estimate the relative composition of two liquids in themixture. It is based on detecting changes in the intensity of reflected light at the interface of the glass-mixture brought about by changes in the one liquid proportion over that of the other in the mixture. Sample mixtures for this study have been prepared by altering the concentration of substances such as diesel and kerosene fuel in a fixed volume of petrol. A technique for detecting as well as estimating the concentration of diesel fuel or of kerosene or of a mixture of the both in a sample of petrol has been described. Evaporation of these fuel sample mixtures is achieved by exposing them to a constant air flow at the same temperature as that of the fuel sample mixtures. Determination of the changes in the reflected intensity is attained by using an arrangement in which one of the two isosceles surfaces of a prism (right-angled isosceles) is interfaced with the fuel sample mixture. Determined values for some of these changes are compared with the

theoretical assessments for them obtained from Fresnel's equation[27].

2.14. Fuel quantification using quartz sensors

Muhammad R et.al developed a sensor to detect the fuel quantification and adulteration by using an array of quartz crystal sensors modified by chemical materials. The sensor response spent only up to 60 seconds for a measurement cycle. Later statistical data analysis such as Neural Network (NN) methods and Principal Component Analysis (PCA), it was possible to deduce that the sensor array is able to differentiate the fuel vapors with high reproducibility and to find out the rate of fuel adulteration with linear correlation[28].

2.15. Mass and capacitance transducers for the detection of adulterated gasoline

Among the existing technologies, mass and capacitance transducers are typically interesting because they can take benefit also from non-conductive sensing layers, such as most of the fascinating molecular recognition systems. In this experimental procedure, an array of quartz micro-balance sensor is accompanied by an array of capacitors obtained from a commercial biometric device. The two sets of transducers which are functionalized by sensitive polymeric and molecular films are used to measure the content of ethanol in gasoline[19].

IV. Conclusion

This review article has recapitulated some of the imperative literature reports which involved analytical approaches for monitoring of adulteration of petroleum fuels. Petrol and diesel adulteration can be analyzed more precisely with the help of fuel adulteration detection sensors, which are a perfect mechanism at thestatutory level.On-boarddetection systemscould be used in real time by developing sensor based detection in fuel adulteration. This kind of techniques can avoid the complex obstacles which generally appear in the laboratory based methods. There is arequirement of research in the area of sensor based detection, which is used for easy and quick identification of adulteration concentrations in sample fuel.

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Nerve conduction and surface electromyography of lower limbs of barbers: effect of anthropometric variables

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Abstract- Nerve conduction and surface electromyography of lower limbs of barbers: effect of anthropometric variables

Background: Nerve conduction studies (NCS) are conventionally performed with electromyography (EMG), which is electro diagnostic studies, provides a comprehensive evaluation of suspected nerve, muscle and/or neuromuscular impairment. Several studies had shown a significant effect of anthropometric variables on nerve conduction variables while their effects on surface EMG variables are hardly known.

Objectives: To study the effect of anthropometric variables on nerve conduction and surface electromyography variables of lower limbs in barbers.

Material and methods : This study was done on twenty six (age 38.12±8.21 years) consenting male barbers selected from Dharan municipality by a convenient sampling method. Anthropometric variables such as age, height, weight, BMI were recorded. Compound muscle action potential (CMAP) and sensory nerve action potential (SNAP) of peripheral nerves and bilateral gastrocnemius muscles of lower limbs were recorded using standard techniques in Neurophysiology Lab II, Department of Basic and Clinical Physiology, B.P Koirala Institute of Health Sciences, Dharan, Nepal. The data obtained were entered into MS Excel sheet and further analyzed using SPSS 11.5. Descriptive analysis was done for anthropometric variables while Pearson's correlation was applied between anthropometric and nerve conduction and surface electromyography variables.

Results : Anthropometric variables such as age, height and weight showed a significant relationship with NCS variables, but not with surface EMG variables. Height and weight showed a positive correlation with latencies of most of the nerves ($p<0.05$). Height showed a negative correlation with conduction velocities of right common peroneal and right sural nerves ($p<0.05$). Weight showed a negative correlation with left common peroneal conduction velocity ($p<0.05$). Anthropometric variables did not show any significant correlation with surface EMG variables.

Conclusion : Height and weight showed a significant effect on nerve conduction variables of most of the peripheral nerves. Nerve conduction variables significantly vary moreover with the height of a subject. Thus, adjustments for height must be considered while giving normal standard values.

Index Terms- anthropometric, nerve conduction studies, surface electromyography

Nerve conduction and surface electromyography of lower limbs of barbers: effect of anthropometric variables

I. Introduction

Nerve conduction studies (NCS) are the most sensitive and reproducible measure of peripheral nerve functions. These can define and quantities normal nerve activity.[1] These tests examine the state of rapidly conducting myelinated fibers in a peripheral nerve.[2] NCS are conventionally performed with electromyography (EMG), which are electro diagnostic studies; provide a comprehensive evaluation of a suspected nerve, muscle or neuromuscular impairment.[3] NCS is a part of electro diagnostic procedures that help in establishing the type and nature of the nerves by evaluating their function. NCS assesses three types of nerves: motor, sensory and mixed. Motor NCS includes the assessment of the compound muscle action potential (CMAP), whereas sensory NCS include the assessment of the sensory nerve action potential (SNAP) of the peripheral nerves in the upper and lower limbs. The median, ulnar, radial, common peroneal, tibial, and sural are the commonly examined nerves. Latency, amplitude and conduction velocity of CMAP and SNAP responses are measured. Minimum F wave latency of the late response is routinely measured.[4] Nerve conduction variables are affected by physiological and technical variables. Physiological variables such as age, height, gender, weight, body mass index (BMI), temperature affect conduction velocity. Diameter and myelination of the nerve fibers are strong physiological factors that affect NCV.[3]

Dilip et al showed a substantial positive correlation between height and F wave latencies of all motor nerves, except the left common peroneal nerve and with the SNAP latencies of the right radial and sural sensory nerves.[5] There is a significant slowing of conduction velocities and increase in sensory latencies with increasing age and more height.[6] Similarly, some other studies had shown a significant effect of anthropometric variables on nerve conduction parameters.[7,8,9] However, the effect of age and other anthropometric variables on surface EMG parameters are hardly known.

Thus, we aimed to evaluate the impact of anthropometric factors like age, sex, height, weight, BMI on nerve conduction and surface EMG variables as well. As such, appropriate adjustments may be considered while finding normal values.

II. Material and methods

Electrodiagnostic studies are powerful tools used to objectively examine the physiologic status of a peripheral nerve and muscles. NCS evaluates motor and sensory parameters of the nerve and surface EMG evaluates the electrical activity in the muscles. In motor NCS, bilateral common peroneal and tibial

nerves while in sensory NCS, bilateral sural nerves were assessed. Surface EMG of bilateral gastrocnemius muscles was recorded.

We conducted the study at Neurophysiology Lab II of BPKIHS. Twenty six healthy male barbers of 20-50 years from Dharan municipality were selected by a convenient sampling method. Those barbers with history of diabetes, neuropathy or neuromuscular disorder were excluded. Subjects were explained about the study procedure in detail and informed written consent was taken before the electrophysiological test. Anthropometric, NCS and surface EMG variables were studied.

Both NCS and surface EMG of lower limbs were recorded using Digital Nihon Kohden (NM-420S, H36, Japan). Both tests were performed by placing the participants in lying down position.

Recording of motor NCS: [3]

The stimulator with water soaked tips was used for nerve stimulation. The stimulating electrodes were placed on the skin overlying the nerve at two sites along the course of a nerve. The recording and reference electrodes were placed over the muscle supplied by the nerve being tested using a belly tendon montage i.e. active electrode placed on the center of the muscle belly and the reference electrode placed distally, over the tendon of the muscle. The ground electrode was placed between stimulating and recording electrodes. The current of stimulator was initially set to zero, then gradually increased with successive stimuli. A CMAP appeared that grew larger and larger with the increasing current. When current was increased to the point that CMAP was no longer increasing in size the current was increased by another 20% to ensure supra maximal stimulation. For each nerve, latency, and amplitude of CMAP were recorded. The trace was stored and the stimulating electrode moved proximally to a second stimulation site. Distance between the two sites was measured and fed into the machine for calculation of nerve conduction velocity (NCV).

For the recording of F waves of motor nerve, the stimulator was placed at the distal site of stimulation with cathode facing proximally. Minimum, maximum and mean latencies of F waves were recorded.

Recording of sensory NCS: [3]

Antidromic method of stimulation was employed for sural sensory nerve. Twenty stimuli were averaged. Onset latency, SNAP amplitude and NCV were recorded.

Recording of SEMG: [10]

Surface EMG of bilateral gastrocnemius muscles was done. The skin over the muscle was cleaned with a Skin Pure gel. The electrodes were placed on the skin area and secured by a tape. Active electrode was placed on the center of the muscle belly and a reference electrode was placed distally, over the tendon of the muscle. Ground electrode was also placed on the limb. The electrode diameter was about 12 mm and kept 20 mm apart on the muscle to be tested.

The sensitivity and the speed were kept at 100 microvolt and 10 milliseconds per division respectively. Motor unit action potentials (MUAPs) were assessed for its frequency, amplitude and duration manually according to the machine calibration.

The data were entered into MS Excel and analyzed by SPSS 11.5 version.

III. Results

As data were normally distributed, Pearson's correlation was applied for correlating anthropometric variables with NCS and surface EMG variables. Anthropometric variables such as age, height, weight showed a significant relationship with NCS but not with surface EMG variables.

Table 1: Anthropometric variables

	Age (yrs)	**Height (m)**	**Weight (Kg)**	**BMI (Kg/m^2)**
Mean±SD	38.12±8.21	1.65±0.07	63.73±8.93	23.15±2.41

Table 2: Correlation of anthropometric variables with NCS variables

NCS Variables	**Anthropometric variables**	**Pearson's Correlation**	**P value**
RTPLat (ms)	Height	0.587	**0.003**
RTDLat (ms)	Height	0.487	**0.016**
RTDAmp (mv)	Height	0.109	0.612
RTNCV (m/s)	Height	-0.307	0.144
LTDLat (ms)	Height	0.326	0.12
LTDAmp (mv)	Height	0.042	0.844
LTNCV (m/s)	Height	-0.197	0.356
RCPPLat (ms)	Height	0.562	**0.004**
RCPNCV (ms)	Height	-0.570	**0.004**
RSOL (ms)	Height	0.415	**0.04**
RSAmp (µv)	Height	-0.094	0.663
RSNCV(m/s)	Height	-0.414	**0.04**
LSOL (ms)	Height	0.351	0.093
LSAmp (µv)	Height	0.159	0.457
LSNCV (m/s)	Height	-0.35	0.094
LTFmin (ms)	Height	0.673	**0.001**
RTFmin (ms)	Height	0.526	**0.008**
LCPFmin (ms)	Height	0.555	**0.03**
RCPFmin (ms)	Height	0.49	0.054
RTPLat (ms)	Weight	0.432	**0.03**
RTPAmp (mv)	Weight	-0.199	0.352
RTNCV (m/s)	Weight	-0.19	0.374
LCPPLat (ms)	Weight	0.399	0.053
LCPPAmp (mv)	Weight	-0.043	0.843
LCPNCV (m/s)	Weight	-0.445	**0.02**
RCPPLat (ms)	Weight	0.44	**0.03**
RCPPAmp (mv)	Weight	-0.123	0.567
RCPNCV (m/s)	Weight	-0.404	0.05
LTFmin (ms)	Weight	0.424	**0.03**
RTFmin (ms)	Weight	0.454	**0.02**

LCPFmin (ms)	Weight	0.564	**0.03**
RCPFMin (ms)	Weight	0.466	0.06
RTPLat (ms)	LL	0.570	**0.04**
RTPAmp (mv)	LL	-0.072	0.737
RTNCV (m/s)	LL	-0.344	0.1
LCPPLat (ms)	LL	0.411	**0.04**
LCPNCV (m/s)	LL	0.347	0.096
RCPPLat (ms)	LL	0.678	**0.001**
RCPPAmp (mv)	LL	-0.013	0.951
RCPNCV (m/s)	LL	-0.700	**0.001**
LSOL (ms)	LL	0.382	0.065
LSAmp (µv)	LL	0.109	0.613
LSNCV (m/s)	LL	-0.480	**0.01**
RSOL (ms)	LL	0.511	**0.001**
RSAmp (µv)	LL	-0.654	0.768
RSNCV (m/s)	LL	-0.566	**0.004**
LTFmin (ms)	LL	0.618	**0.001**
LCPFmin (ms)	LL	0.656	**0.01**
RTFmin (ms)	LL	0.500	**0.01**
RCPFmin (ms)	LL	0.694	**0.003**

†ms- millisecsonds, m/s- meter/ second, RTPLat- right tibial proximal latency, RTDAmp- right tibial distal amplitude, RTNCV- R right tibial nerve conduction velocity, LTDLat- left tibial distal latency, LTDAmp- left tibial distal amplitude, LTNCV- left tibial nerve conduction velocity, RCPPLat- right common peroneal proximal latency, RCPNCV- right common peroneal nerve conduction velocity, RSOL- right sural onset latency, RSAmp- right sural amplitude, RSNCV- right sural nerve conduction velocity, LSOL- left sural onset latency, LSAmp- left sural amplitude, LSNCV- left sural nerve conduction velocity, LTFMin- left tibial F wave minimum latency, RTFMin- right tibial F wave minimum latency, LCPFMin- left common peroneal F wave minimum latency, RCPFMin- right common peroneal F wave minimum latency

Table 3: Correlation of with anthropometric variables with surface EMG variables

Surface EMG variables	Anthropometric variables	Pearson's correlation	P value
LGAOA	Height	-0.055	0.799
LGFOA	Height	0.184	0.39
LGAOR	Height	-0.07	0.745
LGFOR	Height	0.145	0.499
RGAOA	Height	-0.14	0.514
RGFOA	Height	0.026	0.903
RGAOR	Height	-0.043	0.842
RGFOR	Height	-0.043	0.842
LGAOA	Weight	-0.216	0.311
LGFOA	Weight	0.255	0.228
LGAOR	Weight	-0.207	0.331
LGFOR	Weight	0.229	0.281
RGAOA	Weight	-0.267	0.208
RGFOA	Weight	0.274	0.195
RGAOR	Weight	-0.24	0.259
RGFOR	Weight	0.373	0.073

IV. Discussion

Our study showed a positive correlation of the right tibial and right common peroneal proximal latencies with height and a significant negative correlation with right common peroneal conduction velocity. Right sural onset latency is positively correlated with height while conduction velocity was negatively correlated. The lower limb length showed a positive correlation with latencies of most of the nerves while a negative correlation was noted with right common peroneal conduction velocity and bilateral sural sensory conduction velocities. Length of a nerve depends upon the height of an individual thus, taller persons showed longer latencies and velocity depends upon latency, hence longer the latency, slower is the conduction velocity.

Similarly, a significant positive correlation was found between height and F wave latencies of all motor nerves tested except the right common peroneal nerve. Most of the studies showed a direct relationship of latencies with a height of an individual. Peioglou HS et al and Lin KP et al found a strong positive correlation between the F wave latencies and height.[11,12] Likewise, in a study done by Puksa et al the minimal latency of the F wave was found to increase with height in studies on the upper and lower limbs. [13]

Rivner MH et al found that height was positively correlated with the latencies of the sural, peroneal, tibial and median nerves.[14] It showed a negative correlation with the conduction velocities of the bilateral ulnar motor and the left median sensory nerves. Takono et al supported the possibility of an inverse correlation of the conduction velocity of the ulnar nerve with height.[15] Saaed et al found an increase of the latency of sural sensory nerve with increasing height.[16]

A negative correlation between distal fiber diameter and height may best explain both decreased conduction velocity and amplitude. Campbell proposed that a decrease in diameter occurs abruptly at a given distance from the cell body. [17] Our results duplicated those of others who have found a strong negative correlation between height and either sural or peroneal conduction velocity.

In brief, this study explores the effect of anthropometric variables on nerve conduction study parameters of the motor and sensory nerves. Our study findings are along with many other previous reports. Clinical recognition of this height effect on NCS parameters is important, otherwise an individual with mildly slowed peripheral nerve conduction velocity solely related to tall height may be considered as abnormal.

Likewise, F wave minimum latencies were found to be positively correlated with weight for most of the tested nerves. There were positive correlation of weight with proximal latencies of right tibial and common peroneal nerves, meanwhile weight showed a negative correlation with left common peroneal conduction velocity. Buschbacher et al showed that individuals with higher body weights have longer latencies of median,

peroneal, tibial F wave, and H-reflex studies compared to those with lower body weights. [18] Increase in weight means an increase in subcutaneous fat, thus, increased amount of fat can cause compression of peripheral nerves resulting in slower conduction, resulting in an increase in latency and a slower conduction velocity.

V. Conclusion

Height and weight showed a significant correlation with the nerve conduction parameters of most of the peripheral nerves. Thus, adjustments for height and weight must be considered while giving normal standard values.

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EXPLORING LIBRARY ANXIETY AMONG STUDENTS OF UiTM

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Abstract- The objective of the current study was to examine library anxiety level among Universiti Technologi Mara (UiTM) undergraduate and Post-graduate students. Furthermore, the study also aimed to correlate students' library anxiety with constructs such as age, gender, the highest qualification, the frequency of library visits, CGPA, the field of study, and mode of study, which are believed to influence students' levels of library anxiety. The study used a quantitative, descriptive survey method using Library Anxiety Scale questionnaire to collect data from the respondents. The data through the questionnaire was collected from a sample of 146 respondents of which 56 were male and 90 were females. Meanwhile, 65 of them were undergraduate and the other 81 were postgraduate students studying in 17 different faculties of UiTM. The participants were randomly selected and participated voluntarily in the study. The data gathered through the questionnaire was analyzed using Statistical SPSS v.23 where both descriptive statistics and inferential statistics such as t-tests, One-Way ANOVA, and correlation were used to test hypotheses. The results of the study reveal a moderately low level of library anxiety among UiTM students. In addition, the results of the study indicate that students' demographic profiles did not have any significant effect on their levels of library anxiety.

Keywords: Library, Anxiety, Students, UiTM

I. Introduction

Library plays a very vital role in the academic career of all university students no matter if they are undergraduate or post-graduate since at some point those students will come across the need that they have to use the library to access certain information. However, there are students who might not be enthusiastic to use the library facilities due to their inadequate knowledge and skill to use the available resources at their university libraries, such feelings of not being competent enough to use the library resources certainly damage the self-confidence of the students and create feelings of anxiety for those students when they go to the library.
The term library anxiety according to Mellon (1988) is defined as a feeling where students don't have the adequate knowledge of how and where to locate information they want, for instance, where or how to initiate their search regarding the issues they are exploring. Furthermore, Mellon also describes it as the feeling of incompetence, hesitancy in calling for support, and also lacking the necessary knowledge about the available facilities in the library, taking into account the use of computers. Likewise, Jiao and Onwuegbuzie (1997) discuss library anxiety as an uncomfortable unpleasant feeling accompanied with tension, confusion, nervousness, and vulnerability, happening to a student in a library. Abusin & Zainab (2010) describe library anxiety as a psychological barrier that students face when performing a library task.

Library anxiety or the fear of students inside a library, according to Mellon (1988) has a direct relationship with how much students will be able to learn at school. Likewise, Jiao & Onwuegbuzie (1997) and Asgharpour & Sajed (2013) refer to library anxiety as a psychological barrier to the success of students in their academic career which could have serious negative effects on students' educational performance and quantity and quality of their academic productions.

The phenomenon of library anxiety among university students is not a new issue. Available literature reveals that, in different countries, various studies have been conducted to investigate this topic, for example (Mallon, 1986; and Jiao & Onwuegbuzie, 1997, in the USA; Anwar, Al-Kandari & Al-Qallaf, 2004, in Kuwait; Abusin & Zainab, 2010 in Malaysia). The results of those studies reveal that the feeling of anxiety alongside unfamiliarity with the library facilities, and hesitancy in asking for the assistance of the librarians results into university students to avoid going to the library. This is evident in the studies conducted by Mellon (1986), Jiao & Onwuegbuzie (1997), and Bostick's (1992) revealing that the sense of avoidance among students with library anxiety was quite high in comparison to students with low library anxiety.

In this sense, it is essential to identify the barriers or factors that contribute to library anxiety of students, and ultimately, seek out appropriate measures to tailor with the problem. Therefore, the present study is an attempt to investigate library anxiety levels among

students of Universiti Teknologi Mara (UiTM) and identify the key factors contributing to this phenomenon. Furthermore, the study also aims to compare students' library anxiety levels with constructs such as, gender, age, education level, major, CGPA, and the frequency of going to the library, that are believed to have an effect on library anxiety level. To be more precise, the objective and research question that guides this study are as follow:

Research Objectives

1. To investigate how often students: a) visit the library; b) borrow books from the library, and c) how long do they stay in the library;
2. To explore the library anxiety levels of UiTM students in relation to the following barriers: a) staff barriers, b) affective barriers, c) technological barriers, d) library knowledge barriers, e) library comfort barriers, and f) resource barriers;
3. To investigate if there is any significant difference in overall library anxiety levels and in regard to the six barriers among the demographic profile of the students (gender, age, level of education, mode of study, fields of study, and the frequency of the library visits;

Research Questions

1. How often students: a) visit the library; b) borrow books from the library, and c) how long do they stay in the library?
2. Is there any significant difference in the frequency of library visits between male and female students?
3. What are the library anxiety levels of UiTM students in relation to the following barriers: a) staff barriers, b) affective barriers, c) technological barriers, d) library knowledge barriers, e) library comfort barriers, and f) resource barriers?
4. Is there any significant difference in library anxiety levels in regard to the six library barriers between male and female students?
5. Is there any significant difference in students' library anxiety levels in regard to the six library barriers between among students' age?
6. Is there any significant difference in students' library anxiety levels in regard to the six library barriers between undergraduate and postgraduate students?
7. Is there any significant difference in students' library anxiety levels in regard to the six library barriers between full-time or part-time students?
8. Is there any significant difference in students' library anxiety levels in regard to the six library barriers between among students' CGPA range?
9. Is there any significant difference in students' library anxiety levels in regard to the six library barriers between arts and science students?
10. Is there any significant difference in students' library anxiety levels in regard to the six library barriers among students' frequency of library use?
11. Is there any significant relationship between the six library barriers?

II. Review of the Literature

In order to do a research project or an assignment for a particular course as part of completing students' academic program, all students will eventually find it necessary to refer to their school's library and do a widespread search and use information resources. However, a number of students usually feel fear or library anxiety while they go to the library and such feeling is connected with the search for information resources in the library. Usually, many college students label library anxiety as the undesirable feelings towards utilizing the library. Library anxiety is a very challenging issue for the students in the library. Students with anxiety condition result in a passive attitude in their academic careers i.e. lacking interest in visiting the library, and ultimately do below par on their class projects. This library anxiety, research suggests is due to a number of factors or certain barrier students face while being in the library.

2.1. Library Barrier Contributing to Library Anxiety

Many studies have been carried out to investigate these barriers (Abusin & Zainab, 2010; Alicia, 2015; Yu, 2009; Jiao & Onwuegbuzie, 1995; Carlile, 2007; Adkins & Lu, 2012; Erfanmanesh, 2011; Sinnasamy, Harun, & Karim, 2016). However, it was Bostick (1992) who developed an instrument comprising statement denoting different library barriers to measure library anxiety. Bostick categorized those factors in terms of staff barriers, affective barriers, mechanical barriers, library comfort barriers, library knowledge barriers, and resources barriers.

2.1.1. Staff Barriers

The first set of barriers resulting in library anxiety that research indicates are related to library staff. In this set of barriers, a student sees the library as a terrifying place where the library staff is ill-tempered, annoying, and the students feel forced or uncomfortable while entering into the library (Abusin & Zainab, 2010). In their study, Abusin & Zainab found that pupils viewed library as a depressing space, and were not able to stay there for a longer period of time since they felt discomfort. In addition, Adkins & Lu

(2012) found out that the issue of staff became an utmost source of the anxiety for the students as the library staff was not attentive to students' needs and the students didn't receive assistance at the time needed.

2.1.2. Effective Barriers

The second barrier the research found in relation to library anxiety is categorized as effective barriers which denote students of being shy. Several students verified that they felt ashamed and conscious while asking for help regarding the library; therefore, the students preferred not to ask the staff because they were ashamed of their inadequate knowledge of the library (Sinnasamy, Harun, & Karim, 2016). This is confirmed in Abusin and Zainab's (2010) study who argue that the students felt shy while approaching the staff due to their insufficient knowledge regarding the library. Mellon (1986) put forward that the students do not approach the library staff due to the fact that their insufficient library knowledge or research skills would be exposed.

2.1.3. Technical Barrier

The technical or mechanical barrier is the third component which causes students' library anxiety (Bostick, 1992). In this set of barriers, the students perceived that the equipment or the technology available in the library is not approachable, or in other words, they are incapable to operate the devices in the library such as computer, printer, photocopiers…etc. (Carlile, 2007). Moreover, lack of computer knowledge, lack of familiarity with technology, less computer usage, and sometimes hate to use computers are all the factors found to rise library anxiety in the pupils (Mellon, 1986). In regards to technical barriers, in their study, Abusin & Zainab (2010) discovered a few features such as students' anxious feelings while using computers and they lack computer skills were the main contributors to library anxiety. On the other hand, Adkins and Lu (2012) doesn't consider technological barrier a serious cause of library anxiety for graduate pupils, especially international pupils, who have acquainted themselves previously with equipment like a printer, copier and so on. However, they argue that these technological barriers could still be a problematic issue for new international students.

2.1.4. Lack of Library Knowledge Barrier

Lack of information or knowledge of library is the fourth factor found in researches which causes anxiety in students while using the library. The students felt uncomfortable because they lacked knowledge about the library. Viewing students' insufficient knowledge and information about the library where items are located, made them feel unconfident and insecure (Alicia, 2015; Bostick, 1992). Likewise, Erfanmanesh (2011) also in his study stated that the reasons that cause library anxiety in students are, for example, access to services, library literacy skills and access to resources. Furthermore, other causes of students' anxieties in the library setting are when one is not aware of doing a library search, no significant purpose what to do in the library, or where to look for items in the library (Carlile, 2007).

2.1.5. Comfort Barrier

Comfort is another element that causes library anxiety in students. The students believe that the sentiment of being comfortable in the library is relevant to what extent the library is a secure environment (Carlile, 2007). Similarly, comfort with the library measures that how the library environment and its atmosphere is welcoming (Sinnasamy, Harun, & Karim, 2016). For example, the Albert Library doesn't offer a comfortable environment for the residents, thus, they are not happy with using it (Community-Led Libraries Toolkit, 2008, p. 13).

2.1.6. Resource Barrier

The last barrier as a contributor to the library anxiety is the resource barrier. The library has an effective role in order to support the needs of the students by supplying various resources and the students are required to use the library to approach the information for their research (Abusin & Zainab, 2010). Abusin & Zainab's study also reveals that the students wanted to avoid the library because of the insufficient resources, references, and the number of books. The students main concern was the unsatisfactory number of books in the library (Alicia, 2015). In addition, Andrews (1991) discovered in his study that the available amount of books were not enough particularly for the students who are taking a similar course. In the same manner, the SPELL (2016) research exposed that library charges and fees for unpaid, spoiled, and lost materials are barriers that avoid families and guardians of young children from utilizing public libraries.

Considering the barriers contributing to library anxiety, as discussed in the literature review, most of the students viewed staff barrier as a major constraint contributing to library anxiety in students. The students didn't feel at ease when it comes to the staff of the library. However, this might not be true since as long as the students follow the procedure of the library, the staff of the library will remain assistive. Secondly, several students verified that they feel conscious while asking for assistance in the library and it is due to the fact of their insufficient knowledge of the search skills. This is quite a common issue with many students and it is natural that they might feel anxious when asking for assistance. Similarly, lack of knowledge was also found by students as a factor resulting library anxiety. The students find it difficult to approach the relevant materials. This obstacle is sometimes caused due to the fact that there are some apathetic students who don't bother to put the books in its right shelf where it was taken from and this ultimately causes anxiety to other students. Likewise, sometimes the students claim that the atmosphere of the library is bothering. The students don't

visit the library because it is crowded and noisy. It is true as it is quite difficult for the students to focus on learning when there are noises.

2.2. Previous Studies Investigating Library Anxiety

In various countries, numerous studies have been conducted to measure library anxiety among university students. A large number of those studies conclude that the university students in their studies suffered certain levels of library anxiety. The results of some of these studies are below:

Ansari (2009) conducted a study exploring library anxiety among undergraduates in Malyasian IIUM University, from freshman to senior students. The outcomes of his research revealed that the phenomenon of library anxiety was present among undergraduates using International Islamic University Malaysia library. Furthermore, the study found those male students were found to have suffered more from library anxiety when compared to females in their thinking with regard to the awareness of library resources.

Yu (2009) carried out a study in Jinwen University in China on Library anxiety. He found that there was low library anxiety among the students of Science and Technology that needs a serious attention. The students were familiar with the library environment; however, they felt they cannot use the library quite professionally. In the meantime, mostly female freshmen students from different disciplines identified the effective and mechanical barriers as significant causes of library anxiety. That is an important reminder for the library staff to promote educating the students for a better usage of the library.

Jiao & Onwuegbuzie (1995) conducted a research in Indonesian context investigating library anxiety among university pupils. They added that vast amount of information is accessible from various sources in today's academic libraries, but the students the encountered difficulties using the library. Moreover, Jiao & Onwuegbuzie (1995) assert that the library anxiety is a rough and uncomfortable feeling which is experienced in the context of the library and has affective consequences. These authors characterized the library anxiety as tension, hesitation, helplessness, and negative self-defeating beliefs.

Another survey was carried out by Alicia (2015) in Humanities and Education faculties at the University of West Indies among the undergraduate students. The results identified the key contributing factors to library anxiety were affective barriers such as uncertainty, confusion, helplessness; technological barrier, i.e. absence of computers, lack of proper signs, an organization of the floor, and unsatisfactory books. The study recognized the lack of library knowledge barriers the inability of the students to locate the resources and the usage of online catalogs as the chief features among resulting in library anxiety.

III. Methodology

This study investigates library anxiety among undergraduate and postgraduate students in UiTM. The present study uses a quantitative, descriptive survey method utilizing a questionnaire. According to Fraenkel, Wallen & Hyun (2016), in a survey method, the researcher collects information from a large group of participants through their responses to the questionnaire items. They add that quantitative study essentially tries to explain the problem using numbers and attempts to generalize the results of the study to a larger population.

3.1. Sampling and Data Collection Procedure

The total numbers of participants in this study are 146, among which 56 are male and 90 are females. As for their educational qualification, 65 of them are undergraduate and 81 are postgraduate students currently studying in 17 different faculties of UiTM. The participants were randomly selected and participated voluntarily in this study.

3.2. Research Instruments

The main instrument used in this survey research is a questionnaire. The questionnaire has four parts: part A elicits participants' demographic information; part B elicits the frequency of reading, other than academic materials; part C asks about the frequency of using the library; and finally, part D consists of questions inquiring library barriers contributing to library anxiety.

Part D is an adoption of Bostick's (1992) Library Anxiety Survey questionnaire consisting of 46 simple statements. And students are asked to respond to those statements using a ten-point Likert scale where 1 signifies 'Strongly Disagree' and 10 signifies 'Strongly Agree'. In the meantime, a high score on any subscale represents high anxiety in this area. Bostick's Library Anxiety Survey consists statement in the following areas: 1) *Barriers with staff*, denoting to the perceptions of students of librarians and library staff as, being busy or unapproachable to assist the students in using the library; 2) *Affective barriers* denoting to the perceptions of students toward their inadequacy of library knowledge comparing to other students; 3) *Technological barriers*, referring to the feelings of student of being not able to operate technological equipment of the library, for example, the internet, computer, or printer; 4) *Library knowledge barriers*, denoting to the extent of unacquainted students feel they are with the library; 5) *Library Comfort barriers*, referring the perceptions of students toward the safe environment of the library; 6) *Resources barriers*, referring to the frustration of a student when she/he has located an online resource but can't find that resource in the library itself.

This instrument has been used in many researches, and those studies signify that all the items in the instrument are both valid and reliable (Bostick, 1992; Onwuegbuzie, Jiao, & Bostick, 2004).

Once all survey questionnaires were collected, the data was coded and using SPSS v.23 the results were analyzed using descriptive and inferential statistics. The data was analyzed in terms of mean score and standard deviation.

IV. Data Analysis

4.1. Characteristics of the Respondents

Table 1 shows the demographic information of the respondents in categories of gender, age, level of education, faculty, CGPA, and study mode.

Table 1: Distribution of respondents by demographic information

	Characteristics	No. of Respondents	%
Gender	Male	56	38.4
	Female	90	61.6
Age	18-22	37	25.3
	23-27	82	56.2
	28-32	11	7.5
	33 and above	11	7.5
	Missing	5	3.4
Level of Education	Postgraduate	80	54.8
	Undergraduate	65	44.5
	Missing	1	.7
Faculty	ACC	3	2.1
	AD	1	.7
	Aps	1	.7
	APS	4	2.7
	Asc	9	6.2
	ASC	1	.7
	BM	5	3.4
	Cms	3	2.1
	CMS	3	2.1
	Edu	60	41.1
	EDU	1	.7
	Eng	23	15.8
	HealthSN	1	.7
	HS	1	.7
	Music	19	13
	PHAR	1	.7
	SSR	10	6.8
CGPA	High	106	72.6
	Low	23	15.8
	Missing	17	11.6
Mode of Study	Part Time	6	4.1
	Full Time	140	95.9

4.2. Research Question 1

How often the students: a) visit the library; b) borrow books from the library, and c) how long do they stay in the library?

4.2.1. Research Question 1a: How often students visit the library?

Table 2 shows how often students visit the library.

Table 2. frequency of going to library

	Frequency	Percent
Daily	3	2.1
Five times a week	4	2.7
Four days a week	7	4.8
Three days a week	8	5.5
Two days a week	11	7.5
Once in a week	21	14.4
Hardly visit the library	68	46.6
Do not use library	24	16.4
Overall frequency of students going to library on a scale of 1-10	**146**	**100.0**

The result in Table 2 shows that 3 students (2.1%), 4 students (2.7%), 7 students (4.8%), 8 students (5.5%), 11 students (7.5%), 21 students (14.4%), 68 students (46.6%) and 24 students (16.4%) visit library daily, five times in week, 4 days, 3 days, 2 days, 1 time in a week and hardly visit library respectively. This shows that the majority of the students are not that much interested in the library and hardly visit the library.

4.2.2. Research Question 1b: How often students borrow books from the library

Table 3 shows how often students borrow books from the library

Table 3. Frequency of borrowing books

	Frequency	Percent
Never	31	21.2
Everyday	1	0.7
Every 2 - 3 days	2	1.4
Once a week	4	2.7
Once a month	12	8.2
depending on the need	95	65.1
Missing	1	0.7
Total	146	100.0

Table 3 shows that 31 students (21.2%), 1 student (.7%), 2 students (1.4%), 4 students (2.7%), 12 students (8.2%), and 95 students (65.1%) borrow books never, every day, every 2-3 days, once a week, once a month and depending on the needs respectively, whereas one student data was missing. This designates that the respondents are not that much attracted to borrowing books and, thus, very rarely borrow books from the library.

4.2.3. Research Question 1c: How long do students stay in the library?

Table 4 shows how long do the students usually stay in the library.

Table 4. Duration of stay in the library

	Frequency	Percent
Less than 1 hour	10	6.8
1-2 hours	56	38.4
3-4 hours	65	44.5
More than 5 hours	15	10.3
Total	146	100.0

Table 4 shows that 10 students (6.8%), 56 students (38.4%), 65 students (44.5%) and15 students (10.3%) stay in the library less than one hour, 1-2 hours, 3-4 hours and more than 5 hours respectively. This shows that the majority of students stay around three hours in the library when they visit the library.

4.3. Research Question 2

Research Question 2 aims at examining if there is a significant relationship in library visits of female and male pupils. To answer this research question, Chi Square Test of Independence is used to compare the frequency of visiting library between male and female students.

Table 5: Going to the Library * Gender Cross tabulation

	Gender	Total

			Male	Female	
Visit To Library	Rarely	Count	10	12	22
		Expected Count	8.4	13.6	22.0
	Often	Count	46	78	124
		Expected Count	47.6	76.4	124.0
Total		Count	56	90	146
		Expected Count	56.0	90.0	146.0

The descriptive results in Table 5 above indicate that 10 male and 12 female students expressed that they rarely visit their library. Then 46 males and 78 females indicated that they visit their university library often.

Now to examine if there is a significant relationship among the frequency of library visits between male and female students, the Chi Square Test was conducted.

Table 6: Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.552[a]	1	.457
Likelihood Ratio	.543	1	.461
Linear-by-Linear Association	.548	1	.459
N of Valid Cases	146		

0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.44.[a]

Computed only for a 2x2 table[b]

The results of the Chi-Square test in table 6 above reveal that there is no significant relationship in the frequency of library visits between male and females students (X^2 (1) = .552, p = .457) at the .05 level. Thus we infer that there is no significant relationship between gender and frequency of visit to the library. In other words, the two variables are independent of one another.

4.4. Research Question 3

The third research question tends to examine the perceived library anxiety level of UiTM students' in relation to the following barriers: a) library staff barriers, b) affective barriers, c) technological barriers, d) library knowledge barriers, e) library comfort barriers, and f) resource barriers.

4.4.1. a) Library staff barriers

Table 8 shows the perceived level of UiTM students' library anxiety in relation to the library's staff barriers

Table 8. Perceived level of UiTM students' library anxiety in relation to the library staff barriers

	Mean	Std. Deviation
The librarians are not approachable.	4.11	2.34
The librarians are helpful	4.03	2.19
Librarians don't have time to help me, because they are too busy	3.96	2.22
I don't get help in the library in time	3.96	2.36
I don't have opportunities to talk with librarians on-line, to send questions	4.17	2.51
Overall Staff Barrier on a scale of 1-10	4.05	1.70

Table 8 indicates the perceived level of UiTM students' library anxiety in relation to the library staff barriers. The highest mean score is obtained for the item 'I don't have opportunities to talk with librarians on-line, to send questions" with a mean score of 4.17 (SD=2.51). This is followed by "The librarians are not approachable." and "The librarians are helpful" with mean scores of 4.11 (SD=2.34) and 4.03 (SD=2.19) respectively. On the other hand, the lowest mean scores are for the items "Librarians don't have time to help me because they are too busy" (M= 3.96, SD=2.22) and "I don't get help in the library in time" (M=3.96, SD=2.36). The

overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the library staff barriers on a scale of 1-10 is 4.05 (SD=1.70). This indicates library staff in the study displays an intermediate level of barrier in the students' library anxiety.

4.4.2. b) Affective barriers

Table 9 shows the perceived level of UiTM students' library anxiety in relation to the affective barriers.

Table 9. The perceived level of UiTM students' library anxiety in relation to the affective barriers

	Mean	Std. Deviation
I am embarrassed that I don't know how to use the library.	3.50	2.60
I think that other students know the library better than me and this is embarrassing for me.	3.79	2.64
I am embarrassed while asking the librarians questions	3.25	2.34
When I'm in the library and I don't know what to do – I am anxious.	3.30	2.53
I am ashamed, that I can't use the library.	3.11	2.39
When I entered the library for the first time I felt uncomfortable	3.14	2.26
I always feel uncomfortable when I am going to library or I think about going there.	3.06	2.34
I am ashamed of my lack of knowledge about how to use computer catalogs, the Internet, databases and so on.	3.35	2.32
I like the library (reverse-score).	6.50	2.76
Overall affective barrier on a scale of 1-10	3.65	1.78

Table 9 indicates the perceived level of UiTM students' library anxiety in relation to the affective barriers. The highest mean score is obtained for the item 'I like the library" with a mean score of 6.50 (SD=2.76). This is followed by "I think that other students know the library better than me and this is embarrassing for me" and "I am embarrassed that I don't know how to use the library" with mean scores of 3.79 (SD=2.64) and 3.50 (SD=2.60) respectively. On the other hand, the lowest mean scores are for the items "I always feel uncomfortable when I am going to the library or I think about going there" (M= 3.06, SD=2.34) and "I am ashamed, that I can't use the library" (M=3.10, SD=2.39). The overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the affective barriers is 3.65 (SD=1.78). This indicates in the study low level of affective barrier in the students' library anxiety.

4.4.3. c) Technological Barriers

Table 10 shows the perceived level of UiTM students' library anxiety in relation to the technological barriers.

Table 10. The perceived level of UiTM students' library anxiety in relation to the technological barriers

	Mean	Std. Deviation
I am not effective in using electronic databases (full-text and abstract) which are accessible on the library web page or on the library net	4.07	2.60
I am not effective in using computer catalogs.	4.29	2.54
I don't know how to order a book in the library via the Internet.	4.86	2.82
I don't know how to check the balance of my library account.	5.01	3.08
I would rather use the library in person, not on-line, because of my resistance to new technology.	4.55	3.01
I avoid using computers.	3.05	2.66
The library's home web page is friendly (reverse-score).	6.23	2.54
I can't use self-service copy machines.	4.53	2.86
Overall technological barrier on a scale of 1-10	4.57	1.89

Table10 indicates the perceived level of UiTM students' library anxiety in relation to the technological barriers. The highest mean score is obtaineded for the item 'The library's home web page is friendly" with a mean score of 6.23 (SD=2.54). This is followed by "I don't know how to check the balance of my library account" and "I don't know how to order a book in the library via the Internet" with mean scores of 5.01 (SD=3.08) and 4.86 (SD=2.82) respectively. On the other hand, the lowest mean scores are for the items "I avoid using computers" (M= 3.06, SD=2.34) and "I am ashamed, that I can't use the library" (M=3.05, SD=2.66). The overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the technological barriers is 4.57 (SD=1.89). This indicates technological barriers in the study display an intermediate level of barrier in the students' library anxiety.

4.4.4. d) Library knowledge barriers

Table 11 shows the perceived level of UiTM students' library anxiety in relation to the library knowledge barrier.

Table 11. The perceived level of UiTM students' library anxiety in relation to the library knowledge barrier

	Mean	Std. Deviation
A lot of things connected with libraries are complicated for me.	4.10	2.37
I don't know how to begin a search in the library	3.80	2.42
I don't know what to do when the book I'm looking for isn't on the shelf.	3.93	2.43
I don't have sufficient knowledge about the library, its departments, reading rooms etc.	4.33	2.53
I can't use the library either in person or on-line.	3.54	2.44
The library training was insufficient.	4.33	2.57
I can't use the inter-library loan.	5.20	2.90
I like learning new things about the library (reverse-score).	4.51	2.58
I am never able to find anything in the library.	3.98	2.52
There is a lack of adequate library instructions.	4.49	2.47
Overall library knowledge barrier on a scale of 1-10	4.21	1.78

Table 11 indicates the perceived level of UiTM students' library anxiety in relation to the library knowledge barriers. The highest mean score is obtained for the item 'I can't use the inter-library loan" with a mean score of 5.20 (SD=.90). This is followed by "I like learning new things about the library" and "There is a lack of adequate library instructions" with mean scores of 4.50 (SD=2.58) and 4.49 (SD=2.47) respectively. On the other hand, the lowest mean scores are for the items "I can't use the library either in person or on-line" (M= 3.54, SD=2.44) and "I don't know how to begin a search in the library" (M=3.80, SD=2.42). The overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the library knowledge barriers is 4.21 (SD=1.78). This indicates library knowledge barriers in the study an intermediate level of barrier in the students' library anxiety.

4.4.5. e) Library Comfort Barriers

Table 12 shows the perceived level of UiTM students' library anxiety in relation to the library comfort barrier.

Table 12. The perceived level of UiTM students' library anxiety in relation to the library comfort barriers

	Mean	Std. Deviation
The library is not a nice, comfortable place.	3.12	2.49
There are not good facilities conditions for reading, studying in the library	3.42	2.54
There are not good facilities conditions for group working in the library.	3.68	2.56
Library rules are not too restrictive (reverse-score).	5.40	2.78
The library is not well organized, complicated (rooms and collections layout).	3.53	2.30
I don't like to be in the library, I would rather use the library on-line, at home	4.23	2.72
I don't like the library at all	2.97	2.31
Library equipment is unreliable (computers, copy machines, printers).	3.63	2.36
Overall library comfort Barrier on a scale of 1-10	3.75	1.79

Table 12 indicates the perceived level of UiTM students' library anxiety in relation to the library comfort barriers. The highest mean score is obtained for the item 'Library rules are not too restrictive" with a mean score of 5.40 (SD=2.78). This is followed by "I don't like to be in the library, I would rather use the library on-line, at home" and "There are not good facilities conditions for group working in the library" with mean scores of 4.22 (SD=2.72) and 3.67 (SD=2.56) respectively. On the other hand, the lowest mean scores are for the items "I don't like the library at all" (M= 2.97, SD=2.31) and "The library is not a nice, comfortable place" (M= 3.11, SD=2.49). The overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the library comfort barriers is 3.74 (SD=1.79). This indicates library comfort barriers in the study are a low level of barrier in the students' library anxiety.

4.4.6. f) Resource Barriers

Table 13 shows the perceived level of UiTM students' library anxiety in relation to the resources barrier.

Table 13. The perceived level of UiTM students' library anxiety in relation to the resources barrier

	Mean	Std. Deviation
The library doesn't subscribe to journals, which I need.	4.05	2.47
The library doesn't own/purchase books, which I need.	4.50	2.44
The library doesn't purchase access to world-wide text databases.	4.38	2.50

The library has too few copies of the most popular titles.	4.74	2.35
A lot of books are overdue	4.73	2.41
There are always materials which I need in the library	5.32	2.34
Overall resources barriers on a scale of 1-10	4.64	1.63

Table 13 indicates the perceived level of UiTM students' library anxiety in relation to the resources barriers. The highest mean score is obtained for the item 'There are always materials which I need in the library" with a mean score of 5.32 (SD=2.34). This is followed by "The library has too few copies of the most popular titles" and "A lot of books are overdue" with mean scores of 4.73 (SD=2.35) and 4.72 (SD=2.41) respectively. On the other hand, the lowest mean scores are for the items "The library doesn't subscribe to journals, which I need" (M= 4.05, SD=2.47) and "The library doesn't purchase access to worldwide text databases" (M= 4.38, SD=2.50). The overall mean score obtained for perceived level of UiTM students' library anxiety in relation to the resources barriers is 4.64 (SD=1.63). This indicates in the study intermediate level of library resources barriers in the students' library anxiety.

4.5. Research Question 4

In order to answer research question 4: is there any significant difference in library anxiety levels, in terms of (staff barriers, affective barriers, technological barriers, library knowledge barriers, library comfort barriers, and resource barriers) between male and female students, an Independent Samples t-test was conducted.

Table 14 indicates the descriptive statistics and independent samples t-test results for the difference between library anxiety levels, in terms of library barriers, between male and female students.
The descriptive statistics indicate that for staff barrier the mean score obtained by male students is 4.17 (SD=1.81) and for female 3.97 (SD = 1.62). For affective barriers, the mean score obtained by male students is 3.83 (SD=1.98) whereas for females it is 3.53 (SD = 1.65). For technological barriers, the mean score obtained by male students is 4.77 (SD=2.10) whereas for females it is 4.45 (SD = 1.75). For library knowledge barrier the mean score obtained by male students is 4.38 (SD=1.98) but for females, it is 4.11 (SD = 1.66). And for library comfort barrier the mean score obtained by male students is 3.90 (SD=1.85) where for females it is 3.64 (SD = 1.74). Finally, for resource barriers, the mean score obtained by male students is 4.82 (SD=1.48) while for females it is 4.53 (SD = 1.71). This indicates that there is a difference in the mean scores obtained by male and female students. However, in order to determine if this difference is significant, an independent sample t-test was conducted.

Table 14: Independent Sample t-test: Library anxiety and gender

	Gender	Mean	Std. Deviation	t	Df	sig
Staff Barrier	Male	4.17	1.81	.680	144	.497
	Female	3.97	1.62			
Affective Barrier	Male	3.83	1.98	.971	142	.333
	Female	3.53	1.65			
Technological Barrier	Male	4.77	2.10	.991	144	.324
	Female	4.45	1.75			
Library Knowledge Barrier	Male	4.38	1.98	.898	143	.371
	Female	4.11	1.64			
Library Comfort Barrier	Male	3.90	1.85	.839	144	.403
	Female	3.64	1.74			
Resources Barriers	Male	4.82	1.48	1.003	143	.318
	Female	4.53	1.71			

The results of the independent samples t-test indicate that there is no significant difference in the library anxiety level of male and female students in terms: staff barriers (t (144) = .680, p= .497); affective barriers (t (142) = .971, p= .333); technological barriers (t (144) = .991, p= .324); library knowledge barriers (t (144) = .898, p= .371); library comfort barriers (t (144) = .839, p= .403); and resource barriers (t (143) = .1.003, p= .318) at the $p<0.05$ level. Therefore, we fail to reject the null hypothesis.

4.6. Research Question 5

Research question 5 tends to examine if there any significant difference in library anxiety levels among students' age. To examine this question a One-Way ANOVA was conducted.

Table 15 indicates the One-Way ANOVA results examining the difference between library anxiety levels among the age groups.

Table 15 One-Way ANOVA: Library anxiety level among age

	Sum of Squares	df	Mean Square	F	Sig.

Staff Barrier	Between Groups	1.297	3	.432	.146	.932
	Within Groups	405.742	137	2.962		
	Total	407.039	140			
Affective Barrier	Between Groups	3.480	3	1.160	.355	.785
	Within Groups	441.026	135	3.267		
	Total	444.506	138			
Technological Barrier	Between Groups	4.682	3	1.561	.425	.735
	Within Groups	502.849	137	3.670		
	Total	507.531	140			
Library Knowledge Barrier	Between Groups	.431	3	.144	.044	.988
	Within Groups	445.207	136	3.274		
	Total	445.638	139			
Library Comfort Barrier	Between Groups	6.360	3	2.120	.642	.590
	Within Groups	452.702	137	3.304		
	Total	459.062	140			
Resources Barriers	Between Groups	8.502	3	2.834	1.072	.363
	Within Groups	359.522	136	2.644		
	Total	368.025	139			

The One-Way ANOVA analysis indicate that there is no significant difference among the age of students and their levels of library anxiety: staff barriers (f (3, 137) = .146 & p= .932); affective barriers (f (3, 135) = .355 & p= .785); technological barriers (f (3, 137) = .425 & p= .735); library knowledge barriers (f (3, 136) = .044 & p= .988); library comfort barriers (f (3, 137) = .642 & p= .590); and resource barriers (f (3, 136) = 1.072 & p= .363) at the $p<0.05$ level. Consequently, we fail to reject the null hypothesis. In other words, the results of One-Way ANOVA reveal that the age of the students did not have any significant effect on the library anxiety levels of the students.

Likewise, The Post-Hoc LSD multiple comparison analysis also indicate no significant difference in all the age groups and level of library anxiety.

4.7. Research Question 6

To examine research question 6, is there any significant difference in library anxiety levels among undergraduate and postgraduate students, Independent Samples t-test was conducted.

Table 16 signifies the independent samples t-test results examining the difference of library anxiety among undergraduate and postgraduate students

Table 16: Independent Sample t-test: Library anxiety and education level

	Level of Education	N	Mean	Std. Deviation	t	df	sig
Staff Barrier	Undergraduate	65	4.17	1.52	7.84	143	.434
	Post Graduate	80	3.95	1.83			
Affective Barrier	Undergraduate	65	3.61	1.51	-.218	141	.828

	Post Graduate	78	3.67	2.00			
Technological Barrier	Undergraduate	65	4.64	1.65	.399	143	.691
	Post Graduate	80	4.51	2.09			
Library Knowledge Barrier	Undergraduate	65	4.19	1.49	-.015	142	.988
	Post Graduate	79	4.20	1.98			
Library Comfort Barrier	Undergraduate	65	3.80	1.70	.276	143	.783
	Post Graduate	80	3.71	1.86			
Resources Barriers	Undergraduate	65	4.83	1.29	1.197	142	.233
	Post Graduate	79	4.51	1.84			

Table 16 indicates the descriptive statistics and independent samples t-test results for difference in library anxiety levels, in terms of library barriers, between undergraduate and post-graduate students. The results of the independent t-test indicate that there is no significant difference in the library anxiety level of undergraduate and post-graduate students in terms: staff barriers (t (143) = 7.84, p= .434); affective barriers (t (141) = -.218, p= .828); technological barriers (t (143) = .399, p= .619); library knowledge barriers (t (142) = -.015, p= .988); library comfort barriers (t (143) = .276, p= .783); and resource barriers (t (142) = 1.197, p= .233) at the $p<0.05$ level. Consequently, the null we fail to reject the null hypothesis.

4.8. Research Question 7

To examine research question 7 that tends to examine if there is any significant difference in library anxiety levels between full-time and part-time students, Independent Samples t-test was used.

Table 17 displays the descriptive statistics and independent samples t-test results for the difference in library anxiety levels, between full-time and part-time students.

Table 17: Independent Sample t-test: difference in the Library anxiety level between full-time and part-time students

	Mode of Study	N	Mean	Std. Deviation	t	df	sig
Staff Barrier	Part Time	6	4.70	1.44	.963	144	.337
	Full Time	140	4.01	1.70			
Affective Barrier	Part Time	6	3.42	1.42	-.314	142	.754
	Full Time	138	3.66	1.80			
Technological Barrier	Part Time	6	4.22	1.45	-.456	144	.649
	Full Time	140	4.59	1.91			
Library Knowledge Barrier	Part Time	6	3.96	1.64	-.347	143	.729
	Full Time	139	4.22	1.79			
Library Comfort Barrier	Part Time	6	4.89	1.07	1.618	144	.108
	Full Time	140	3.69	1.79			
Resources Barriers	Part Time	6	5.50	2.63	1.321	143	.189
	Full Time	139	4.60	1.57			

The results of the independent t-test indicate that there is no significant difference in the library anxiety level of full-time and part-time students in terms: staff barriers (t (144) = .963, p= .337); affective barriers (t (142) = -.314, p= .754); technological barriers (t (144) = -.456, p= .649); library knowledge barriers (t (143) = -.347, p= .729); library comfort barriers (t (144) = 1.618, p= .108); and resource barriers (t (143) = 1.321, p= .189) at the $p<0.05$ level. Accordingly, we fail to reject the null hypothesis.

4.9. Research Question 8

Research question 8 tends to examine if there is any significant relationship among students' library anxiety levels and their CGPA scores. To examine this question, first students CGPA scores were categorized into low (2.50 – 3.20) and high (3.21 – 4.00). Then independent Sample–test was conducted to examine if there is any significant difference in the library anxiety levels of students according to their CGPA.

Table 18 indicates the descriptive statistics and independent samples t-test results for the difference between library anxiety levels and CGPA.

Table 18: Independent Sample t-test: difference in the Library anxiety level in terms of CGPA

	CGPA	N	Mean	Std. Deviation	t	df	sig
Staff Barrier	Low	3	5.13	.90	1.142	138	.255
	High	137	4.01	1.69			
Affective Barrier	Low	3	3.55	1.88	-.037	136	.970
	High	135	3.59	1.74			
Technological Barrier	Low	3	4.00	2.28	-.508	138	.612
	High	137	4.55	1.87			
Library Knowledge Barrier	Low	3	4.13	2.02	-.052	137	.959
	High	136	4.18	1.75			
Library Comfort Barrier	Low	3	3.50	1.73	-.213	138	.831
	High	137	3.71	1.71			
Resources Barriers	Low	3	5.33	.33	.772	137	.442
	High	136	4.61	1.61			

The results of the independent t-test indicate that no significant difference in the CGPA scores of students and their library anxiety levels: staff barriers (t (138) = 1.142, p= .255); affective barriers (t (136) = -.037, p= .970); technological barriers (t (138) = -.508, p= .612); library knowledge barriers (t (137) = -.052, p= .959); library comfort barriers (t (138) = -.213, p= .783); and resource barriers (t (137) = .772, p= .442) at the $p<0.05$ level.

4.10. Research Question 9

Research Question 9 aims to examine if there any significant difference in library anxiety levels between arts and science students. To examine this question, an independent samples t-test was conducted.

Table 19 indicates the descriptive statistics and independent samples t-test results for the difference between library anxiety level and students field of study.

Table 19: Independent Sample t-test: Library anxiety and field of study

	Faculty	N	Mean	Std. Deviation	t	df	sig
Staff Barrier	Arts	96	3.96	1.80	-.767	144	.444
	Science	50	4.19	1.46			
Affective Barrier	Arts	94	3.89	1.95	2.308	142	.022
	Science	50	3.18	1.31			
Technological Barrier	Arts	96	4.82	1.95	2.277	144	.024
	Science	50	4.08	1.69			
Library Knowledge Barrier	Arts	95	4.39	1.94	1.659	143	.049
	Science	50	3.87	1.38			
Library Comfort Barrier	Arts	96	3.73	1.94	-.102	144	.919
	Science	50	3.76	1.45			
Resources Barriers	Arts	95	4.57	1.72	-.688	143	.493
	Science	50	4.77	1.44			

The results of the independent t-test indicate that there is significant difference between arts and science students' level of library in terms of affective barrier (t (142) = 2.308, p= .022), technological barriers (t (144) = 2.277, p= .024), and library knowledge barriers (t (143) = 1.659, p= .049).

However, the t-test results also reveal that there is no significance difference between arts and science students' level of library in terms of staff barriers (t (144) = -.767, p= .444), library comfort barriers (t (144) = -.102, p= .919), and resource barriers (t (143) = -.688, p= .493).

4.11. Research Question 10

This question tends to investigate if there is any significant difference in the mean scores among frequency of going to the library and students' level of library anxiety. For this particular question, the variable 'frequency of going to library' was re-coded into a categorical variable where it classified students' frequency of going to the library in 4 categories: 1 = Never, 2 = Rarely, 3 = Sometimes, and 4 = Regularly. To examine this research question, a One-Way ANOVA was conducted.

Table 20 below shows One-Way ANOVA results among frequency of going to the library, and students' level of library anxiety.

Table 20: One-Way ANOVA: library anxiety and frequency of going to the library

		Sum of Squares	df	Mean Square	F	Sig.
Staff Barrier	Between Groups	11.17	3	3.72	1.303	.276
	Within Groups	406.02	142	2.85		
	Total	417.20	145			
Affective Barrier	Between Groups	24.14	3	8.04	2.610	.054
	Within Groups	431.73	140	3.08		
	Total	455.87	143			
Technological Barrier	Between Groups	4.89	3	1.63	.449	.718
	Within Groups	515.83	142	3.63		
	Total	520.73	145			
Library Knowledge Barrier	Between Groups	7.39	3	2.46	.773	.511
	Within Groups	450.04	141	3.19		
	Total	457.44	144			
Library Comfort Barrier	Between Groups	5.57	3	1.86	.578	.630
	Within Groups	457.01	142	3.21		
	Total	462.59	145			
Resources Barriers	Between Groups	2.99	3	.99	.371	.774
	Within Groups	379.96	141	2.69		
	Total	382.96	144			

The One-Way ANOVA analysis indicate that there is no significant difference among the frequency of going to the library and students' levels of library anxiety in terms of the six barriers: staff barriers (f (3, 142) = 1.303 & p= .276); affective barriers (f (3, 140) = 2.610& p= .054); technological barriers (f (3, 142) = .449& p= .718); library knowledge barriers (f (3, 141) = .773& p= .511); library comfort barriers (f (3, 142) = .578& p= .630); and resource barriers (f (3, 141) = .371& p= .774) at the $p<0.05$ level. Consequently, we fail to reject the null hypothesis.

Likewise, The Post-Hoc LSD multiple comparison analysis also indicates no significant difference among the frequency of going to the library and level of library anxiety considering the six barriers.

4.12. Research Question 11

Research question 11 examines if there is any significant relationship among the six library barrier factors that measure library anxiety. To explore this question, Pearson multiple correlations was conducted.

Table 21 displays Pearson multiple correlation coefficients for the six sets of barriers measuring library anxiety.

Table 21 Multiple Correlations: Relationships among the six components of library anxiety

		Staff Barrier	Affective Barrier	Technological Barrier	Library Knowledge Barrier	Library Comfort Barrier	Resource Barriers
Staff Barrier	Pearson Correlation	1	.322**	.246**	.372**	.295**	.272**
	Sig. (2-tailed)		.000	.003	.000	.000	.001
	N	146	144	146	145	146	145
Affective Barrier	Pearson Correlation	.322**	1	.585**	.677**	.529**	.355**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	144	144	144	143	144	143
Technological Barrier	Pearson Correlation	.246**	.585**	1	.666**	.487**	.340**
	Sig. (2-tailed)	.003	.000		.000	.000	.000
	N	146	144	146	145	146	145
Library Knowledge Barrier	Pearson Correlation	.372**	.677**	.666**	1	.600**	.497**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	145	143	145	145	145	144
Library Comfort Barrier	Pearson Correlation	.295**	.529**	.487**	.600**	1	.555**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	146	144	146	145	146	145
Resources Barriers	Pearson Correlation	.272**	.355**	.340**	.497**	.555**	1
	Sig. (2-tailed)	.001	.000	.000	.000	.000	
	N	145	143	145	144	145	145

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

The results of multiple correlations suggest that 9 out of 15 correlations were statistically significant and were greater or equal to ($r >= +.35$, $p < .05$). The results of the multiple correlations also indicate that there is a significant relationship between the six components in overall library anxiety. In general, the results signify that if students feel anxiety in one component, they tend to have anxiety in other components as well.

V. Discussions

This study investigates the level of the library anxiety among the students of University Teknologi Mara. The findings of this study indicate that there is a moderate level of library anxiety among the students of the UITM as the overall mean score obtained for all six library barriers was found to be 4.21. The findings of this study are in harmony with the finding of Khosravi, Jahromi&Hosseini (2014) who found that the students of Persian Gulf University had moderate or normal levels of library anxiety.

Among the six library barriers which contribute to the library anxiety, this study revealed that resource barriers were ranked the highest by the student. Additionally, technological barrier ranked the second highest library anxiety among the UITM students and the previous research (Carlile, 2007; Khosravi, Jahromi&Hosseini, 2014) has also testified its significant influence on the increasing level of library anxiety at Charles Sturt University and at Persian Gulf University. As for the knowledge of the library, it was the third highest factor among the six factors identified by the students of the UITM. Likewise, this result was confirmed by (Bosticks, 1991; Alicia, 2015) which made the students feel unconfident and insecure; whereas, the similar factor had insignificant levels of library anxiety among the students of Jinwen University (Yu, 2009).

In this study, the students of UITM identified barriers with staff as the fourth factor contributing to library anxiety. Similarly, Adkins & Lu (2012) found in their study the utmost source of the library anxiety as the barriers with staff at the University of Missouri, while the same factor was found an unimportant source of the library anxiety by the students of Malaya University (Erfanmanesh, 2012). However, affective barriers were identified by students of UITM as the lowest factor among the barriers; whereas, a similar factor was found as the greatest source of library anxiety by the students of Missouri University (Adkins & Lu, 2012). Additionally, the students of the UITM classified the library comfort barrier as the second lowest factor among the six factors. On the other hand, Yu (2009) certified library comfort barrier as students' significant high level of library anxiety at the Jinwen University.

Moreover, the results of this study pointed out that there is no noteworthy variance between the male and female students of the UITM in the level of library anxiety and this result is in accordance with the previous research (Khosravi, Jahromi&Hosseini, 2014). However, Erfanmanesh (2012) discovered that there was a significantly higher level of library anxiety among male students than female students at Malaya University. Also, the current study revealed that the age of the UITM students did not have any significant effect on the library anxiety level of the students. This result is different from a previous study which reported that older students' level of library anxiety was less than the younger students' level of library anxiety at Shahid Beheshti University (Erfanmanesh, 2016). Regarding the six barriers, this study found that there is no significant variance in the library anxiety level of post-graduate and

undergraduate students of the UITM, while previously Seggern (2001) stated the level of library anxiety as the most dominant feelings among the undergraduate students. As well as, the findings revealed that there is no significant difference in the library anxiety level of full-time and part-time UITM students in terms of the six barriers.

The independent sample t-test indicates that there isn't any significant difference between CGPA scores of the UITM students and their library anxiety; whereas Vitasari, Wahab, Othman, Herwand & Sinnadurai (2010) determined the high level of anxiety in low academic performers at the University of Malaysia Pahang. Furthermore, it was revealed that the students of Art and Science at the UITM experienced library anxiety in affective barriers, technological barriers, and library knowledge barriers. However, similar respondents did not identify any library anxiety in terms of staff barriers, comfort barriers, and resources barriers. Relatively, the students of Arts at Cape Breton University have built their library anxiety, while Science students still experienced the level of library anxiety in overall six factors (Lawless, 2011). Finally, the results verify that if the students experience anxiety in one factor, they are likely to have anxiety in other factors too.

VI. Conclusion

This study examined the level of library anxiety among UiTM students. The results of this study revealed that there is an existence of a moderate level of library anxiety among UITM students. The study indicated that the students feel moderate or normal library anxiety in terms of six library barriers. However, specifically, the study signified resource barriers and technological barriers rated a little higher than other barriers, while affective and comfort barriers were identified as the lowest factors of library anxiety. Additionally, the results found that there is no significant difference in library anxiety among UiTM students in terms of gender, the level of education, mode of study, age, and their CGPA scores.

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Interaction Effect of Fertilizer and Manure on the Growth and Yield of T. Aman Rice in Different Soil

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Abstract- The experiment was conducted in the experimental area of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka during the period from June to November 2013 in aman season to find out effect of fertilizer and manure on the yield of T. Aman rice in different soil. BRRI dhan33 was used as the test crop in this experiment. The experiment comprised of two factors- Factors A: Soils from different location (soil from 2 locations), S_1: SAU soil, S_2: Shingair soil (collected from Shingair Manikgonj) an Factor B: Levels of fertilizers and manures (5 levels)- T_0: Control condition i.e. no fertilizers and manures; T_1: Recommended dose of fertilizer ($N_{120}P_{25}K_{60}S_{20}Zn_2$), T_2: 50% NPKSZn + 5 ton cow dung ha^{-1}, T_3: 50% NPKSZn + 5 ton compost ha^{-1} and T_4: 50% NPKSZn + 3.5 ton poultry manure ha^{-1}. The experiment was laid out in a randomized complete block design (RCBD) with three replications. Due to the interaction of soil from different location and fertilizers and manure, the highest grain yield (134.97 g pot^{-1}) was found from S_2T_4, whereas the lowest grain yield (32.03 g pot^{-1}) was recorded from S_1T_0. Shingair soil and 50% NPKSZn + 3.5 ton poultry manure ha^{-1} performed better in relation to yield contributing characters and yield of BRRI dhan33.

I. Introduction

Rice (*Oryza sativa* L.) the most important and staple food not only for Bangladesh but also for the South Asia and widely grown in tropical and subtropical regions (Singh *et al*., 2012). It provides 21% and 15% per capita of dietary energy and protein, respectively (Maclean *et al*., 2002). The slogan 'Rice is life' is most appropriate for Bangladesh and this crop plays a vital role in food security and livelihood for millions of rural peoples. However, at present the national average rice yield in Bangladesh (4.2 t ha^{-1}) is very low compared to other rice growing countries, like China (6.30 t ha^{-1}), Japan (6.60 t ha^{-1}) and Korea (6.30 t ha^{-1}) (FAO, 2009). Rice yields are either decelerating/stagnating/declining in post green revolution era mainly due to imbalance in fertilizer use, soil degradation, type of cropping system practiced, lack of suitable rice genotypes/variety for low moisture adaptability and disease resistance (Prakash, 2010).

Among the fertilizers, nitrogen (N) is essential for vegetative growth but excess N may cause excessive vegetative growth, prolong the growth duration and delay crop maturity with reduction in grain yield. Many research works revealed a significant response of rice to N fertilizer in different soils (Hussain *et al*., 1989). Inadequate and improper applications of N are now considered one of the major reasons for low yield of rice in Bangladesh. Phosphorus is also one of the important essential macro elements for the normal growth and development of plant. It is a major component in ATP, the molecule that provides 'energy' to that plant for such processes as photosynthesis, protein synthesis, nutrient translocation, nutrient uptake and respiration (Li *et al.*, 2007). Potassium plays a vital role in proper growth and development and also increased growth parameters and also yield of rice (Krishnappa *et al.*, 2006). Sulphur requirement of rice varies according to the nitrogen supply and it is required early in the growth of rice plants. If it is limiting during early growth, then tiller number and therefore final yield will be reduced (Blair and Lefroy, 1987). Zinc deficiency is the most widespread micronutrient disorder in lowland rice and application of Zinc increases the grain yield dramatically in most cases (Chaudhary *et al*., 2007; Muthukumararaja and Sriramachandrasekharan, 2012). Soil organic matter improves the physicochemical properties of the soil and ultimately promotes crop production. Evidences from different AEZ of the country have shown a decrease in the content of organic matter by the range of 15 to 30% over the last 20 years (Miah, 1994). Therefore, it would not be wise to depend only on inherent potentials of soils for higher crop production. More recently, attention is focused on the global environmental problems; utilization of organic wastes, vermicompost and poultry manures as the most effective measure for the purpose. The application of different fertilizers and manures also positively correlated with soil porosity and enzymatic activity. Organic fertilizer enhances soil porosity by increasing regular and irregular pores and causes a priming effect of native soil organic matter. Application of both chemical and organic fertilizers needs to be applied for the improvement of soil physical properties and supply of essential plant nutrients for higher yield. A suitable combination of organic and inorganic sources of nutrients is necessary for sustainable agriculture that can ensure quality food production. The long-term research of BARI revealed that the application of cow dung @ 5 t ha^{-1} year^{-1} improved rice productivity as well as prevented the soil resources from degradation (Bhuiyan, 1994). A marked higher incidence of micro and macro nutrient deficiency is found in crop due to intensive cropping, loss of

fertile top soil and losses of nutrient through leaching (Rahman *et al*., 2008; Somani, 2008 and Singh *et al*., 2011). Keeping in the view of the importance of rice and role of organic and inorganic nutrient in crop physiology, therefore, the present research work has been undertaken with the following objectives:

- Effects of fertilizer and manure with different soils on the nutrient availability in soil with rice culture,
- Effects of fertilizer, manure and soil on the yield and quality of T. Aman rice, and

II. MATERIALS AND METHODS

The experiment was conducted to find out effect of fertilizer and manure on the yield of T. Aman rice in different soil. The experiment was conducted during the period from June to November 2013 in aman season.The location of the site is $23^0 74^/$N latitude and $90^0 35^/$E longitude with an elevation of 8.2 meter from sea level.

Two different soils from different places and AEZ were collected. There were used 30 earthen pots altogether and 14 kg soil was taken in each earthen pot. BRRI dhan33 was used as the test crop in this experiment. This variety was developed at the Bangladesh Rice Research Institute. It is recommended for Aman season and average plant height of the variety is 100 cm. It requires about 118 days completing its life cycle with an average yield is 4.5 t ha^{-1} (BRRI, 2012). The experiment comprised of two factors

Factors A: Soils from different location (soil from 2 locations)

S_1: SAU soil, **S_2**: Shingair soil (collected from Shingair Manikgonj)

Factor B: Levels of fertilizers and manures (5 levels)

T_0: Control condition i.e. no fertilizers and manures, **T_1**: Recommended dose of fertilizer ($N_{120}P_{25}K_{60}S_{20}Zn_2$), **$T_2$**: 50% NPKSZn + 5 ton cow dung ha^{-1}, **T_3**: 50% NPKSZn + 5 ton compost ha^{-1}, **T_4**: 50% NPKSZn + 3.5 ton poultry manure ha^{-1}

There were in total 10 (2×5) treatment combinations such as S_1T_0, S_1T_1, S_1T_2, S_1T_3, S_1T_4, S_2T_0, S_2T_1, S_2T_2, S_2T_3 and S_2T_4. The experiment was laid out in a randomized complete block design (RCBD) with three replications. Each block was divided into 10 unit pots as treatments. Thus the total numbers of pots were 30. Seeds were collected from BRRI (Bangladesh Rice Research Institute), Gazipur just 25 days ahead of the sowing of seeds in seed bed. Seeds were immersed in water in a bucket for 24 hours. These were then taken out of water and kept in gunny bags. The seeds started sprouting after 48 hours which were suitable for sowing in 72 hours. The nursery bed was prepared by puddling with repeated ploughing followed by laddering. The sprouted seeds were sown as uniformly as possible. The pot selected for conducting the experiment was filled up with 14 kg soil in the second week of July 2013. Weeds and stubbles were removed. The experimental pot was partitioned in accordance with the experimental design. Organic and inorganic manures as indicated below were mixed with the soil of each pot. The fertilizers N, P, K, S and Zn in the form of urea, TSP, MoP, Gypsum and zinc sulphate, respectively were applied as per treatment. As a manure cowdung, compost and poultry manure also applied as per treatment. The one third amount of urea and entire amount of TSP, MOP, gypsum and zinc sulphate were applied during the final preparation of pot. Rest urea was applied in two equal installments at tillering and panicle initiation stages. Twenty five days old seedlings of BRRI dhan33 were carefully uprooted from the seedling nursery and transplanted on 22 July, 2013 in well prepared pots. Two seedlings pot^{-1} were used. After one week of transplanting all pots were checked for any missing hill, which was filled up with extra seedlings whenever required. The data obtained for different parameters were statistically analyzed to find out the significant difference of fertilizer and manure on the yield of T. Aman rice in different soil. The mean values of all the characters were calculated and analysis of variance was performed by Mstat-C. The significance of the differences among the treatment means were estimated by the Duncan's Multiple Range Test (DMRT) at 5% level of probability (Gomez and Gomez, 1984).

III. RESULTS AND DISCUSSION

The experiment was conducted to find out effect of fertilizer and manure on the yield of T. Aman rice in different soil. The results have been presented and discusses with the help of table and possible interpretations given under the following headings:

Plant height

Statistically non-significant variation was recorded due to the interaction effect of soil from different location and levels of fertilizers & manures (Table 1). The tallest plant (106.7 cm) was observed from S_2T_2 (Shingair soil with 50% NPKSZn + 5 ton cowdung ha^{-1}) which was similar to S_1T_1, S_1T_3, S_1T_4, S_2T_1, S_2T_2 and S_2T_3 treatment combination. The shortest plant (89.8 cm) was recorded from S_1T_0 (SAU soil in control condition) treatment combination which was statistically comparable to S_2T_0 treatment combination.

Plant height was significantly influenced by the integrated effect of organic and inorganic fertilizers. Gurung and Sherchan (1993) reported that the application of cowdung with chemical fertilizers produced significantly plant than that of chemical fertilizers alone. Rini and Srivastava (1997) reported that one-third or one-quarter of N as vermicompost increased plant height yield components of rice.

Number of effective tillers $hill^{-1}$

Interaction effect of soil from different location and levels of fertilizers & manures showed non-significant variation on number of effective tillers $hill^{-1}$ (Table 1). The maximum number of effective tillers $hill^{-1}$ (35.33) was recorded from S_2T_4 and the minimum number (12.67) was found from S_1T_0. Kant and Kumar (1994) reported that the increasing rates of amendments of chemical fertilizers with FYM increased the number of effective tillers $hill^{-1}$ significantly and at the maximum level of FYM (30 t ha^{-1}) the increase of 48% tillers $hill^{-1}$ over the control were recorded.

Length of panicle

Number of filled grains $panicle^{-1}$ showed non-significant variation due to the interaction effect of soil from different location and levels of fertilizers & manures (Table 1). The maximum number of filled grains $panicle^{-1}$ (174.1) was observed

from S_2T_2 and the minimum number (99.5) was recorded from S_1T_0. Rini and Srivastava (1997) reported that one-third or one-quarter of N as vermicompost increased yield components of rice.

Number of filled grains panicle^{-1}

Interaction effect of soil from different location and levels of fertilizers & manures showed non-significant variation on length of panicle (Table 1). The longest panicle (25.91 cm) was found from S_1T_3, while the shortest panicle (21.66 cm) was observed from S_1T_0. Kant and Kumar (1994) reported that the increasing rates of amendments of chemical fertilizers with FYM increased the number of grain panicle^{-1} increased over the control and at the maximum level of FYM (30 t ha^{-1}) the increase of 14% number of grain panicle^{-1} over the control were recorded.

Table 1. Interaction effect of soil from different locations and fertilizer & manure on plant height, effective tiller hill^{-1}, panicle length and grains panicle^{-1} of BRRI dhan33

Treatment	Plant height (cm)	Number of effective tiller hill^{-1}	Panicle length (cm)	Number of filled grain panicle^{-1}
S_1T_0	89.8	12.667	21.66	99.5
S_1T_1	106.4	26.333	25.51	163.0
S_1T_2	98.3	23.667	23.98	130.3
S_1T_3	105.8	27.667	25.91	158.6
S_1T_4	101.3	30.337	24.33	143.2
S_2T_0	94.1	13.333	22.28	123.4
S_2T_1	101.7	31.667	25.02	153.4
S_2T_2	106.7	32.333	25.04	174.1
S_2T_3	105.9	31.667	25.66	171.5
S_2T_4	104.9	35.333	24.94	154.0
SE(±)	NS	1.643	NS	NS

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 0.05 level of probability

S_1: SAU soil
S_2: Shingair soil
T_0: Control condition
T_1: Recommended dose of fertilizer ($N_{120}P_{25}K_{60}S_{20}Zn_2$)
T_2: 50% NPKSZn + 5 ton cow dung ha^{-1}
T_3: 50% NPKSZn + 5 ton compost ha^{-1}
T_4: 50% NPKSZn + 3.5 ton poultry manure ha^{-1}

Weight of 1000-grain

Interaction effect of soil from different location and levels of fertilizers & manures showed non-significant variation on weight of 1000-grains (Table 2). The highest weight of 1000-grains (21.33 g) was obtained from S_2T_4 and the lowest weight (19.67 g) was found from S_2T_0. Kant and Kumar (1994) reported that the increasing rates of amendments of chemical fertilizers with FYM increased weight of 1000-grain also increased over the control and 4.5% weight of 1000-grain over the control were recorded.

Grain yield pot^{-1}

Statistically significant variation was recorded due to the interaction effect of soil from different location and levels of fertilizers & manures in terms of grain yield pot^{-1} (Table 2). The highest grain yield pot^{-1} (134.97 g) was found from S_2T_4, whereas the lowest grain yield pot^{-1} (32.03 g) was recorded from S_1T_0. Gurung and Sherchan (1993) reported that the application of cowdung with chemical fertilizers produced significantly higher grain yield than that of chemical fertilizers alone. Rahman (2001) reported that in rice-rice cropping pattern, the highest grain yield of Boro rice was recorded in the soil test basis (STB) N P K S Zn fertilizers treatment while in T. Aman rice the 75% or 100% of N P K S Zn (STB) fertilizers plus green manure (GM) with or without cowdung gave the highest or a comparable yield.

Straw yield pot^{-1}

Interaction effect of soil from different location and levels of fertilizers & manures showed significant variation on straw yield pot^{-1} (Table 2). The highest straw yield pot^{-1} (110.07 g) was observed from S_2T_4 and the lowest straw yield pot^{-1} (32.93 g) was recorded from S_1T_0. Chittra and Janaki (1999) reported that application of 50 kg N with green leaf manure gave the highest straw yield.

Table 2. Interaction effect of soil from different locations and fertilizer & manure on weight of 1000 grains and grain and straw yield plant^{-1} of BRRI dhan33

Treatment	Weight of 1000 grains (g)	Grain yield (g pot^{-1})	Straw yield (g pot^{-1})
S_1T_0	19.83	32.03d	32.93
S_1T_1	20.33	84.33c	80.87
S_1T_2	21.00	74.10c	77.07
S_1T_3	20.33	78.23c	70.67
S_1T_4	21.17	112.33b	92.63
S_2T_0	19.67	35.37d	36.30
S_2T_1	20.83	108.10b	89.77
S_2T_2	21.00	111.33b	91.27
S_2T_3	21.00	115.87ab	90.27
S_2T_4	21.33	134.97a	110.07
SE(±)	NS	5.37	NS

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly at 0.05 level of probability

S_1: SAU soil
S_2: Shingair soil
T_0: Control condition
T_1: Recommended dose of fertilizer ($N_{120}P_{25}K_{60}S_{20}Zn_2$)
T_2: 50% NPKSZn + 5 ton cow dung ha^{-1}
T_3: 50% NPKSZn + 5 ton compost ha^{-1}
T_4: 50% NPKSZn + 3.5 ton poultry manure ha^{-1}

IV. CONCLUSION

It may be concluded that Shingair soil and 50% NPKSZn + 3.5 ton poultry manure ha^{-1} performed better in relation to yield contributing characters and yield of BRRI dhan33.

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Morpho-Physiological and Yield Contributing Characters and Yield of Sesame with Different Doses of Nitrogen

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Abstract- The experiment was undertaken in the Farm laboratory of Sher-e-Bangla Agricultural University, Dhaka, during Kharif 1 season, April to July 2013 to examine the response of different levels of nitrogen on morpho-physiology, yield contributing attributes and seed yield of sesame (*Sesamum indicum* L.) variety BARI Til 4. In this experiment, the treatment consisted of three different N levels *viz*. N_0 = 0 kg N/ha, N_1 = 60 kg N/ha and N_2 = 120 kg N/ha. The experiment was laid out in a factors Randomized Complete Block Design (RCBD) with three replications. The total treatment were 3 and plot (3x3) 9. Results showed a significant variation among the treatments in respect of the majority of the observed parameters. The N significantly increased morpho-physiological characters - plant height, number of leaves plant^{-1}, fresh and dry weight of shoot and root; yield contributing characters - number of pod plant^{-1}, pod diameter, pod length, seed weight plant^{-1}, seed weight plot^{-1},thousand seed weight compared to control. The maximum seed yield (1.26 t/ha) was obtained from 60 kg N/ha, whereas (1.01 t/ha) was from 120 kg N/ha which was better than control (0.88 t/ha). Based on the present results, it can be suggested that the use of 60 kg N/ha increased plant morpho-physiological parameters and seed yield of sesame than 120 kg N/ha due to excessive use of this element may produce too much of vegetative growth or toxicity, thus seed production decreased and failed to give highest yield.

Index Terms- Sesame, Nitrogen, Morpho-physiology, Yield

I. Introduction

Sesame (*Sesamumindicum*L.) is a annually cultivated flower bearing oil crop under the family ofPedaliaceae. It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds, which grow in the form of pods and introduced over 3000 years before. Sesame is highly tolerant to drought or any other environmental variations where other crops may fail to grow. The world harvested about 4.76 million metric tons of sesame seeds in 2013 and the largest producer was Burma. The world's largest exporter of sesame seeds was India and Japan because they use sesame seed in bakery industry (FAO, 2012). Bangladesh ranks twenty and share 0.8% in the total production of sesame in the world. Sesame occupies third position as an oil crop followed by rapeseed and mustard in Bangladesh according to cultivation and production (BARI, 2012). The sesame contains very high percentage of oil, protein and carbohydrate which is tasteless, nutty flavor and plays a vital role in human diet and used as a cuisine across the world (Hansen, 2011). The nutritive value of sesame is excellent due to the most stable vegetable oils, with long shelf life, the high level of natural antioxidants: sesamin, sesamolin, and sesamol which inhibit the development of rancidity in the oil. It has 47 percent oleic and 39 percent linoleic acid and is rich in Omega 6 fatty acid, but lacks Omega 3 fatty acid. It is also used in salad and margarine. The flour that remains after oil extraction is called sesame meal which is an excellent high-protein feed for poultry and livestock (Oplinger *et al.*, 2011). The sesame meal also contains 35 to 50 percent protein, has good effective carbohydrates, and contains water-soluble antioxidants sesaminol, glucosides that provide added shelf-life to many products. Presently, Bangladesh faces an acute shortage of edible oil due to insufficient production of cooked oil in the country. Our production only ensures 4 g of oil per person whereas every man can consume 10g of oil day^{-1}, indicates that extra 6 g added through import from other oil producing countries. Separately, it has been recommended that an adult should consume 22 g oil day^{-1} for better health. Thus we are experiencing 70% deficit of edible oil till to date. To meet up the demand of edible oil we are spending lots of million US dollar every year. Sesame is one of the most important oil crops in Bangladesh and grown in all regions. In the year of 1999-2000, the crop covered an area of 96000 acres in Bangladesh with production of 25000 M tons wereas, recently (BBS, 2013) reported that 84310 acres of land cultivated for sesame and production was 30972 M tons. The above information suggests that although the land of cultivation of sesame is decreasing whereas the production is in increasing trend from 1999 to 2013. But in a view of population growth, the requirement of edible oil is increasing with high in demand than the production. It is therefore, highly expected that the production of edible oil should be increased considerably to fulfill the increasing demand in lower cost. The production may be increased either by increasing cropping area under oil crop or increasing yield. But it is difficult to extent the area of oil production in our country due to over population, high demand of cereal crops etc. That is why; the farmers of our country did not get enough interest to grow oil

crops. Therefore, it is a general consensus that increasing yield per unit area is most reasonable way. The yield of sesame may be increased by using numerous improved technologies and practices such as use of high yielding varieties and suitable practices. As practices, proper balanced supply of nutrients is one of the most important factors to increase higher yield and also decreases the fertilizer cost.

Nitrogen (N) is one of the most important nutrient elements that accelerate the growth of the plant because it is a constituent of chlorophyll thus ensure crop growth vigorously. The significant response of the number of leaves to N may have led to increase in photosynthetic activity thereby resulting in the improvement of morphological characters i.e. produced more branches and simultaneously enhanced pod production and thus increased seed yield (Shehu *et al.*, 2009). The N can contribute to increase seed yield and protein content in seed by synthesizing more protein as N is a part of protein chemistry. Nitrogen (N) has an important role in seed protein and physiological functions of the plant and supports the plant with rapid growth, increasing seed and fruit production and enhancing quality of leaf and oil seed yield (Allen and Morgan, 2009). Previous many authors showed that the N significantly increased morpho-physiological parameters such as leaf area and rate of photosynthesis etc. Separately, they also reported that N increases the vegetative growth but delayed maturity of seed yielding plants and excessive use of this element may produce too much of vegetative growth, thus food production may be impaired and suggesting that N management is crucial in cropping system and for normal plant growth and development. Unfortunately, N content of Bangladesh soil is very low and need to supply N fertilizer in proper amount in available form and at right time to make sure for better seed production. These results suggest that the optimum doses of N/ha for sesame seed yield is needed to examine. In this study, we used different levels of N to find out the best dose for highest morpho-physiological attributes, yield contributing characters and yield of sesame using variety of BARI Til 4.

II. MATERIALS AND METHODS

The experiment was carried out at Sher-e-Bangla Agricultural University Farm, Dhaka-1207, Bangladesh which located at $90^0 22'$ E longitude and 23°4l′ N latitude at an altitude of 8.6 meters above the sea level under the agro-ecological zone of Modhupur Tract, AEZ-28 during Kharif 1 season, April 2013 to July 2013 to examine the response to different levels of nitrogen (N) on morpho-physiology, yield attributes and yield of sesame variety BARI Til 4. A pest and disease resistant and high yielding variety seed was collected from the Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur. Before sowing of the seed in the experimental plot, germination test was done in the laboratory and results of percentage of germination were over 90%. The experiment was laid out in a factors randomized complete block design with three replications. Treatments of the experiment was, three different N levels *viz*. N_0 = 0 kg N/ha, N_1 = 60 kg N/ha,N_2= 120 kg N/ha. The total plot number was (3 x 3) 9 and the unit plot size was 2 m x 1.5 m = 3 m^2. The distance between blocks was 1 m and distance between plots was 0.5 m and plant spacing was 30 cm × 5 cm. The final ploughing and land preparation were done on 1 April, 2013. According to the lay out of the experiment the entire experimental area was divided into blocks and prepared the experimental plot for the sowing of sesame seed. In addition, irrigation and drainage channels were made around the plot. Sowing was done on 13 April, 2013 in rows 30 cm apart. Seeds were sown continuously in rows at a rate of 7.5 kg ha^{-1}. After sowing, the seeds were covered with the soil and slightly pressed by hand, and applied little amount water for better germination of seeds. The optimum plant population, 60 plants m^{-2} was maintained by thinning excess plant at 15 DAS. The plant to plant distance was maintained as 5 cm in the row. One weeding with khurpi was given on 25 DAS. Two irrigations were given during immediately after topdressing and 60 DAS with watering can. As per preventive measure seed was treated with a fungicide Vitavex 200 @ 2 g kg^{-1} before showing and fungal disease, Diathen M 45 EC @ 2 ml $litre^{-1}$ of water was applied twice first at 25 DAS and second at 50 DAS. Previous randomly selected ten plants plants from each plot were selected as random and were tagged for the data collection. Some data were collected from 30 days sowing with 10 days interval (Plant height, No. of leaves $plant^{-1}$, No. of primary branches $plant^{-1}$) and some data were collected at harvesting stage during 11-16 July, 2013 (No. of pod $plant^{-1}$, Pod length and diameter, Seed weight $plant^{-1}$ and $plot^{-1}$, Seed weight of 1000 seed and Yield). The sample plants were uprooted prior to harvest and dried properly in the sun (Fresh and dry weight of Shoot). The seed yield $plot^{-1}$ was recorded after cleaning and drying those properly in the sun. The data obtained from the experiment were subjected to statistical analysis following analysis of variance technique. The mean differences were tested through, least significant difference (LSD) method.

III. RESULTS AND DISCUSSION

Plant height (cm)

In this experiment different levels of nitrogen (N) fertilizer showed significant effect on plant height of sesame at 30 days after sowing (DAS), 40 DAS and 50 DAS (Fig. 1). At 30 DAS, the highest plant height (61.31 cm) was observed from the N_1, 60 kg N/ha which was statistically similar with N_2 (59.95 cm) and the lowest (54.17 cm) was observed from N_0, 0 kg N/ha. At 40 DAS, the highest plant height (90.47 cm) was observed from the N_1,60 kg N/ha which was statistically similar with N_2, 120 kg N/ha(90.40 cm) whereas the lowest (86.10 cm) was observed from N_0. At 50 DAS, the highest plant height (121.3 cm) was observed from the N_1 which was statistically similar with N_2 (122.3 cm) whereas the lowest (118.0 cm) was observed from N_0. So the highest plant height at 30 DAS, 40 DAS and 50 DAS was from N_1 (60 kg/ha N) which similar to obsereved by Shilpi *et al*, (2012).

Number of leaf $plant^{-1}$

Nitrogen fertilizers had significant effect on number of leaf $plant^{-1}$ of sesame at 30 DAS, 40 DAS and 50 DAS (Fig. 2). At 30 DAS, the highest number of leaf $plant^{-1}$ (15.42) was observed from the N_1 which was statistically similar with N_2 (15.08) and the lowest (13.08) was observed from N_0. At 40 DAS, the highest number of leaf $plant^{-1}$ (18.25) was observed

from the N_1 which was statistically similar with N_2 (17.08) and the lowest (14.92) was observed from N_0 which was statistically similar with N_2 (17.08). At 50 DAS, the highest number of leaf plant^{-1} (37.67) was observed from the $N_1$and the lowest (30.25) was observed from N_0 which was statistically similar with N_2 (33.50). These findings were similar to Okpara *et al.*, (2007), who reported that increased in such growth characters of sesame due to applied N. Leaf number of sesame plant increased with the increased application of nitrogen fertilizer up to a certain limit was stated by Shilpi *et al*, (2012).

Shoot fresh weight (g)

There was significant variation among the different levels of nitrogen fertilizer doses on shoot fresh weight (g) of sesame (Fig.3). The highest fresh shoot weight (49.17 g) was obtained from N_2 while the lowest result (37.16 g) was recorded from N_0. The results suggest that application of N increased the shoot fresh weight of sesame plant.

Shoot dry weight (g)

Application of different levels of nitrogen fertilizer had significant influenced on dry shoot weight (g) of sesame (Fig. 4). The highest dry shoot weight (7.41 g) was obtained from N_1 which was statistically similar with N_2 (7.20 g) and the lowest result (5.833 g) was recorded from N_0. The results showed that there was not statistical variation in N_1, 60 kg N/ha and N_2, 120 kg N/ha, so it was found that the shoot dry weight of sesame (g) increased with the increasing doses of N.

Root fresh weight (g)

The N showed (Fig. 5) indicated significant variationamong the different doses of nitrogen fertilizer on root fresh weight (g) of sesame. The highest root fresh weight (6.90 g) was obtained from N_1 which is statistically similar with N_2 (6.75 g) treatment while the lowest result (4.66 g) was recorded from N_0 treatment. It can be attributed towards more availability of nitrogen resulting in enhanced vegetative growth.

Root dry weight (g)

Here the results showed that nitrogen fertilizer doses had significantly effected on root dry weight (g) of sesame (Fig. 6). The highest dry root weight (1.75 g) was obtained from $N_1$and the lowest result (1.56 g) was recorded from N_0 which was statistically similar with N_2 (1.60 g). These results showed similarity with shoot dry weight (g) (Fig. 5) and suggested that nitrogen had important role in increased of root dry weight of sesame in application at proper doses.

Number of pod plant^{-1}

A significant variation was recorded due to the different nitrogen fertilizer doses for number of pod plant^{-1} of sesame (Fig. 7).The maximum number of pod plant^{-1} (49.08) was recorded for the N_1 treatment and the lowest (42.37) was observed from N_0 treatment which was statistically similar with N_2 (43.75). From the result it appears that pod number plant^{-1} increased due to the increased rate of nitrogen fertilizer application up to certain level but excess application of nitrogen enhanced the vegetative growth instead of pod formation had reported by Bahar *et al*. (2015) and Shilpi *et al*. (2012). These results are consistent with the vegetative characters of sesame (Fig. 1 and 3).

Pod length (cm):

As consistent to fruit diameter nitrogen fertilizer doses had significant influenced on fruit length (mm) of sesame (Fig. 8). The highest fruit length (21.49 mm) was obtained from N_1 (60 kg N/ha) which was statistically similar with N_2 (20.44 mm) while the lowest result (18.63 mm) was recorded from N_0 (0 kg N/ha). These data resulted that application of N fertilizer increased fruit lenth (mm) in contrast with fruit diameter (mm).

Pod diameter (mm)

Nitrogen fertilizer doses had significant influenced on fruit diameter (mm) of sesame(Fig. 9).The highest fruit diameter (9.85 mm) was obtained from N_1 while the lowest result (8.34 mm) was recorded from N_0 which was statistically similar with N_2 (8.55mm). Here results showed that without and excess nitrogen fertilizer application founded less pod growth in diameter for sesame plant.

Seed weight plant^{-1} (g)

In this study N fertilizer levels showed significant variation in the seed weight plant^{-1} of sesame (Fig. 10). The maximum seed yield plant^{-1} (27.41 g) was produced by N_1 (60 kg N/ha) whereas N_0 produced the minimum seed weight plant^{-1} (21.14 g). This finding corroborated those of Okpara *et al*. (2007), Fathy and Mohammed (2009), Haruna *et al*. (2010).The lowest number of pod seed weight was found from control or without N (N_0).

Seed weight plot^{-1} (g)

The figure 11 showed that different levels of nitrogen fertilizer had significant variation in the seed weight plot^{-1}(g) of sesame. The maximum seed weight plot^{-1}(g) (380.4 g) was produced by N_1 (60 kg/ha) not from N_2 (120 kg/ha) and N_0(0 kg/ha) produced the minimum seed weight plot^{-1} (265.0 g). From the study of results I found that excess nitrogen fertilizer application decrease seed weight plot^{-1}(g). Sesame pod number, pod length and diameter also increased with N, which believe to increase seed weight plot^{-1} of sesame.

1000 seed weight (g)

The application of nitrogen influenced significantly on the thousand seed weight (g) of sesame (Fig. 12). The maximum thousand seed weight (11.18 g) was produced by N_1 and N_0 produced the lowest thousand seed weight (10.29 g). These results showed that without application of nitrogen (N) resulted in minimum 1000seed weight and with the application of N the 1000-seed weight increased and got highest weight from N_1 (60 kg N/ha) .

Yield (t ha^{-1})

The seed yield of sesame plot^{-1} (g) was converted into hectare^{-1} and has been expressed in metric tons. The different levels of nitrogen had significant effect on the yield of seed ton (t) hectare^{-1} as consistent with number of pod, seed weight plant^{-1} (g), seed weight plot^{-1} (g) and 1000 seed weight (g) (Fig.7, 10, 11 and 12). The maximum yield of seed hectare^{-1}(1.26 t) was

obtained from N_1 (60 kg/ha) whereas the minimum yield of seed per hectare (0.88 t) was obtained from N_0 (control or without N). N_1 (60 kg/ha) gave the maximum yield than N_2 (120 kg/ha) this could be because of excessive nitrogen had been reported to reduce fruit number and yield for sesame but enhances plant growth (Fathy & Mohammed, 2009). Kulsum *et al*., (2007) had reported that application of 60 kg N ha^{-1} favored most of the yield contributing characters that contributed the maximum grain yield production.

IV. CONCLUSION

The sesame have both the nutritious as well as high economic value. Bangladesh imports a large amount of sesame every year, so it is highly expected that the production of sesame oil should be increased considerably to fulfill the increasing demand in lower cost. As practices, proper balanced supply of nutrients is one of the most important factors to increase higher yield and also decreases the fertilizer cost.The production hasenhanced by the use of less nitrogen in sesame cultivation. The highest yield obtained from 60 kg/ha Nitrogen, means half of the recommended dose and also decreases the fertilizer cost.

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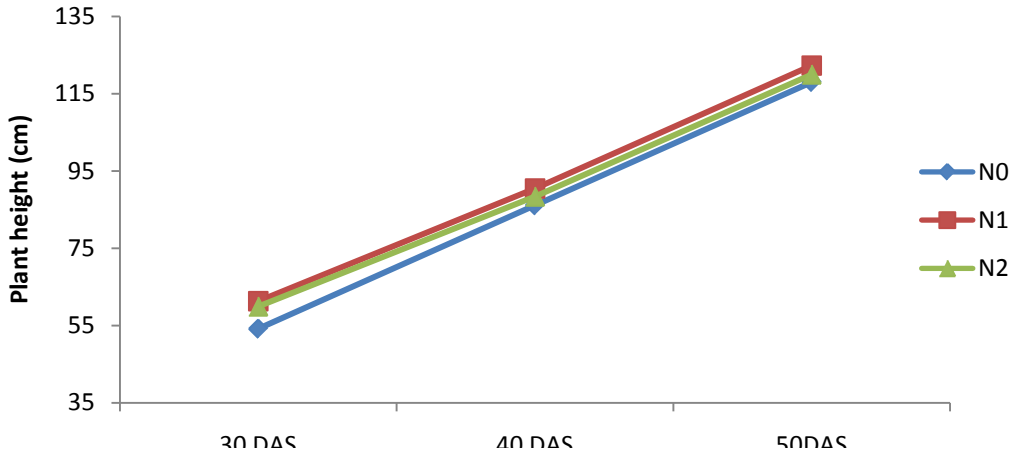
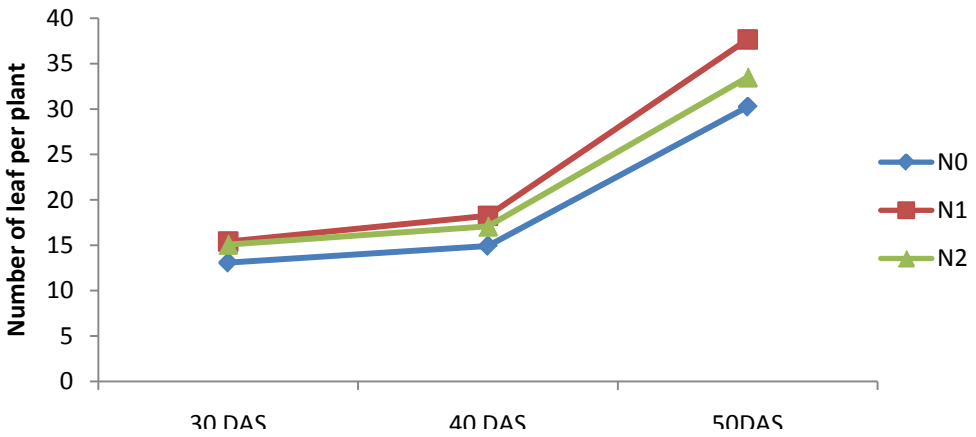


N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea, DAS (Days after sowing)

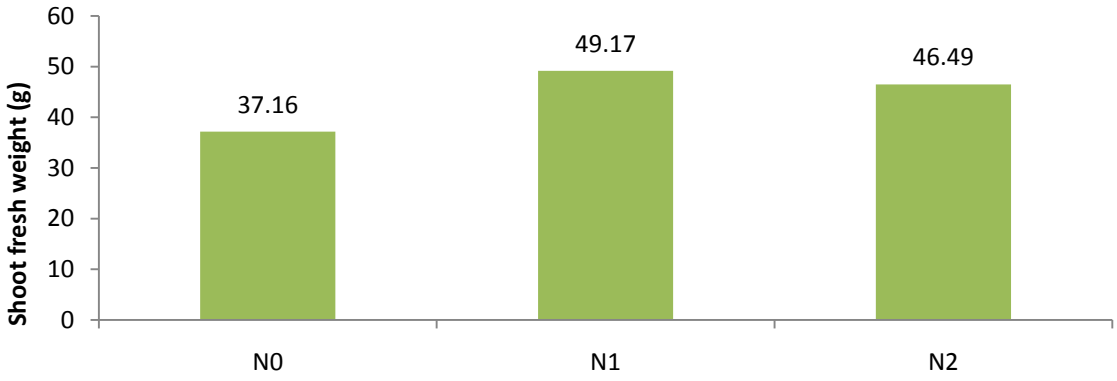
Fig. : 1. Effect of different levels of nitrogen at different days after sowing DAS on the height of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea, DAS (days after sowing)

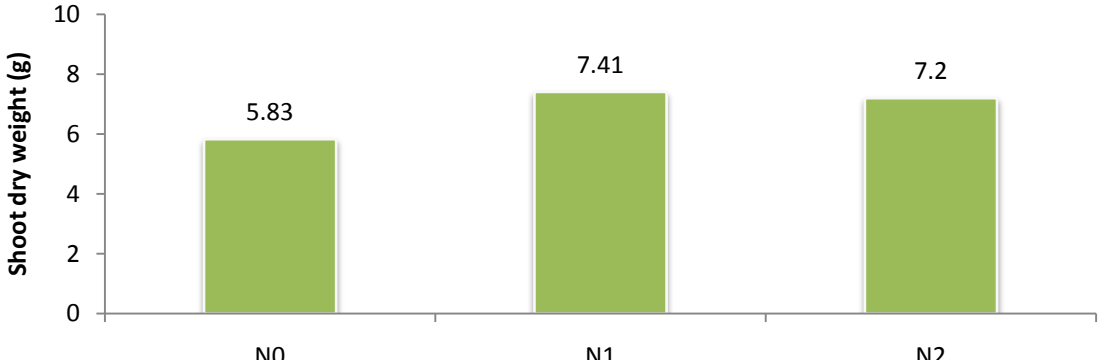
Fig.: 2. Effect of different levels of nitrogen at different DAS on the leaf number of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ha nitrogen applied as urea

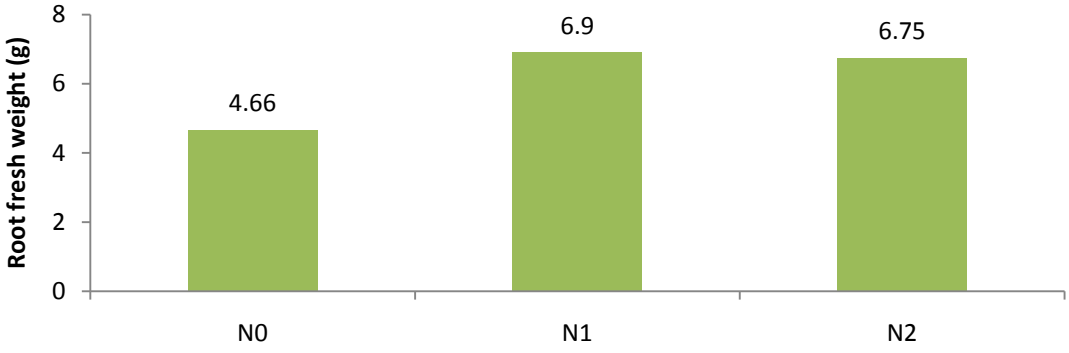
Fig.: 3. Effect of different levels of nitrogen on shoot fresh weight of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

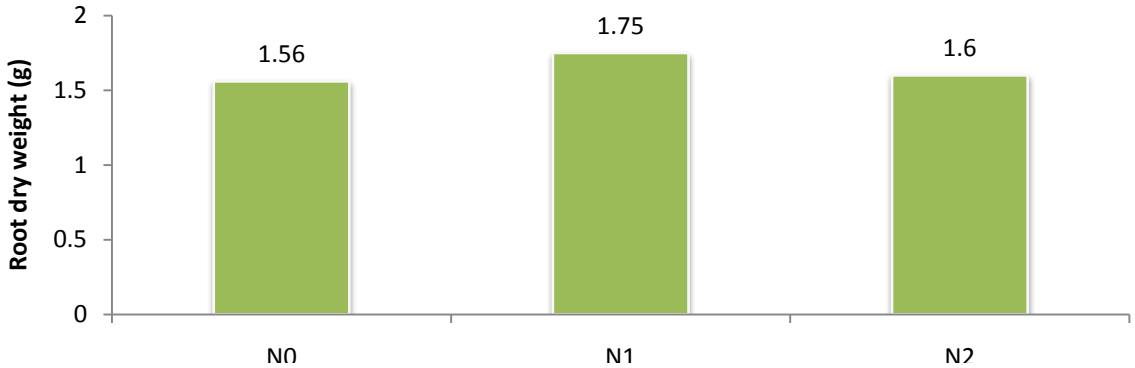
Fig.: 4. Effect of different levels of nitrogen on the shoot dry weight of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

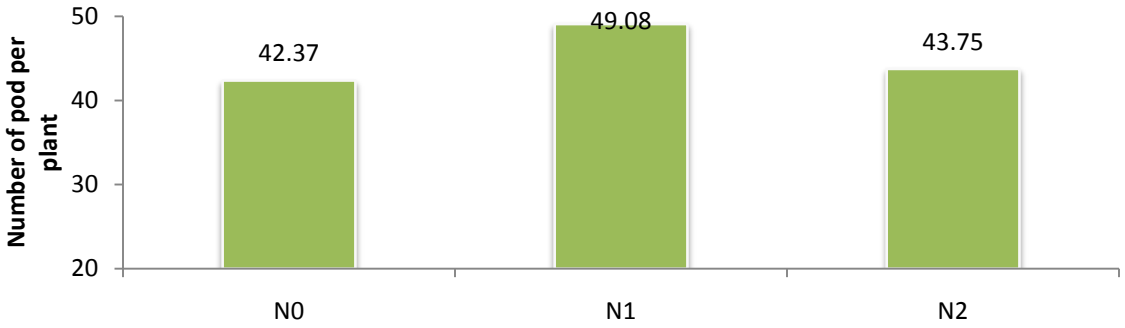
Fig.: 5. Effect of different levels of nitrogen on root fresh weight of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea, DAS = Days after sowing

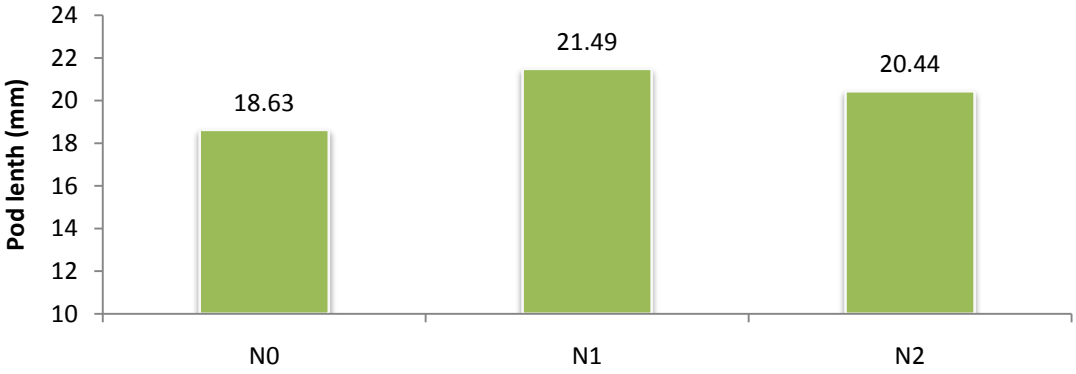
Fig. : 6. Effect of different levels of nitrogen on root dry weight of sesame plant



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

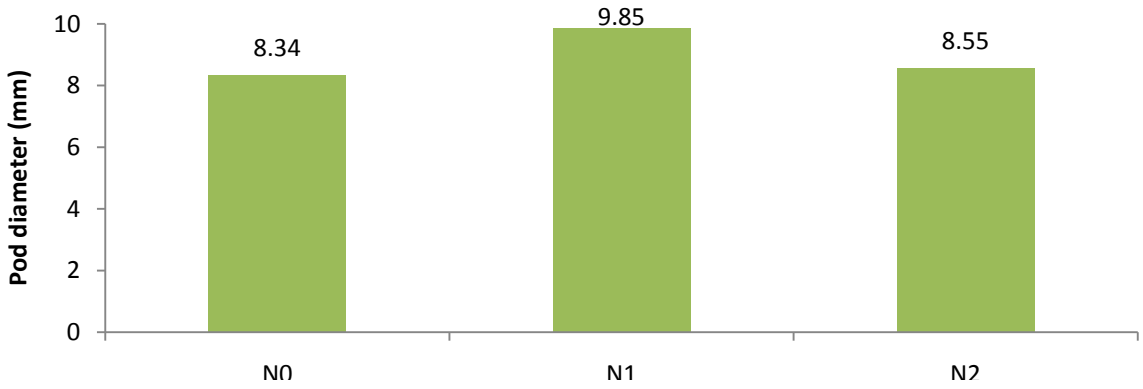
Fig. : 7. Effect of different levels of nitrogen on number pod plant^{-1} of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

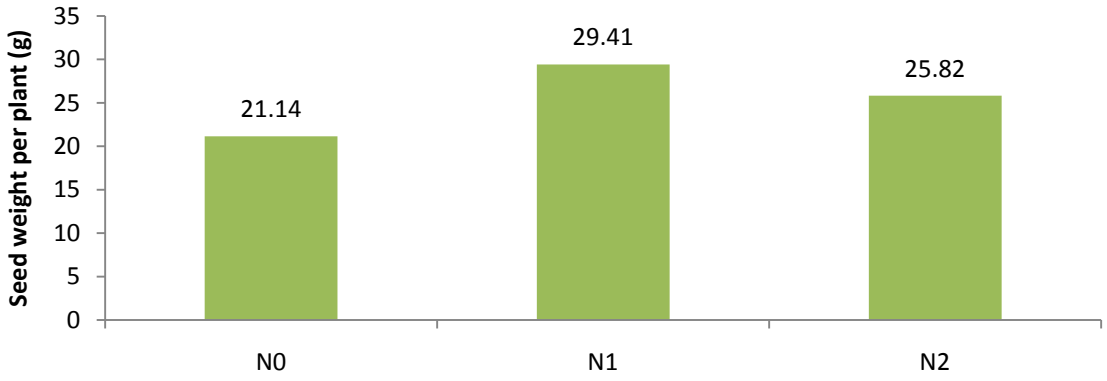
Fig. : 8. Effect of different levels of nitrogen on the pod length of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

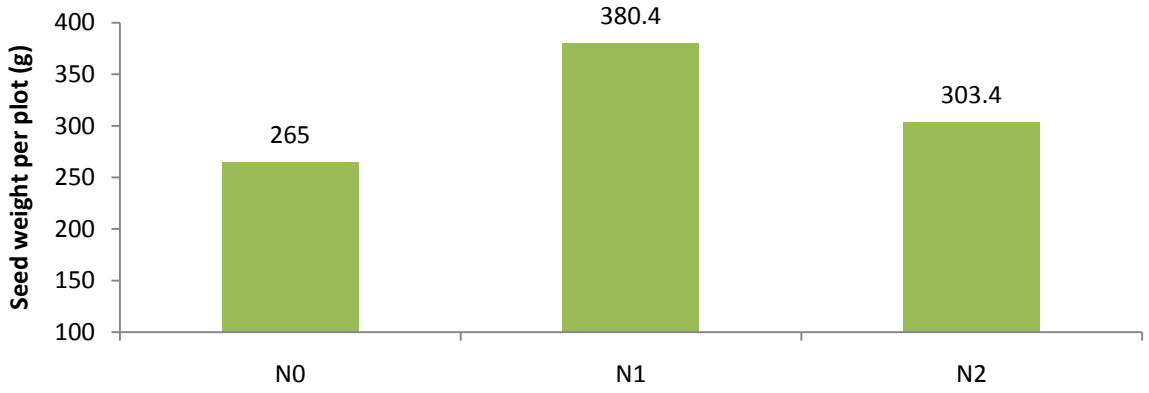
Fig. : 9. Effect of different levels of nitrogen on the pod diameter of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

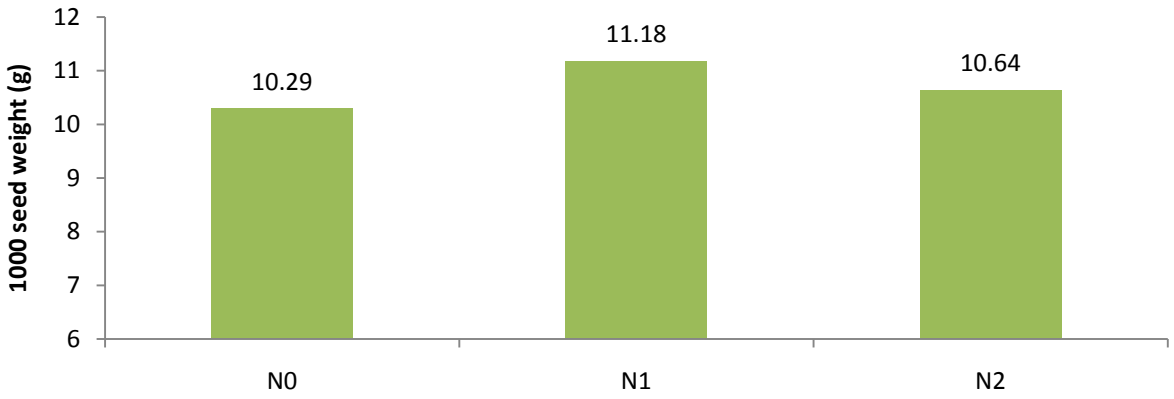
Fig. : 10. Effect of different levels of nitrogen on the seed weight plant^{-1}of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

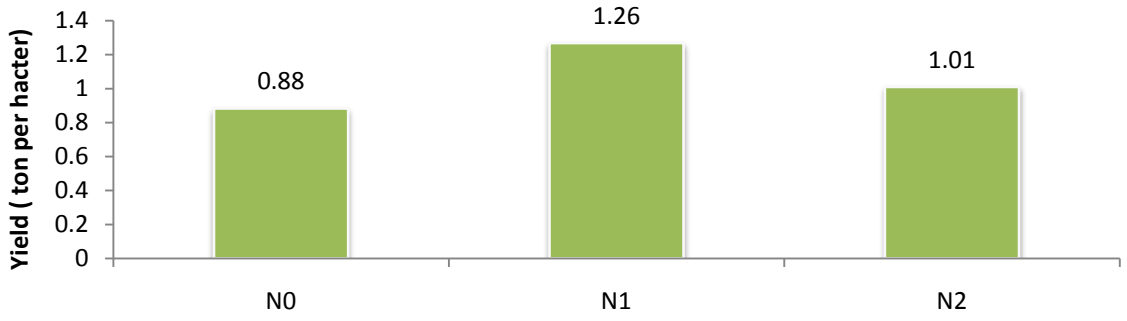
Fig. : 11. Effect of different levels of nitrogen on the seed weight plot^{-1}of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

Fig. : 12. Effect of different levels of nitrogen on 1000 seed weight of sesame



N_0 – No nitrogen applied, N_1 – 60 kg/ha nitrogen applied as urea ,

N_2– 120 kg/ ha nitrogen applied as urea

Fig. : 13. Effect of different levels of nitrogen on the yield of sesame

Level of Work Ethics among Employees of Capiz State University- Mambusao Satellite College

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Abstract- The study aimed to determine the socio-demographic profile of employees as to sex, age, civil status, monthly salary and length of service; ascertain the level of work ethics of employees of CapSU-Mambusao Satellite College when classified according to variables and as a whole; and is there a significant difference on the level of work ethics of employees of CapSU-Mambusao Satellite College in terms of selected variables. The main instrument of the study was questionnaire consist of three parts. Part I was gathered information on socio-demographic profile, Part II was a 20-items statement that enabled to evaluate the level of the work ethics they possessed and Part III was a 4-items questions that measured their work productivity. Results of the study will be analyze using frequency count, percentage, standard deviation and mean. T-test and one-way ANNOVA was used to determine the significant difference on the level of work ethics of the government employees. Correlational analysis was used to find out the relationship of level of work ethics to productivity of employees. Most of the employees were married age within 21-30, 31-40, 41-50 and within 14 years and below in service. Most of the employees have a high level of work ethics when classified as to age, gender, civil status, length of service and monthly salary. There is no significant difference in level of work ethics when employees are categorized as to age, gender, civil status, monthly salary and length of service.

Index Terms- Work ethics, government employees

I. Introduction

Work ethics is essentially a subjective practice, but employers usually agree as to the characteristics of "good" work ethics looked for in their employees. Personal ethics are defined as moral objectives or values that you believe in and practice as part of your life's philosophy. When it comes to work, your ethics also encompass your overall attitude about work. One definition of a person with good work ethics is a person who shows up on time with the willingness to do what it takes to get the job done without complaint (the nest, 1997).

In many cases, however, wrongdoing is done by people who are viewed as good employees, good managers, and even good leaders. The real challenge understands why “good” people do “bad” things. One reason is that they fail to recognize that the problem they are confronting has an ethical component and is not solely marketing or finance or other kind of problem. As a result, they often lack the ability to analyze the problem from an ethical perspective. Thus, the goal of ethics training is not to change people’s ethics — that is, make bad people good — but, rather, to enhance people’s sensitivity to ethical issues and provide them with tools for resolving ethical dilemmas effectively.

The citizens wanted to have a better public service, enlarged responsibility of public officials. Employees also demanded to be treated well by their co-employees. They provide a better quality of life to people and build a good relationship to their co-workers so as to attain success in their public service. For this reason, this study will be conducted to measure the level of work ethics of employees apiz State University.

We live in a society that is very centered around our work. People are always rushing to work to spend majority of their time working. Since it is harder to keep and maintain jobs in our economic climate, it is very important for employees to remember what professional behavior is and what are not (Stevens, 2012).

Public officials and employees shall perform and discharge their duties with the highest degree of excellence, professionalism, intelligence and skill. They shall enter public service with utmost devotions and dedication to duty.

Ethical theories are devices which a worker may use to analyze and determine the moral goodness of his decision, what he should do or why he should refrain from doing an act. This help worker effectively respond to moral dilemma commonly encountered in the performance of work. (Articuloet., al., 2003)
An ethical advocate of ethics is a person who is knowledgeable about business ethics, employed by the company and acts as the company’s conscience. He sits at the board of directors and sees to it that every policy adopted conforms to ethical standards. As it is always possible for a group, like the board to commit the “group think” and “blind conformity” errors, the contribution of the ethical advocate cannot be discounted.

Science has proven that every individual has distinct personalities. Information can be obtained on each employee and on organization as a whole. Demographics information of respondents in the area covered by research is important to establish proof of existing condition and improve it. For instance, several researches find education, age and sex composition of the work force, among others, can affect, favorably or unfavorably, productivity rates. Participation in research and development between male and female explores educational background and personal and professional data. The so-called “gender gap” has not, empirically, been investigated before(http://www.emeraldinsight.com/10.1108/02610150610719128). Marcos (2016) conducted a study about women managers in the selected local government units in the province of Capiz and found out that most of the women managers/executives were middle age, married, bachelor's degree holders, had a family size of 4-6 members, government employment as their main source and farming as their secondary source of income earning a

monthly income from all sources of PhP30,000-39,999, were members of some organizations, had been in the government service for 12 - 25 years, occupying managerial positions with permanent status of appointment and attended many seminars/trainings.

Government employees of its traditional functions entrusted with public resources and authority to utilize them to achieved its desired goals, has moral responsibility to be fully accountable for its activities. The accountability of this person is deemed part of good and responsible government. Enhancing productivity of public service is commonly delegated to employees to achieve socio-economic development. The knowledge of how to enhance or improve productivity may contribute to solution and pressing problems of the country, thus, it contributes to social and economic progress.

II. RESEARCH ELABORATIONS

This study was conducted in Capiz State University Mambusao Satellite College, Mambusao, Capiz. The respondents of the study were all the faculty and staff Capiz State University Mambusao Satellite College, Mambusao, Capiz. A survey questionnaire was used to gather data. Part I is focused on socio-demographic factors such as age, sex, civil status and length of service, Part II is Instrument Proper containing 20-item statements that enables to evaluate the level of the work ethics they possessed. A letter of request to the Campus Administrator was made to administer the questionnaire. The questionnaires were then personally administered to the respondents by the researcher. After the questionnaires were answered, these were immediately retrieved for coding and analysis. The researchers employed mean, frequency, percentage, t-test, one-way ANOVA and standard deviation.

III. RESULTS OR FINDINGS

Profile of the Respondents

As to gender, majority were females 37 or 66.07 % while 19 or 33.93 % were males. This shows that majority of the employees in Capiz State University, Mambusao Satellite College, Poblacion, Mambusao, Capiz were females.

As to age, most (19 or 33.93 %) of the respondents were within of 21 – 30 years old, 17 (30.36 %) were wtihin of 41 – 50 years old, 11 (19.64 %) were within of 31 – 40 years old and only 9 (16.07 %) were within of 51 – 65 years old. The youngest respondent is 22 years old and the oldest respondent is 64 years old with the mean age of 33.96.

In terms of civil status, result revealed that 37 (66.07 %) were married, 15 (26.79 %) were single and 4 (7.14 %) were widowed/separated. This implies that most of the employees in Capiz State University, Mambusao Satellite College, Poblacion, Mambusao, Capiz were married.

In terms of monthly salary, result revealed that 21 (37.50 %) had a monthly salary of 10,001– 20,000, 15 (26.79 %) had a monthly salary of 30,001 and ab0ve, 13 (23.21 %) had a monthly salary of 5,001 – 10,000, 7 (12.50 %) had a monthly salary of 20,001 – 30,000, and there were no employee receiving a salary of 5,000 below. The lowest salary received by the respondents is P6,314.00 and the highest salary is P67,690.00 with the mean of P22,819.00

In terms of length of service, most of the respondents (31 or 55.36 %) had served for 1 - 10 years, 19 (33.93 %) had served for 11 – 20 years and 6 (10.71 %) were in the bracket of 21 – 30 years. The shortest service rendered by the respondents was 1 year and the longest service is 30 years with the mean of 10 years.

Level of Work Ethics of CapSUMambusao Satellite College Employees in terms of Selected Variables and as a whole

The level of work ethics of CapSUMambusao Satellite College Employees in terms of sex, age, civil status, monthly salary and length of service were “high”. When classified as a whole, results showed a mean of 3.62 indicates that the level of work ethics of CapSU employees were “high”.

Differences in the Level of Work Ethics when grouped according to Variables

The difference in the level of work ethics of the respondents are similar regardless of their sex, age, civil status, monthly salary and length of service.

IV. CONCLUSIONS

1. CapSU Employees composed of 19 males and 37 females. Most of the employee were married, age within 21-30, 31-40, 41-50 and within 14 years and below in service.
2. Most of the employees have a high level of work ethics when classified as to age, gender, civil status, length of service and monthly salary.
3. There is no significant difference in level of work ethics when employees are categorized as to age, gender, civil status, monthly salary and length of service.

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Attitude Towards and Proficiency in English of High School Seniors

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Abstract- This descriptive-correlational research was conducted with the following objectives:to determine the attitude towards English of the high school seniors as an entire group and when classified according to sex, grade in English, type of school, level of mass media exposure, and parents' educational attainment; to determine the English proficiency of the high school seniors as an entire group and when classified according to sex, grade in English, type of school, level of mass media exposure, and parents' educational attainment; and to find out if attitude towards English is significantly related to the English proficiency of the high school seniors. A questionnaire composed of four parts was used in the gathering of data. The findings are as follows: (1)In general, the attitude towards English of the high school seniors is "somewhat positive;" (2)Generally, high school seniors have "very satisfactory" level of English proficiency; and (3)The high school seniors' attitude towards English is significantly related to their English proficiency.

Index Terms- attitude towards English, English proficiency, mass media exposure, high school seniors

I. Introduction

Attitudes signify what people think of, how they feel, and how they tend or intend to behave toward an object. Overt behavior of people is determined not only by what they would like to do but also by what they think they should do, by what they are used to doing, and by the consequences which they anticipate. That is, social norms, peer expectations, established habits, expected consequences, and situational factors also influence one's behavior. Attitudes are facilitative causes, but their strength may not always be sufficient to overcome the forces produced by other variables such as social pressure (Arul, 2000, in Billena, 2007).

According to Starks and Paltridge (1996), in Karahan (2007), learning a language is closely related to the attitudes toward the languages. In Siregar (2009), attitude refers to "a hypothetical construct used to explain the direction and persistence of human behavior" (Baker, 1992). In other words, it can represent internal thoughts, feelings and tendencies in behavior across a variety of contexts. Although an attitude in individual, it has origins in collective behavior. Moreover, some characteristics of attitude are: it is learnt, it is not inherited, it is also likely to be relatively stable, and it has a tendency to persist. Attitudes also play a vital role in language growth or decay, restoration or destruction. In other words, the status and importance of a language in society and within an individual can be adopted and learnt (Baker, 1988, in Siregar, 2009).

Many teachers believe that students' attitudes toward a subject affect their achievement in the subject (Giner, 2002). Attitude stirs passion and drive and result to empowerment (Mesiti, 1999). Similarly, Alimen (1999) confirmed that indeed, attitude is what makes students work to gain achievement in school especially in English. In addition, Savignon (2002) accentuated that the learner's attitude is and without doubt the single most important factor in the learner's success. Whether the motivation of the learner is integrative or instrumental, the development of communicative competence involves the whole learner. Hence, she concluded that the most successful teaching programs are those that take into account the affective as well as cognitive aspects of language learning.

According to Holbrook, et al. (2005), in Domingo (2007), there is a positive correlation between the amount of knowledge a person possess and the personal importance of the person's attitudes toward the object. Falsario (2000) in her study found that pupils had an uncertain attitude towards English as a subject. This implies that there is a need to develop a favorable attitude towards the English subject among pupils since attitude was found to have a positive relationship to performance. A positive attitude leads to a better performance in English and other subjects as well.

II. RESEARCH ELABORATIONS

The study utilized the survey-correlational method of research. The study involved 182 randomly selected samples from the population of 335 high school seniors. The participants were selected at random using lottery technique. The dependent variable in this study was English proficiency. The independent variable was attitude towards English. The antecedent variables were the students' characteristics such as sex, grade in English, type of school, level of mass media exposure, and parents' educational attainment. The questionnaire was composed of four parts. Part One obtained data on the characteristics of the respondents which included their sex, grade in English, type of school, level of mass media exposure, and parents' educational attainment. Part Two of the research instrument gathered data on the level of mass media exposure. Part Three gathered data on the attitude towards English. Part Four was the English Proficiency Test. The researcher administered the questionnaire with the help of some English teachers. The respondents who were involved in the study were predetermined by drawing of lots. The data gathered were tabulated, processed, analyzed, and interpreted. The statistical tools utilized in the analysis of data were frequency count, percentage, mean, standard deviation, t-

test for independent samples, one-way ANOVA and Gamma. All inferential tests were set at 0.05 alpha level of significance.

III. RESULTS OR FINDINGS

Attitude towards English of High School Seniors

In general, the attitude towards English of the high school seniors is "somewhat positive."

The research also found out that high school seniors who are females; with outstanding and very satisfactory grades in English; from private school and state university and college (SUC); with very high and high levels of mass media exposure; whose mothers have achieved post-graduate education, are college graduates, have attained college level and have finished high school; and whose fathers have attained post-graduate education, are college graduates, and have attained college level and elementary level have "somewhat positive" attitude towards English. On the other hand, high school seniors who are males; those whose grades in English are satisfactory, fair and needs improvement; those who come from public school; those with average, low, and very low level of mass media exposure; those whose mothers have attained high school level, are elementary graduates and have attained elementary level; and those whose fathers have finished high school, have attained high school level, and have finished high school have "neutral" attitude towards.

The standard deviations show a narrow dispersion on the students' attitude towards English. This indicates that high school seniors have more or less similar attitude towards English.

English Proficiency of High School Seniors

Generally, high school seniors have "very satisfactory" level of English proficiency.

On the basis of the result, female students; those with outstanding and very satisfactory grades in English; those students from private school and state university and college; those with very high, high and average levels of mass media exposure; those whose mothers and fathers have earned post-graduate, have finished college and have attained college level; have "very satisfactory" level of English proficiency. However, male students; those with satisfactory and fair grades in English; those students who come from public schools; those with either low or very low level of exposure to mass media; those whose mothers and fathers have finished high school, have achieved high school level, have finished elementary, and have achieved elementary level; have "satisfactory" level of English proficiency except for those whose grade in English needs improvement where their English proficiency was "fair."

Relationship between Students' Attitude Towards English and their English Proficiency

The data show that majority (60 percent) of students with positive attitude towards English have very satisfactory English proficiency compared to 40 percent of students with outstanding English proficiency. However, among students with somewhat positive attitude towards English, majority (61.10 percent) have very satisfactory, less than a quarter (24.40 percent) have satisfactory, 11.10 percent have outstanding while only very few (3.30 percent) have less satisfactory English proficiency. Among students with neutral attitude towards English, majority (67.90 percent) have satisfactory English proficiency, nearly one-fourth (23.80 percent) have very satisfactory and very few have either less satisfactory (4.80 percent) or outstanding (3.60 percent) English proficiency. Finally, for students who have somewhat negative attitude towards English, all of them (100 percent) posted a satisfactory English proficiency.

The test of association between students' attitude towards English and their English proficiency using Gamma, indicates that there is a significant relationship between students' attitude towards English and their English proficiency. This means that students with better attitude towards English tend to become more proficient in English.

IV. CONCLUSIONS

1. As a whole, the attitude towards English of the high school seniors is "somewhat positive."
2. In its entirety, the English proficiency of the high school seniors is "very satisfactory."
3. Attitude towards English is significantly related to English proficiency. Better attitude towards English can be equated to higher proficiency in English.

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Level of Usage of Teachers' Code Switching Practices as Perceived by Students in Relation to their English Language Proficiency

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Abstract- This survey-correlational study was conducted at Capiz State University- Mambusao Satellite College to determine the level of usage of teacher's code-switching practices as perceived by the students and its relation to their English Language Proficiency. Specifically it sought answers to determine the level of usage of teacher's code-switching practices as perceived by the students when taken as a whole and when classified according to the profile of the respondents in terms of course pursued, year level and type of high school graduated from, to determine the English Language Proficiency of the respondents when taken as a whole and when classified according to the profile of the respondents in terms of course pursued, year level and type of high school graduated from, to determine the significant differences in the level of usage of teacher's code-switching practices as perceived by the students when taken as a whole and when classified according to profile of the respondents in terms of course pursued, year level and type of high school graduated from, to determine the significant differences in the English Language Proficiency of the respondents when taken as a whole and classified according to profile of the respondents in terms of course pursued, year level and type of high school graduated from and to determine if the level of usage of teacher's code-switching practices as perceived by the students significantly related to the English Language Proficiency of the respondents.

Respondents perceived their teachers as "always" practicing code-switching in delivering their lessons. When grouped according to selected variables, the perceived level of usage of teacher's code-switching practices only differ in the type of high school where the respondents graduated from. Moreover, the respondents has a "Very Satisfactory" English Language Proficiency. Only when grouped according to the course pursued did the English Language Proficiency of the respondents varied. Lastly, the analysis of the data using Pearson product moment correlation showed a significant relationship between the level of usage of teacher's code-switching practices and the English Language Proficiency of the students, r=-0.146, p=0.029.

Index Terms- Code-switching Practices, English Language Proficiency

I. INTRODUCTION

Code-switching is an interesting linguistic activity which is worth looking at from a pedagogical point of view. It signifies different social and cultural functions in post-colonial territories such as the Philippines. Code-switching is pertinent to different language teaching strategies e.g. the bilingual teaching approach.

Generally, code switching in informal contexts is not contested, but research is divided on the matter of allowing code-switching in the classroom. On the local front, Inductivo (1994) cites the studies of Menil (1980), Braganza (1988),and Abad (2005) as supportive of classroom code-switching.

Abad (2005) noted that code-switching managed to lower the affective filter, and this consequently established rapport and created an atmosphere of informality. Lee (2006) likewise contends that the discourse in a math classroom should not be so different from the discourse used by students outside the classroom. The similarity in the discourses will allow students to contribute in classroom discussions and bridge any social and cultural gap.Inductivo (1994) recommended that provisions be created for code-switching in classroom interactions.

English proficiency of the college students covering 305 respondents inCapiz State University, MambusaoUnit was conducted by Magbanua,(2016). Results revealed that in terms of English proficiency, the college students are very satisfactory in terms of grammar, satisfactory in terms of spelling but are not proficient in terms of vocabulary (Magbanua, 2016). In line with this result, it might be timely to conduct study about code-switching in English subjects.

Along with this premise, this research also builds in the concept of understanding the linguistic phenomenon of code-switching.

II. RESEARCH ELABORATIONS

The study was conducted at Capiz State University-Mambusao Satellite College from September 2015-August 2016.The respondents of the study were 497 randomly selected second year, third year and fourth year students officially enrolled at Capiz State University- Mambusao Satellite College during the first semester of academic year, 2016-2017.

Proportional allocation was used to determine the number of respondents per course. A questionnaire composed of three parts- Student's Personal Characteristics, Level of Teacher's Usage of Code-switching (Norba et.al. 2016) and Level of English Language Proficiency (Magbanua, 2010). were used. Part I gathered data on student's personal characteristics.

Mean was used to describe the level of code-switching practices and English Language Proficiency of the respondents as

categorized by variables. T-test for independent samples and one-way ANOVA were used to determine the significant differences on the level of code-switching practices and English Language Proficiency of the respondents in terms of selected variables. Pearson's r was used to determine the significance of the relationship level between code-switching practices and English Language Proficiency of the respondents. Alpha level was set at 0.05.

III. RESULTS OR FINDINGS

Most (48.20%) of the respondents were taking BS Computer Science. The rest were taking up BS Office Administration (26.58%), BS Food Technology and Entrepreneurship (14.41%) and Bachelor of Arts (10.81%). This indicates that majority of the students prefer to enroll in the BSCS course.

Most (49.10%) of the respondents were categorized as second year or sophomore students. The rest were in their third year or junior (25.23%) and fourth year or senior (25.68%). The decrease of the enrollees in fourth and third year levels could be attributed to the fact that the campus is offering a ladderized course both in BSFTE and BSCS courses. Therefore, majority of the students would graduate after their second year level.

More than two-thirds (81.08%) of the respondents hailed from public schools. Being a state university, CAPSU offers a lower tuition as compared to other private schools and universities, thus students from public schools who wanted to pursue their tertiary education opted to enroll in CapSU.

Results revealed that majority (51.80%) of the students perceived their teacher as "often" practicing code-switching in their classes. Most perceived their teachers as "always" (37.84%) practicing code-switching. Only a few perceived their teachers practicing code-switching as "sometimes" (4.96%), "seldom", (3.15%) and "never" (2.25%). This implies that code-switching is prevalent in the classes and is always utilized by the teachers in discussing their lessons.

When grouped according to course pursued, almost all of the respondents perceived their teachers as "always" practicing code-switching. Only in the Bachelor of Arts, did the respondents perceived their teachers as "often" practicing code-switching. English is embedded in the curriculum of Bachelor of Arts. This could be one of the reasons why they had a lower perception of the code-switching practices of their teachers as compared to the other courses.

Regardless of the year level, the respondents perceived their teachers as "always" practicing code-switching in their classes.

Respondents that had graduated their high school education in public high schools perceived their teachers as "always" (M=4.60) practicing code-switching. Meanwhile, those who hailed from private schools perceived their teachers as practicing code-switching "sometimes" (M=3.33). This difference could be attributed to the schema of students from the private high schools to perceive their teachers as strictly utilizing English as a medium of instruction in the classroom.

When taken as a whole, respondents have a "Very Satisfactory" English Language Proficiency (M=25.99). This implies that the respondents possessed an acceptable background knowledge on the English subject.

When it comes to the course pursued, the Bachelor of Arts had the highest English Language Proficiency (M=40.83) interpreted as "Very Good". This was followed by the BSOA (M=24.42) and BSCS (M=24.09) categorized as "Very Satisfactory". The BSFTE (M=18.53) has a "Satisfactory" English Language Proficiency. These results could be attributed to the exposure of the students in English. The Bachelor of Arts students are more exposed to the structure and application of the English Language because it is a part of their curriculum.

Regardless of the year level of the respondents, their English Language Proficiency were classified as "Very Satisfactory".

Students who attended private schools (M=30.17) during their high school education has a "Good" English Language Proficiency while students who attended public high schools (M=25.75) has a "Very Satisfactory" English Language Proficiency. Probably, students from private high schools are more exposed to English materials that could explain their higher English Language Proficiency than those who were from public high schools.

Difference only emerged in the level of usage of teacher's code-switching practices when grouped according to type of school the respondents graduated from (t=0.015, p=0.000). However there were no significant differences in the level of usage of teacher's code-switching practices when grouped according to course pursued (f=0.621, p=.684). The results imply that the type of school where the respondents graduated from is related to their perception of the level of usage of their teacher's code-switching practices. On the other hand, the course pursued and the year level of the respondents did not differ. Therefore, regardless of the aforementioned variables, their perception of the level of usage of teacher's code-switching did not vary.

Results showed that the English Language Proficiency of the respondents differ, when it was grouped according to the courses they pursue (f=2.138, p=0.001). However, there were no significant differences in the English Language Proficiency when they are grouped according to year level (f=1.779, p=0.173) and type of school (t=1.342, p=0.182).

The analysis of the data using Pearson product moment correlation showed a significant relationship between the level of usage of teacher's code-switching practices and the English Language Proficiency of the students, r=-0.146, p=0.029. Therefore, the level of usage of teacher's code-switching practices as perceived by the respondents is related to their English Language Proficiency.

IV. CONCLUSIONS

1. The respondents had perceived their teachers as "Always" practicing code-switching in the classroom. This implies that code-switching is always utilized by the teachers in their discussions.
2. The respondents had a "Very Satisfactory" English Language Proficiency. This shows that the respondents possessed an acceptable background knowledge on the English subject when it comes to

subject-verb agreement, spelling, vocabulary and writing skills.

3. Students who were from private high schools perceived a lower usage of code-switching practices as compared to those who graduated from public high schools.
4. The Bachelor of Arts students had higher English Language Proficiency because they are more exposed to English Language for it is embedded in their curriculum.
5. The level of usage of teacher's code-switching practices is significantly related to the English Language Proficiency of the Students.

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Comparative Studies on the Prevalence of Ixodid Ticks on Some Selected Sedentary Farms and Trade Cattle in Adamawa State, Nigeria

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Abstract- This study compares the Prevalence of Ixodid Ticks on Some Selected Sedentary Farms and Trade Cattle in Adamawa State. The purposive data sampling technique was used to select 240 cattle from four locations (2-sedentary and 2 trade cattle), from Mayo Belwa, Fufore and Yola South Local Government Areas for four months periods (September-December, 2014). Ticks were collected from half of the body of each sampled cattle using hand-picking and preserved in a sampling bottle with 10% formaldehyde. Ages of the cattle were determined using dentition method. Breed, sex, age of cattle and collection date were recorded on each sampling bottle. The samples were then transported to National Veterinary Research Institute Laboratory for identification. Ticks collected were identified using Soulsby identification key to genera and species level. The data collected were analyzed using chi-square and t-test at 0.05 confidence level. The results showed 79.0% and 94.0% prevalence for sedentary and trade cattle respectively which showed significant differences ($p<0.05$) while other variables (i.e breeds, sex and ages of cattle) showed no significant differences. The *Rhipicephalus appendiculatus* is most prevalent which also infest all breeds except white fulani, while *Amblyomma variegatum* and *Hyalomma truncatus* were found prevalently infesting Bunaji. Both sedentary and trade cattle suffered tick infestation and therefore needed to be controlled.

Index Terms- Ticks, Ixodid,Sedementary, Bunaji

I. Introduction

Ticks are ranked as the most economically important ectoparasites of livestock in the tropics, including sub-saharan Africa [1]. Their veterinary importance is related to their blood-feeding, from which both their direct and indirect pathogenicity originates [2]. In livestock farming enterprise, parasitic diseases constitute major obstacles in maintaining good health and high productive performance of the herd, thus resulting in economic loss to the farming business [3]. The economic importance of ticks had long been recognized due to their ability to transmit diseases to animals [4]. In Nigeria, 90% of the cattle population are kept under the traditional pastoral husbandry of Fulani herders; mostly concentrated in the central to northern part of the country [5], [6]. Under the Fulanis' management, cattle are extensively grazed in pastures and forest, and exposed to infestation by the three ticks genera present in Nigeria (*Amblyomma*, *Hyalomma* and *Rhipicephalus spp*., sub-genus *Boophilus spp*. included) [7]. Apart from the direct effect of tick infestation on animal production and productivity, ticks are inevitably efficient vectors of many pathogens, like protozoa, viruses, bacteria, and rickettsiae to man and domestic animals. In cattle, tick infestation alone can cause anaemia, stress, reduction in weight gain and milk yields, depreciation of hide value, hypersensitivity and toxicosis, leading also to secondary infections [2]. In addition, some tick species can act as vectors of pathogens causing a number of tick-borne diseases (TBDs), a serious impairment to cattle health and productivity in sub-saharan Africa. Human as well are not completely safe from several possible diseases resulted through direct tick bites or food poising through tick excrement, the like of spotted fever, relapsing fever, Lyme disease, tularemia among others makes human-animal relationship become unsaved whenever there is tick infestation [8].

Considering the relationship that exist between tick abundance and tick borne infection. This study was aimed to compare the prevalence of ticks' infestation in Sedentary and Trade cattle in Adamawa State.

II. Materials and Method

2.1 Study Area

Yola South Local Government Area the capital city of Adamawa State is located within latitude 9^0 13' 48" N of the equator and longitude 12^0 27' 36" E of the Greenwich meridian. It has a total land mass of 1,139.1km^2 and share boundaries with Yola North in the North and Fufore in the South and East. The L.G.A. has a population figure of 257,706, [15]. Yola South is considered to be one of the most important commercial and agricultural centers in Adamawa State of Nigeria.

Fufore L.G.A. is one of the twenty one local governments in Adamawa State. It is 26km away from Yola, the state capital. It lies between latitude 9^0 13' N and longitude 12^0 39' E of Green which meridian. It is bounded on the east by the republic of Cameroon and in the west by Yola, Girei and Maiha Local Government Areas. The local government has a total land mass of 4464km^2 and population size of 207287 [9].The Sebore farm is an agricultural farm of private liability located km 12 Mayo-Belwa-Ngurore Road. The farm plays a very vital role in the transfer of knowledge to peasant farmers and other community dwellers who wish to produce fish on small scale, cattle, fruits

and other improved agro related products. The farm has been currently linked with partnership with many governments mostly from North-eastern Nigeria and non-governmental agencies in partnership towards food insecurity and acquisition programme towards self-employment in agriculture for unemployed youths and women farmers, school leavers, and graduates in agriculture or related disciplines [10]. The Borno state government signed Memorandum of Understanding with the Sabore Farm to allow the Borno underwent intensive training in agriculture to boost food production of the state and to improve condition of living of people and to be self-employed.

2.2 Study Design

Three Local Government Areas (LGAs), namely Yola, Fufore, and Mayo-Belwa were used for the study. Among these LGAs Mayo-Belwa and Fufore were identified as places where sedentary cattle are found (i.e in Sebore farm and Benue Valley Farm respectively). Whereas Yola and Fufore local government were structured into circles. They serve as a route through which these trade cattle enters from neighboring countries. One entry point was at Gurin, Fufore LGA while the second one is at Yola cattle market. Oral interviews and questionnaires were used to obtain pre-study data before the commencement of the study in order to acquaint the farmers with the study and also to identify where to take samples.

2.3 Sample Collection

Cattle were randomly sampled from each of the herds for the survey of ticks' infestation. Collection of sample was done in four months (September – December). Ten cattle out of every 100 cattle were sampled for tick collection. The ages of the cattle were determined using dentition method as described by [11]. Breeds of cattle on each herd was recorded. Estimation of total tick infestation per animal was done by collecting ticks manually from half of the body of the cattle and multiplying by two as expressed by [12]. Ticks were placed on a pre-labeled sampling bottle and fill with 10% formaldehyde. The sites of collection as well as collection date were also labeled on the sample bottles. Field information like name of farmer, Animal identification number, month of observation and age were collected. While the identification of ticks for genera and species was done in National Veterinary Research Institute Laboratory, Yola. Adopted the identification keys described by [13] and [14].

2.5Data Analysis

The data collected from each studied animal were recorded and were analyzed using, simple percentage, Chi-square test and T-test. at p-value $\leq$ 0.05 (95% C.I was considered significant) ran on SPSS version 20.

III. Results

The prevalence patterns among sedentary and trade cattle indicated 79% and 94.2% prevalence respectively (Table 1). The results revealed that *Rhipicephalus appendiculatus* was most prevalent species infesting both sedentary and trade cattle by 89.5% and 55.8% respectively, while *Rhipicephalus (Boophilus) decoloratus* was least prevalent among tick species infesting sedentary and trade cattle by 1.1% and 0.0% respectively. The results indicated that there was significant differences in the prevalence of ticksamongsedentary and trade cattle .

***Table* 1: Prevalence of Tick Infestations amongst Sedentary and Trade cattle based on Location**

Type	No. examined	No. Infested (%)	No. infested (%) by sampled tick			
			Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*
Sed	120	95(79.0%)	4(4.2%)	1(1.1%)	22(23.2%)	85(89.5%)
TrC	120	113(94.2%)	54(47.8%)	0(0.0%)	39(34.5%)	63(55.8%)

t-calc (2.96), t-critical (1.968), degree of freedom (238), P-value (0.012).
Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

Prevalence of tick infestation amongst sex revealed males of trade cattle were (93.0%) infested than sedentary male cattle (80.6%). Also, female cattle in the sedentary were less infested (83.1%) than female in the trade cattle 95.2% and in either case, the difference was insignificant (P > 0.05). *Rhipicephalus appendiculatus* species had higher infestation rates of (76.0%) than the *Boophilus decoloratus* (4.0%) and it was statically significant p<0.05 as shown in Table 2.

***Table* 2 Prevalence of Tick Infestation among the Sedentary and Trade Cattle based o Sex**

Type	Sex (N)	No. (%) Infested	No. (%) infested with				
			Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	Hyalomma truncates	*Rhipicephalus appendiculatus*	Total
Sed	Male (31)	25(80.6%)	2(8.0%)	1(4.0%)	3(12.0%)	19(76.0%)	25
TrC	Male (57)	53(93.0%)	25(47.2%)	0(0.0%)	19(35.8%)	28(52.8%)	72
Sed	Female (89)	74(83.1%)	2(2.7%)	0(0.0%)	19(25.7%)	66(89.2%)	87
TrC	Female (63)	60(95.2%)	29(48.3%)	0(0.0%)	20(33.3%)	35(58.3%)	84

Chi-square (x^2) values (0.60) and (1.658) for male and female cattle, table value (3.841), df (1), P-values >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

The result in Table 3 showed that age group (>2½)of trade cattle were more infested (98.7%) than sedentary cattle of the same age group (91.0%). In overall, the adults (>2½)were more infested than the calf (<1½). *Rhipicephalus appendiculatus* was most prevalent ticks' species infesting cattle in the ages less than 1½ year by 35% and 12.5% in both locations. For the age group 1½ to 2½ for trade cattle *Amblyomma variegatumrevealed* most prevalent (56.8%) and *Rhipicephalus appendiculatus*(42.1%) for sedentary cattle. Furthermore, *Rhipicephalus appendiculatus* was reveled most prevalent ticks species for the cattle in the age >2½ years in both locations. The results revealed chi-square values which are all less than table values 3.841 at degree of freedom of 1, thus, implied that the prevalence of tick infestation among age group of cattle in both locations were not significant.

***Table* 3: Prevalence of Tick Infestation and their species among the Sedentary and Trade Cattle based on Age**

Type	Age (Year)	No. of Cattle examined	No. (%) Infested	No. (%) infested with				
				Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*	*Total*
Sed	<1½	20	7(35.0%)	–	–	–	7(35.0%)	7
TrC	<1½	8	3(37.5%)	1(12.5%)	–	1(12.5%)	1(12.5%)	3
Sed	1½ – 2½	38	31(81.6%)	6(15.8%)	–	9(23.7%)	16(42.1%)	31
TrC	1½ – 2½	37	36(97.3%)	21(56.8%)	–	12(32.4%)	16(43.2%)	49
Sed	>2½	78	71(91.0%)	3(3.8%)	1(1.3%)	20(25.6%)	62(79.5%)	86
TrC	>2½	75	74(98.7%)	32(42.7%)	–	26(34.7%)	46(61.3%)	104

<1½ years:-x^2 value (0.016), 1½ - 2½ years: - x^2 value (0.010), >2½ years: x^2 *value* (0.420), table value (3.841), df(1), P-value >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

The results in Table 4 implied that there is no significant difference between the prevalence of ticks infestation among sedentary and trade cattle with respect to breeds. More so, *Amblyomma variegatum* revealed most prevalent species for trade cattle in the Wadara (75%) and Bunaji (51%) breeds, while *Boophilus decoloratus* indicated least prevalent (3.3%) in sedentary. *Rhipicephalus appendiculatus* indicated high prevalence across the rest of the cattle breeds irrespective of location.

***Table* 4 Prevalence of tick Infestation and their Species among Sedentary and Trade Cattle based on Breeds**

Breed	Type	No. examine	No. (%) infected	No. (%) infected with *Amblyomma variagatum*	*Boophilus decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*
Adamawa gudali	Sed	NA	NA	NA	NA	NA	NA
	TrC	32	23(71.9%)	8(25.0%)	0(0.0%)	4(12.5%)	14(43.8%)
Brahman	Sed	42	34(81.0%)	0(0.0%)	0(0.0%)	0(0.0%)	34(81.0%)
	TrC	5	3(60.0%)	1(20.0%)	0(0.0%)	0(0.0%)	2(40.0%)
Wadara	Sed	28	25(89.3%)	2(7.1%)	0(0.0%)	14(50.0%)	20(71.4%)
	TrC	4	4(100.0%)	3(75.0%)	0(0.0%)	1(25.0%)	1(25.0%)
Rahaji	Sed	30	23(76.7%)	2(6.7%)	1(3.3%)	7(23.3%)	19(63.3%)
	TrC	5	4(80.0%)	2(40.0%)	0(0.0%)	0(0.0%)	3(60.0%)
Simmental	Sed	18	12(66.7%)	0(0.0%)	0(0.0%)	1(5.6%)	11(61.1%)
	TrC	NA	NA	NA	NA	NA	NA
Sokoto gudali	Sed	2	1(50.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(50.0%)
	TrC	14	4(28.6%)	2(14.3%)	0(0.0%)	0(0.0%)	2(14.3%)
Bunaji	Sed	NA	NA	NA	NA	NA	NA
	TM	60	53(88.3%)	31(51.7%)	0(0.0%)	25(41.7%)	18(30.0%)

x^2 values: 3.180, 0.513, 0.027 and 0.374, for brahman, Wadara,Rahaji and Sokoto gudali
Table value (3.841), df (1), P-value >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

IV. Discussions

In this study, the prevalence of tick infestations was lower in sedentary (79.0%) than in trade cattle (94.2%), and there is significant difference, $P < 0.05$ These results agreed with [15]; [16]; [17] who reported that animal movement from one zone to another is widely considered as means of introduction of ticks into new ecosystems. [16] reported that in Nigeria, about 80% of livestock are owned by the traditional sector, mostly nomads and that the overwhelming cattle routes in the northern part of Nigeria alongside various inter-border route allow ticks that are expected to have changed their distribution to emerged in new zones. Thus, the trade cattle which mostly involved usual movement for many factors such as grazing, seeking for good markets and better settlement become highly susceptible to tick infestation than those confined in particular location and vegetation.

The findings of the study, also revealed that the prevalence of tick infestation in relation to sex showed no statistically significant differences in the two locations $p < 0.05$. This is in contrast with the findings of [21] and [23] who reported higher infestation of tick in males and females respectively. This difference might be attributed to ecological zones where the studies were carried out as it can affects tick distribution.

The susceptibility of cattle to tick infestation with respect to age is found significant by this study. The results in respect to ages of cattle indicates close tick infestation patterns. This result agreed with the findings of [18]; [19]; [20] who reported higher tick infestation in adult than in younger cows. [21]also reported that age of cattle was observed to have significant effect on tick-borne infection. This is in contrast with the findings of [22] who reported that age of animal has no significant effect on their prevalence to tick species and [22]who found that younger cattle were more susceptible to tick infestation than older cattle. On the other hand, this study revealed no significant difference when comparing between the two locations with respect to age ($p< 0.05$). This might be as a result of exposing the cattle regardless of age to the same treatment. For example, both adult and calf were moved for grazing.The findings of this study also reveals that the relationship between ticks infestation among breed of sedentary and trade cattle had no significant different. Of all the breeds irrespective of location, the tick infestations remain high, though, the results revealed that some breeds are more

susceptible to some species of tick than others. For instance Bunaji indicates high susceptibility to the Amblyomma variegatum than other breeds. This could be attributed to the fact that Bunaji (white fulani) were higher in number in the study sites during the study period.

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Rare alleles and level of inbreeding in five chicken populations reared in Ogun and Ondo states of Nigeria as revealed by microsatellite markers

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Abstract- Microsatellite markers MCW88, MCW150, ADL171 and ADL206 were used to analyze genetic variability and divergence of chicken populations of different geographical location in Ogun and Ondo States, Nigeria. The chicken populations included 16 Frizzle feathered (Ff), 16 Normal feathered (Nf), 16 Naked neck (Nn), 16 Bovan nera (Bn) and 16 Black harco (Bh) making a total of 80 isolated genomic DNAs. Sample of DNAs were amplified by polymerase chain reaction (PCR) and separated on 1% agarose gel. 84 alleles were detected by the selected markers. The number of identified alleles per locus ranged from 2 to 14. High value of F_{ST} (0.1167) across loci revealed a substantial degree of population differentiation. In the majority of the chicken populations high heterozygosity and some level of inbreeding were determined. The heterozygosity ranged from 0.5315±0.08 to 0.6989±0.03 while inbreeding ranged from 0.2168±0.19 to 0.4448±0.09. The Nei's chord genetic distance (D_a) was also calculated using Microsatellite Analyzer. Dendrogram developed using neighbor-joining method showed that Bovan nera(Bn) vs. Black harco(Bh) formed the first group (0.1404), followed by Frizzle feathered (Ff) vs. Bovan nera(Bn) (0.1825), Frizzle feathered(Ff) vs. Normal feathered(Nf) (0.2255), Normal feathered(Nf) vs. Naked neck(Nn) (0.3699), respectively. These results highlight the applicability of microsatellite markers to determine rare allele, inbreeding coefficient and genetic divergence in five chicken populations in Ogun and Ondo States, Nigeria. It was concluded that the markers were useful in revealing genetic information present in the five chicken populations.

Keywords: Chicken populations, genetic divergence, microsatellite, phylogenetic relationship

I. INTRODCTION

An allele is one of a number of alternative forms of the same gene or some genetic locus. Sometimes, different alleles can result in different observable phenotypic traits, such as different pigmentation. However, most genetic variations result in little or no observable variation. Traditionally rare alleles have been defined in term of their frequency. Paul Joyce and Simon Tavares (1995) defines rare variant as an allele with relative frequency of less than q (average frequency), for some small pre-specified value of q such as 0.01. The inbreeding coefficient of an individual is the probability that two alleles at any autosomal locus are identity by descent (ibd). Two alleles are ibd if one is physical copy of the other or if they are both physical copies of the same ancestral allele. The inbreeding coefficient is often calculated from pedigree information, but it is also possible to estimate inbreeding using information from genetic markers. In the absence of pedigree information, genetic markers have been used extensively to estimate relatedness between individual and the level of inbreeding in population (Olowofeso et al., 2016; Al-Qamashoui et al., 2014; Ardeshir et al., 2012). Many genetic diversity variables and approaches can be achieved by using microsatellite markers. These include allele frequencies, inbreeding coefficient, rare alleles, proportion of polymorphic loci, observed and expected heterozygosity, phylogenetic relationship, genetic admixtures and structure (Olowofeso et al., 2016; Miao et al., 2013; Leroy et al., 2012; Getachew et al., 2016). Microsatellite have become the preferred type of genetic markers because of their abundance, random distribution, co-dominant inheritance, high variability, possibility of automated detection Goldstein and Pollock (1997) and ability to determine heterozygosity and genetic distance based on microsatellite analyses is regarded as the most convenient method. Report show that microsatellites are excellent genetic markers because of their locus identity, high PIC value, widespread distribution in the genome, multi-allelisms and their co-dominant nature (Olowofeso et al., 2005; Warren et al., 2008; Ohwojakpor et al., 2012). The high variability of microsatellite and their distribution give them advantages over other markers. The genetic parameters of chicken populations were examine using decamer and microsatellite markers by Oni et al. (2016). Microsatellites have been effective in evaluating genetic differences between and within breed of chicken and also to determine population sub structure (Adeleke et al., 2011; Olowofeso et al., 2011).The objective of the present study was to determine the applicability of microsatellite markers with chicken populations to know the level of inbreeding, rare alleles and genetic divergence of four microsatellite markers used with the five chicken populations in Ogun and Ondo States, Nigeria.

II. MATERIALS AND METHODS

Blood collection, location and sample size

Blood samples were collected from different geographical location in Ogun and Ondo States, Nigeria using random sampling by brachial venipuncture aseptically into a labelled haemotocrit tube containing ethylene diamine tetra acetic acid (EDTA) used as an anticoagulant. Approximately 2ml of blood was collected from each of the birds using 5ml disposable syringe, the blood was

transferred to the laboratory for DNA extraction. Analyses were carried out at the Biotechnology centre, Federal University of Agriculture, Abeokuta, Nigeria. The sample size by population were Frizzle feathered (16), Normal feathered (16), Naked neck (16), Bovan nera (16), Black harco (16), respectively, making a total of 80 chicken populations.

DNA isolation, PCR protocol and electrophoresis

Individual DNA was isolated from chicken blood collected using bench protocol, DNA quality was checked by electrophoresis in a mini gel and quantified using a spectrophotometer based on absorbance at 260nm and 280 nm respectively, each DNA was adjusted to 100 ng/µL. Genotyping of DNA samples at the 4 microsatellite markers were carried out using the isolated DNA from five chicken populations. The sequences of the microsatellite markers were replica of those used by Oni et al. (2016) and coded MCW 150, MCW 88, ADL 206, ADL 171. The microsatellite (MS) PCR component in each micro-PCR tube, contains 1 µL template DNA, 2.5 µL of 10 x PCR buffer, 1 µL of 25 mm dNTP, 2 µL (1 µL forward and 1 µL reverse form) of each pair of primers, 0.2 µL of (5 U/µL) Taq DNA polymerase (enzyme), 2.2 µL of 25 mm/molMg2+ with 16.1 µL sterilised distilled water added. The reaction programme was as follow: initial denaturation (940C, 300 s), 35 cycles of denaturation at (940C, 60 s), annealing temperature ranged between 460C and 550C for 60 s and extension at (720C, 60 s), followed by final extension at (720C, 600 s). The fragments amplified by PCR were separated by gel electrophoresis using 1% agarose gel with a drop of (0.5 µL) ethidium bromide used as staining agent. Exactly 1 µL of mobility marker was place on cellophane paper and 10 µL of amplified products were added, mixed and loaded into capillary well of prepared gel, the buffer used in the gel was 1 x TBE, while 10 µL of PBR322DNA/Msp1 was used as ladder to estimate the size of the amplicons. The electrophoresis lasted for 1 hour at 100 V and 20 mA.

Statistical Analysis

The microsatellite data obtained with the five chicken populations were analyzed with Microsatellite Analyzer (MSA) Version 4.05 developed by Dieringer and Schlotterer (2003) to obtained allele frequency, allelic richness, unique allele, F Statistic and inbreeding coefficient. The unbiased genetic distances (DN) were also obtained with the use of Microsatellite Analyzer. The results were used to construct the dendrogram by neighbour-joining systematic analysis.

III. RESULTS AND DISCUSSION

Allele size and frequency distribution

Figures 1 to 4 represented the allele sizes and frequency distribution at the four microsatellite markers used with the five Nigerian chicken populations. 84 alleles were detected by the selected markers. The number of identified alleles per locus ranged from 2 to 14. Six alleles were produced by marker MCW 150 and the allele size ranged from 145 to 155 base pairs (Figure 1). The highest frequency of 0.6667 at 147bp band was observed in Normal feathered chicken population, while Bovan Nera chicken population recorded the lowest of 0.0333 at 145bp band. The bands frequency of 147bp, 149bp and 151bp fragments were similar across Naked neck, Bovan nera and Black harco chicken population. 147bp and 151bp allele were present in all the chicken populations (Frizzle feathered, Normal feathered, Naked neck, Bovan nera and Black harco). The band size of 145bp, 149bp and 153bp were found in Bovan nera. No band was recorded for Frizzle feathered, Normal feathered, Naked neck and Black harco at 145bp, 149bp and 153bp; Frizzle feathered and Naked neck at 155bp. Allele frequencies data for microsatellite MCW 88 were shown in Figure 2. Five alleles were detected by MCW 88 which ranged from 196bp to 204bp. The highest frequency of 0.7857 at 200 bp was observed in Naked neck, while Frizzle feathered and Bovan nera recorded the lowest frequency of 0.0313 at 200 and 202 bp. No band was detected for Normal feathered at band 196bp and 204bp; Naked neck at 196bp and 198bp; Frizzle feathered at 198bp, 202bp and 204bp; Bovan nera and Black harco at 204bp. The bands of 200bp were detected in all the populations. Allele frequency data for the microsatellite ADL 206 were shown in Figure 3. ADL 206 amplified 5 alleles which ranged from 184bp to 204bp. The Frizzle feathered recorded the highest frequency of 0.8077at 184bp, while the lowest frequency of 0.0416 was recorded at 200bp by Normal feathered chicken population. The bands of 184bp and 186bp were detected in Frizzle feathered; 184bp, 200bp and 202bp were detected in Normal feathered; 202bp and 204bp were detected in Naked neck; 184bp, 202bp and 204bp were detected in Bovan nera; while 184bp, 200bp, 200bp and 204bp were detected in Black harco. No band was detected for Frizzle feathered at 200bp, 202bp and 204bp; Normal feathered at 186bp and 204bp; Naked neck at 184bp, 186bp and 200bp; Bovan nera at 186bp and 200bp; Black harco at 186bp. The allele frequencies determined for microsatellite ADL 171 are shown in Figure 4. For ADL 171, there were 14 alleles which range from 180bp to 204bp. Allele frequency was greatest at 0.5385 for Naked neck chicken population at 190bp. The lowest frequency of 0.03125 was observed in Bovan nera at 202bp and 204bp. No band was observed at 180bp, 182bp, 184bp, 186bp, 188bp, 189bp, 190bp and 192bp for Frizzle feathered; 189bp, 190bp, 192bp and 202bp for Normal feathered; 180bp, 182bp, 184bp, 194bp, 196bp, 198bp, 200bp, 202bp and 204bp for Naked neck; 180bp, 182bp, 184bp, 186bp, 188bp, 189bp, 190bp and 194bp for Bovan nera; 180bp, 182bp, 184bp, 186bp, 188bp, 189bp, 190bp, 192bp and 194bp for Black harco.

Rare/Unique alleles

Tables1-4 shows the observed alleles unique to certain populations. A total of 10 unique alleles were observed. For Bovan nera, a total of 2 unique alleles were observed in MCW 150 (Table 1). Table 2 shows 2 unique alleles in MCW 88, 1 unique alleles each was observed in Normal feathered and in Naked neck. In ADL 206, only 1 unique allele was observed in Frizzle feathered (Table 3). The Normal feathered had 3 unique alleles in ADL 171, while Naked neck had 2 unique alleles also in ADL 171 (Table 4). Consequently, unique alleles could be of importance in the improvement of future strategies towards genetic typing and line identification most especially if occur in relatively high frequency as earlier reported by Toro *et al.* (2006). It was also pointed out by Wimmers *et al.* (2000) that unique alleles could be utilized as population fingerprint even at one allele per locus. The total number of unique alleles in this study is lower than the numbers (13) reported by Roushdy *et al.* (2008) for Egyptian Fayoumi

native breed with six microsatellite markers. Such differences could be attributed to differences in sample size as well as characteristics of microsatellite markers employed. Hillel *et al.* (2003) reported a proportion of rare alleles greater than 10%. Olowofeso *et al.* (2016) also detected 20.29% rare alleles in Nigerian chicken populations confirming the suitability of microsatellite markers in detecting rare alleles in chicken populations. In this studied, 33.33% rare alleles were detected indicating that the four microsatellite markers were suitable for detecting rare alleles in chicken populations, highest number of rare alleles was observed in Normal feathered chicken and can be selected for increased production ahead of other chicken populations examined.

F Statistics

Table 6 reveals the values of global F_{ST}, F_{IT}, F_{IS}, G_{ST} and N_m over all loci considered in this study. The mean value of correlation of genes of different individuals in the same population (F_{ST}) was 0.1667±0.04; the correlation of genes within individual over the all population (F_{IT}) had a mean value of 0.4549±0.09, while correlation of genes within individuals within population (F_{IS}) had a mean value of 0.3509±0.10. The mean value of F_{ST} (0.1677) across loci revealed a substantial degree of population differentiation. Genetic differentiation (G_{ST}) and gene flow rate/migration rate (N_m) had a mean value of 0.1778±0.03 and 1.2632±0.44, respectively. The highest value of 0.2284 was observed in F_{ST} at locus MCW 88, while the lowest value of 0.0880 was detected in locus MCW 150. The highest value of 0.6994 was detected in F_{IT} at locus ADL 206, while the lowest value of 0.2572 was seen in locus ADL 171. Locus ADL 206 had the highest value of 0.6117 at F_{IS} while locus ADL 171 had the lowest value of 0.1514 at F_{IS}. G_{ST} values recorded ranged from 0.1075 at locus MCW 150 to 0.2424 at locus ADL 206 and N_m values ranged from 0.8446 in locus MCW 88 to 2.5909 in locus MCW 150, respectively. This studied shows that migration rate (N_m) depends mainly on F values and a lower value of F brings about higher value of N_m or vice versa. Gene flow occurred among chicken populations because the calculated migrant rate for each marker across population was more than zero. High value of fixation indices (F_{IT} and F_{IS}) observed indicates that inbreeding occurs within these chicken populations.

Inbreeding coefficient (F_{is})

Table 7 shows the value of inbreeding coefficient (F_{is}) using four microsatellite loci. The highest mean value of potential inbreeding of 0.4448±0.09 was observed in Frizzle feathered population, while the lowest mean value of 0.2168±0.19 was observed in Black harco population. The F_{is} value detected in the Normal feathered, Naked neck and Bovan nera chicken populations were 0.4105±0.22, 0.2954±0.04, 0.3406±0.18, respectively. The inbreeding coefficient (F_{is}) which suggested the potential reduction in heterozygosity due to non-random mating and may serve as an indication of inbreeding within the population. In the present study, the F_{is} value was detected in all the chicken populations. This indicated that inbreeding occur the population sampled, resulting in more related bird than expected. The inbreeding could be partly due to the fact that the chicken populations in this study have been subjected to some form of selection over time or partly due to maternal effect.

Heterozygosity (H_S)

Table 9 shows the gene diversity in the five chicken populations which reflected the heredity and mutation of loci in each group. The highest value of 0.6989±0.03 was observed in Bovan nera. This was followed by Black harco, Normal feathered, Frizzled feathered and Naked neck with values of 0.6976±0.02, 0.6147±0.09, 0.5450±0.10 and 0.5315±0.08, respectively. The mean values across populations ranged from 0.5497±0.08 in ADL 206 to 0.7543±0.04 in ADL 171. The highest value of 0.8730 was observed in Normal feathered in locus ADL 171, while the lowest value of 0.3185 was observed in Frizzle feathered in locus ADL 206. Considering the number of allele, markers, high heterozygosity and level of inbreeding within the chicken populations it means that the markers were useful in revealing genetic information present in these chicken populations.

Genetic distance and phylogenetic relationship

The Nei's chord genetic distance was presented in Table 8. The smallest genetic distance was obtained between Bovan nera vs. Black harco (0.1404) while the largest genetic distance was found between Normal feathered vs. Naked neck (0.3699). Bovan nera vs. Frizzle feathered and Frizzle feathered vs. Normal feathered had genetic distance of 0.1825 and 0.2255, respectively. Using these distances obtained, the dendrogram (Figure 5) was constructed using the neighbour-joining method. In the dendrogram, Bovan nera and Black harco formed the first clustered group with the smallest genetic distance and have the smallest measure of relatedness, followed by Frizzle feathered and Normal feathered and Naked neck respectively. Naked neck was the most distantly related among the examined chicken.

IV. CONCLUSION

The results of this research confirm the usefulness of microsatellite markers for the research of genetic variation and divergence in five chicken populations. Although, only a small number of microsatellite markers were used, relatively reliable results were obtained that is markers were useful in revealing genetic information present in the five chicken populations. This study revealed the level of inbreeding, proportion of rare alleles (33.33%) and common alleles (66.67%) present in the chicken. The inbreeding coefficient in the chicken ranged from -0.0276 in Bovan nera population detected by ADL 171 to 0.8511 in Normal feathered population revealed by ADL 206, some of the markers produce negative value within the chicken populations but the fixation index (F_{IS}) of other markers were greater than zero, an indication that inbreeding occur in the five chicken populations. Normal feathered chicken has the highest number of rare alleles and can be selected for increase production. All the microsatellite markers were effective in detecting rare alleles but ADL 171 was more promising in detecting rare alleles. The information on heterozygosity levels, rare alleles and inbreeding coefficient for individual/populations can be used to design breeding programmes which will maximize the genetic variation in successive generation.

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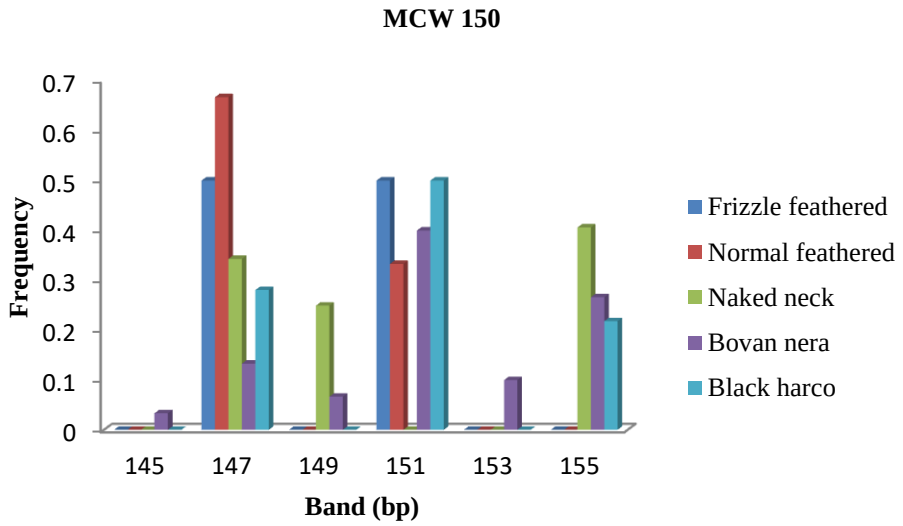

Figure 1: Allele size (bp) and allele frequencies distribution produced by MCW 150 in five chicken populations in Ogun and Ondo States, Nigeria.

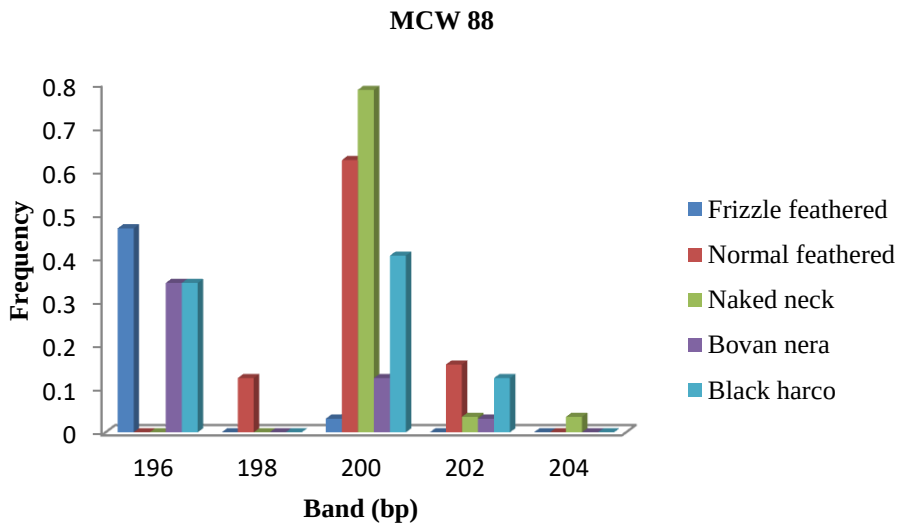

Figure 2: Allele size (bp) and allele frequencies distribution produced by MCW 88 in five chicken populations in Ogun and Ondo States, Nigeria.

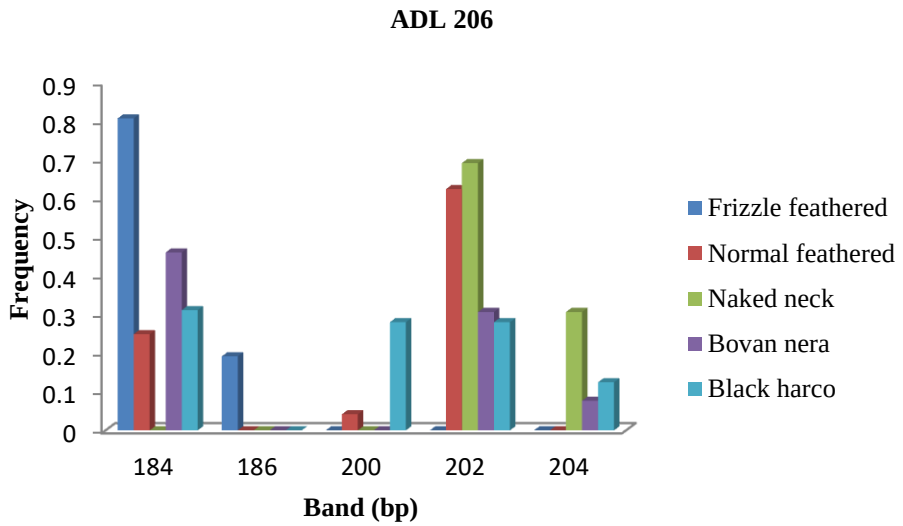

Figure 3: Allele size (bp) and allele frequencies distribution produced by ADL 206 in five chicken populations in Ogun and Ondo States, Nigeria.

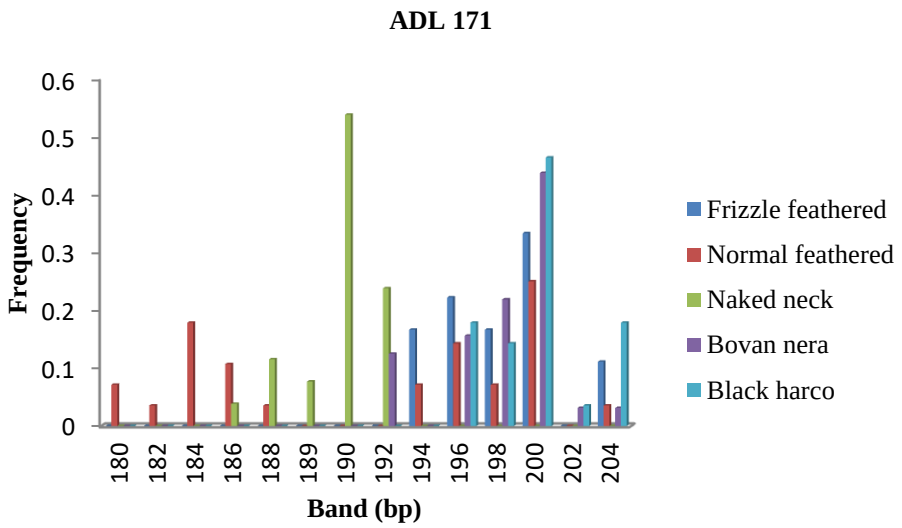

Figure 4: Allele size (bp) and allele frequencies distribution produced by ADL 171 in five Nigerian chicken populations in Ogun and Ondo States, Nigeria.

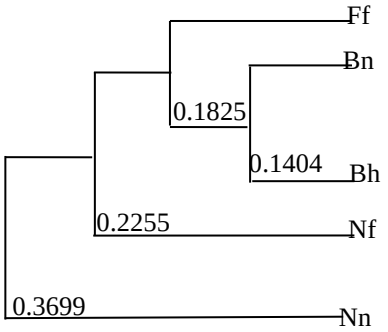

Figure 5: Dendrogram based on D_a-values of microsatellites data (using the minimum distance clustering method) and the numbers at the branch represents measure of relatedness

Table 1: Rare/Unique alleles (bold values) produced by MCW 150 in five Nigerian chicken populations in Ogun and Ondo states, Nigeria

Band/fragment size	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black harco
145	0.0000	0.0000	0.0000	**0.0333**	0.0000
147	0.5000	0.6667	0.3434	0.1333	0.2813
149	0.0000	0.0000	0.2500	0.0667	0.0000
151	0.5000	0.3333	0.0000	0.4000	0.5000
153	0.0000	0.0000	0.0000	**0.1000**	0.0000
155	0.0000	0.0000	0.4063	0.2667	0.2188

Table 2: Rare/unique alleles (bold values) produced by MCW 88 in five Nigerian chicken populations in Ogun and Ondo states, Nigeria

Band/fragment size	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black Harco
196	0.4688	0.0000	0.0000	0.3438	0.3438
198	0.0000	**0.1250**	0.0000	0.0000	0.0000
200	0.0313	0.6250	0.7857	0.1250	0.4063
202	0.0000	0.1563	0.0357	0.0313	0.1250
204	0.0000	0.0000	**0.0357**	0.0000	0.0000

Table 3: Rare/Unique alleles (bold values) produced by ADL 206 in five Nigerian chicken populations in Ogun and Ondo states, Nigeria

Band/fragment size	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black Harco
184	0.8077	0.2500	0.0000	0.4615	0.3125
186	**0.1923**	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0416	0.0000	0.0000	0.2813
202	0.0000	0.6250	0.6923	0.3077	0.2813
204	0.0000	0.0000	0.3077	0.0769	0.1250

Table 4: Rare/Unique alleles (bold values) produced by ADL 171 in five Nigerian chicken populations in Ogun and Ondo States, Nigeria

Band/fragment size	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black harco
180	0.0000	**0.0714**	0.0000	0.0000	0.0000
182	0.0000	**0.0357**	0.0000	0.0000	0.0000
184	0.0000	**0.1786**	0.0000	0.0000	0.0000
186	0.0000	0.1071	0.0385	0.0000	0.0000
188	0.0000	0.0357	0.1154	0.0000	0.0000
189	0.0000	0.0000	**0.0769**	0.0000	0.0000
190	0.0000	0.0000	**0.5385**	0.0000	0.0000
192	0.0000	0.0000	0.2380	0.1250	0.0000
194	0.1667	0.0714	0.0000	0.0000	0.0000
196	0.2222	0.1427	0.0000	0.1563	0.1786
198	0.1667	0.0714	0.0000	0.2188	0.1429
200	0.3333	0.2500	0.0000	0.4375	0.4642
202	0.0000	0.0000	0.0000	0.0313	0.0357
204	0.1111	0.0375	0.0000	0.0313	0.1786

Table 6: F Statistics value for all loci and gene flow/migrant rate

Locus	F_{ST}	F_{IT}	F_{IS}	G_{ST}	N_m
MCW 150	**0.0880**	0.4272	0.3719	**0.1075**	**2.5909**
MCW 88	**0.2284**	0.4357	0.2686	0.2295	**0.8446**
ADL 206	0.2258	**0.6994**	**0.6117**	**0.2424**	0.8591
ADL 171	0.1245	**0.2572**	**0.1514**	0.1319	0.7580
$\bar{X}$±SEM	0.1667±0.04	**0.4549±0.09**	**0.3509±0.10**	**0.1778±0.03**	1.2632±0.44

Table 7: Level of inbreeding (F_{is}) in the five Nigerian chicken populations as revealed by four microsatellite markers

Locus	Populations				
	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black harco
MCW 150	0.6107	0.7085	0.2508	0.1104	0.3122
MCW 88	0.3060	-0.0992	0.2230	0.5040	0.2853
ADL 206	0.2754	0.8511	0.2958	0.7756	0.5817
ADL 171	0.5870	0.1818	0.4118	- 0.0276	-0.3122
$\bar{X}$±SEM	**0.4448±0.09**	0.4105±0.22	0.2954±0.04	0.3406±0.18	**0.2168±0.19**

Table 8: Nei's chord genetic distances (D_a) among the five chicken populations examined in this study

Population	Frizzle feathered	Normal feathered	Naked neck	Bovan nera	Black harco
Frizzle feathered	0.0000				
Normal feathered	0.3252	0.0000			
Naked neck	0.7020	0.3699	0.0000		
Bovan near	0.1825	0.3018	0.4353	0.0000	
Black harco	0.2427	0.2255	0.4087	0.1404	0.0000

Table 9: Heterozygosity (H_S)

Locus	Populations					$\bar{X}$±SEM
	Frizzle feathered	Normal feathered	Naked neck	Bovan Nera	Black Harco	
MCW 150	0.5138	0.4575	0.6674	0.7494	0.6361	0.6048±0.05
MCW 88	0.5403	0.5686	0.3677	0.6300	0.6996	0.5612±0.06
ADL 206	**0.3185**	0.5598	0.4369	0.6862	0.7470	**0.5497±0.08**
ADL 171	0.8072	**0.8730**	0.6539	0.7298	0.7077	**0.7543±0.04**
$\bar{X}$±SEM	0.5450±0.10	0.6147±0.09	**0.5315±0.08**	**0.6989±0.03**	0.6976±0.02	

Prevalence of Voice Disorders and Risk Factors in Teachers of Eastern Nepal

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Abstract- Disorder Voice is a voice which is not capable of fulfilling its linguistic and paralinguistic functions. Among professional voice users teachers form the largest group seeking medical help for their voice problems. We aim to find the prevalence of voice disorder in teachers of Eastern Nepal and determine risk factors associated with voice disorder.307 teachers of various institutions of Morang and Sunsari district were selected after proportionate stratified sampling method from April 2012 to March 2013. They were filled with standard questionnaire and underwent basic clinical and otorhinolarynogological examinations. Flexible nasal endoscopy and 70^0 direct Endoscopy performed in the department. Out of 307 teachers, 190 (61.89%) had voice disorder out of which primary school teachers have more prevalence (67.4%) as compared to non-primary teachers ($p<0.012$) . Majority had Laryngopharyngeal Reflux (25.79%), Acute Laryngitis (23.16%), Vocal Cord Nodule (21.05%), Vocal Cord Polyp (17.37%), Vocal Cord Cyst (5.26%), Reinkes Oedema (3.68%), Leukoplakia (2.11%) and Functional Dysphonia (1.58%). Teachers with more than 20 years was weak statically significant ($p=0.051$) with voice disorder. Tobacco ($p= 0.408$) and Alcohol ($p=0.96$) was not statistical significant with voice disorder whereas smoking ($p=0.039$) and chalk user ($p<0.001$) was associated with voice disorder.

Index Terms- Nepal, Professionals, Teachers, Voice Disorder

I. Introduction

Precise definition of 'voice' is the acoustic outputs from the vocal tract that are characterized by their dependence on vocal fold vibratory inputs. Phonation means the act of voice production and also to the mechanism of voice production.[1]

A disordered voice can be defined as one that has one or more of the following characteristics:

- It is not audible, clear or stable in a wide range of acoustic settings;
- It is not appropriate for the gender and age of the speaker;
- It is not capable of fulfilling its linguistic and Paralinguistic functions;
- It fatigues easily;
- It is associated with discomfort and pain on phonation.[2]

Voice disorder or dysphonia when caused by laryngeal pathology represents dysfunction of the voice in its most general aspects.[1] All people who depend on speaking or singing skills for employment (e.g. salesmen, receptionists, telephone operators, lawyers, clergy, teachers, politicians, public speakers, and most physicians) should be considered professional voice users, because all of them place diverse yet significant demands on their voices.[3] Among professional voice user, teachers form the largest group seeking medical help for their voice problems.[4] They are found to be at an exceptionally high risk of developing voice problems because of stress inherent in their occupation and the environmental conditions in which they work.[5]

II. METHODS

This was comparative cross sectional study conducted in Department of Otorhinolaryngology and head and neck surgery, B.P. Koirala Instiute of Health Sciences, Dharan, Nepal, during a period of one year from April 2012 to March 2013. Ethical approval was taken from Ethical Committee. Informed & Written Consent was taken from each participant.

The following inclusion and exclusion criteria were made for sample to include in the study:

Inclusion criteria:

1. Teachers by profession both male and female of Morang and Sunsari district
2. Taking at least 6 hours of class per week at least one year

Exclusion criteria

1. Teachers having other professions as singers, radio jockey, actors, politicians and salesman
2. Diagnosed case of allergic pharyngitis, rhinosinusitis, gastrooesopharyngeal reflux disease or any previously diagnosed laryngo pharyngeal disease
3. Not willing to take part in study

Total 307 teachers of various institutions were selected after proportionate stratified sampling method. Information's were filled with standard questionnaire and underwent basic otorhinolaryngological examinations. Flexible Nasopharnygolaryngoscopy and 70^0 Direct laryngoscope performed in the department.

The collected data were entered into Microsoft Excel Spreadsheet. The data was analyzed using SPSS version 17. Mean and standard deviation of variables were calculated for numerical data. Chi Square test was used for analyzing categorical data and t- test used for numerical variable. Multivariate analysis was done with logistic regression. Significance level was set at less than 0.05.

III. RESULTS

Among 307 teachers included in study, male were predominant (204, 66.45%). The mean±S.D. age of the participants was 42.19 years ± 10.955. Region wise most of the teachers were from Morang district having 52.77% as compared to Sunsari district having 47.23%. Most of the teachers were non smoker 51.47% as compared to smokers 48.53%. In the study most of the teachers were not tobacco chewers (75.24%) as compared to tobacco chewers (24.76%) In the study majority of teachers was non alcoholic having 59.93% as compared to alcoholic were 40.07%.

Table I. Socio-Demographic characteristics of the participants (n=307)

Characteristics	Frequency	Percentage
Age (in years)		
20-30	61	19.87
31-40	58	18.89
41-50	101	32.90
51-60	79	25.73
>60	8	2.61
Mean Age±SD (Years)	42.19 ± 10.955	
Gender		
Male	204	66.45
Female	103	33.35
District		
Morang	162	52.77
Sunsari	145	47.23
Smoking Habit		
Yes	149	48.53
No	158	51.47
Chewing Tobacco		
Yes	76	24.76
No	231	75.24
Alcohol Intake		
Yes	123	40.07
No	184	59.93

In the study majority of teachers were from primary level having 61.89% and higher secondary level teachers were less accounting 4.56%. Campus and University teachers comprised of 5.21%.The mean years of experience of teachers were 17.42 years with standard deviation of ±9.786.Majority of teachers were having teaching experience of more than 20 years (38.44%) and teachers having experience from 1 to 10 years were 30.29%.

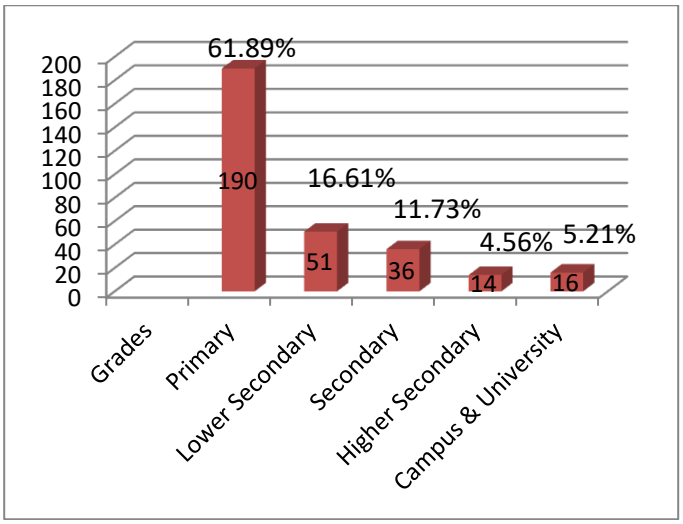

Figure 1: Distribution of Teachers according to grades of teaching

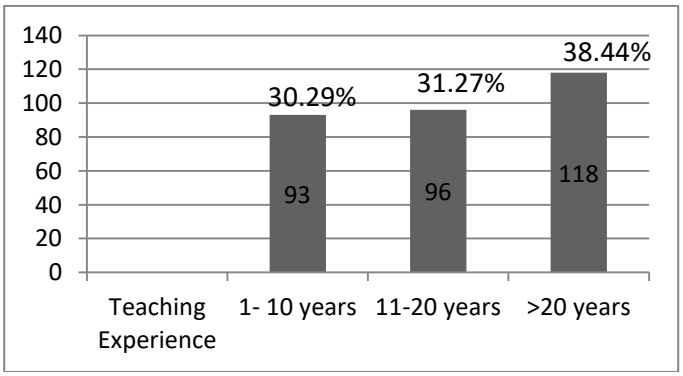

Figure 2: Experience of teachers in years

Main materials for teaching in the classes were chalk accounting 85.70% where as projector and power pointer was less having 1.30%.

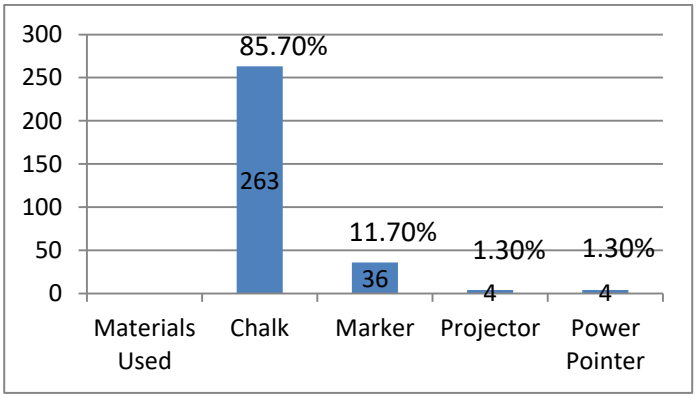

Figure 3: Distribution of materials used in class by teacher

In the study among all teachers 61.89% of total teachers complained that they have voice problems as compared to 38.11% who did not have any voice problems.

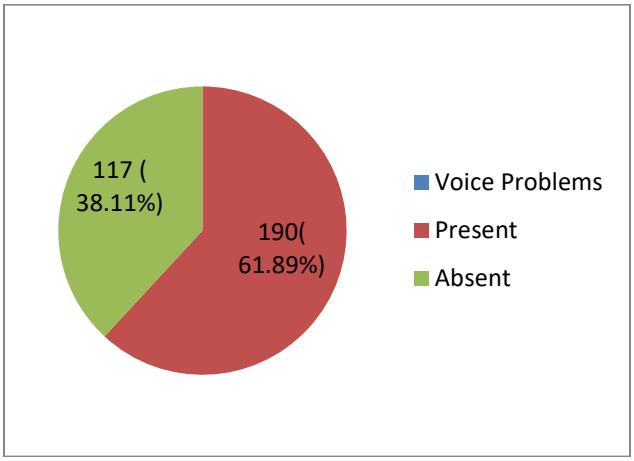

Figure 4: Voice Problems of teachers

Most common findings in flexible nasopharyngolaryngoscopy and 70^0 direct endoscope was laryngopharyngeal reflux having 25.79%, acute laryngitis as 23.16% and vocal nodule 21.05% as second and third common findings. Functional dysphonia was least common findings in just 1.58%

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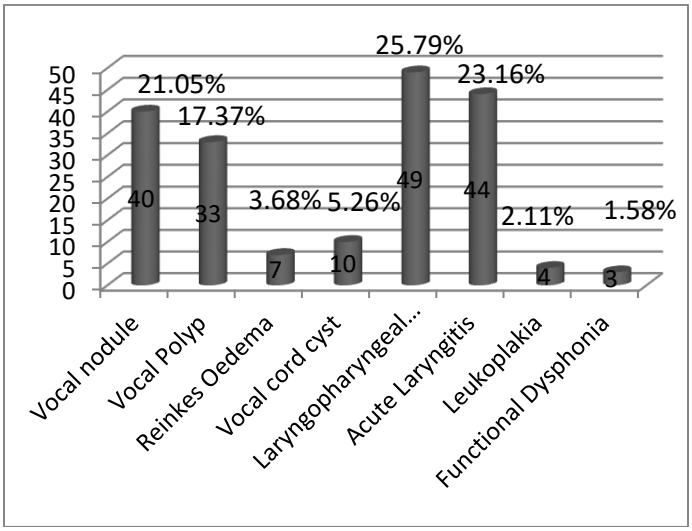

Figure 5: Findings from flexible laryngoscopy and 70^0 direct laryngoscopy

The prevalence of voice disorder was more in primary level teachers as compared to non primary teachers (p<0.012). Smoking was statistically significant with voice disorder than non smoker (p=0.039). Voice disorder were mostly seen in chalk users than non chalk users (p<0.001).There was no statistical significance between voice disorder and tobacco chewers (p=0.408). There was no significant between alcohol use and voice disorder (p=0.976). There was weak statistical significant between teaching experience and voice disorder by Pearson Chi Square test. Teachers having working experience of more than 20 years were having more voice disorder than those teachers having experience of less than 20 years

Table II: Relationship between voice disorder with level of teaching, smoking, chalk user, tobacco chewer, alcohol consumptions and teaching experience

Level of teaching	**Voice Disorder (n=190)**	**Normal (n=137)**	**p Value**
Primary	128(67.4%)	82(32.6%)	0.012
Non-primary	62(53%)	55(47%)	
	Voice Disorder	**Normal**	**P Value**
Smoking	101(67.8%)	48(32,2%)	0.039
Non Smoker	89(56.3%)	69(43.7%)	
	Voice Disorder	**Normal**	**p Value**
Chalk User	166 (66.7%)	83(33.3%)	<0.001
Non Chalk user	24 (41.4%)	34 (58.6%)	
	Voice Disorder	**Normal**	**p Value**
Tobacco User	44 (57.9%)	32(42.1%)	0.408
Non Tobacco user	146 (63.2%)	85(36.8%)	
	Voice Disorder	**Normal**	**p Value**
Alcoholic	76(61.8%)	47(38.2)	0.976
Non alcoholic	114 (62%)	70(38.2)	
Teaching Experience	**Voice Disorder**	**Normal**	**p value**
1-10 years	54(58.1%)	39(41.9)	0.051
10-20 years	53(55.2%)	43(44.8%)	
>20 years	83(70.3%)	35(29.7%)	

Factors responsible for the voice disorder were analyzed by logistic regression by including those factors whose p value was less than 0.2. The risk for voice disorder for teaching experience more than 20 years teachers have 1.809 times more than that of 0 to 10 years of teaching experience which is statistically significant. Similarly risks for primary teachers have 1.424 times of developing voice disorder than non primary teachers but statistically not significant. Also smokers have risk of 1.265 times than non smoker to develop voice disorder (p 0.41). Finally chalk users have high risk of 2.69 times than of non chalk users to develop voice disorder.

Table III: Logistic Regression of voice disorder with teaching experience, level of teaching, cigarette smoking and materials used in class

	Odd Ratio	95% Confidence Interval	Significance (p value)
Teaching Experience			
0 to 10 years	1	Reference	
10 to 20 years	0.902	0.498-1.633	0.073
>20 years	1.809	1.0033-3.264	0.049
Level of teaching			
Non Primary	1	Reference	
Primary	1.424	0.803-2.526	0.226
Cigarette Smoking			
Non Smoker	1	Reference	
Smoker	1.265	0.723-2.213	0.41
Materials used in Class			
Non Chalk User	1	Reference	
Chalk User	2.69	1.465-4.940	0.001

IV. DISCUSSION

Voice disorders are most common among teachers who have to overwork their voices in a noisy atmosphere, in places where there is an echo, or that have poor acoustics, in big rooms or open spaces, a lecture theater where there is not any amplifying equipment, and so on. These things result in chronic or acute symptoms of vocal attrition as vocal fatigue, hoarseness, throat discomfort or pain and benign mucosal lesions. [6]

In this study majority of age distribution were in 41-50 years (32.90%) and least in age above 60 years (2.61%) with mean age of 42.19 years. Preciado et al had teachers from range of 21 to 68 years with mean age of 43.1 years.[9] Lee et al more age group of 30-39 years of 37.8% and least of 9.8% in above 50 years.[7]

In this study male were more (66.45%) as compared to female (33.55%). The study population had less female because the numbers of female teachers are very less as compared to male in Nepal (39.62% in primary level, 24.69% in lower secondary level, 15.56% in secondary level and 4.7% in higher secondary level).[8] The reasons for less number of female teachers in Nepal could be due to less female literacy rate (57.4%) as compared to male (75.1%).[9] Smith et al had male teachers of 49.45% and female of 50.55%.[10] Preciado et al had more female (65.08%) as compared to male teachers (34.92%).[6] Lee et al had study population of female of 78.5% and male 21.5%.[7]

In this study Majority of teachers in schools used Chalk as their main materials (85.70%) and was exposed to chalk dust. Precaido et al mentioned the dust level in 89% (n=511) among dysphonic teachers and 88% (n=284) among normal teachers but did not mentioned particular about the dust of chalk or surroundings.[6] Sampaio et al also mentioned 50.2% of total teachers reported chalk dust in their classes.[11]

In this study 48.53% of total teachers were smokers which were higher than other study results. Precaido et al had 41.87% non smoker.[6] Lee et al study had 98% non smoker.[7] The result of smoker's percentage was much higher than WHO report on prevalence of current cigarette smoking of Nepal in adult population which is 19.25%.[12]

Only 24.76% were tobacco users among the teachers in this study. The prevalence of tobacco use in Nepal as per WHO data is 21.95%.[12] Behlau et al study has shown 82.7% of teachers had tobacco users that include both smoking and chewing tobacco.[13]

In the study 40.07% were alcoholic. Precaido et al study showed 73.33% of total teachers had habit of consuming alcohol.[6] Lee et al had 11.5% of teachers consuming alcohol.[7] The result of this study on alcohol use is less than percentage of alcohol consumption by adult population of Nepal which is 67.5%.[14]

In this study 61.89% (n=190) of total teachers had voice disorder. The prevalence rate varies from country to country. Precaido et al study has prevalence of 57%.[6] Urrutikoetxea et al showed 17.3% current voice problem, 70% had voice problem in their professional career and 22% frequent.[15] Bacha et al (1999) reported 43.41% of teachers in Brazil.[16] Smith et al mentioned 32% of teachers had some voice problems as compared to non-teachers having voice problem (1%).[17]

Laryngopharyngeal reflux were major findings (23.16%), vocal cord nodule in 18.42%, vocal cord polyp in 15.79% Precaido et al study showed 20.2% organic dysphonias, 28.8% functional dysphonias and 8.1% chronic laryngitis in which among organic disorder it was nodular lesion of 16.9%, polyp 2.4%. Similarly it showed gastric reflux laryngitis of 2.7% and tobacco laryngitis of 3.4%.[6] Urrutikoetxea et al have nodules in 9%, Reinkes oedema (3.7%).[20] Sala et al had prevalence of vocal cord nodule of 6% and chronic laryngitis in 17%.[18] In this study functional dysphonia accounted just 1.58% (n=3) where as

Precaido et al study have functional dysphonia of 30.8% which is more due to videolaryngostroboscopy examination.[6]

Precaido et al study found higher prevalence of voice disorder in elementary school (18.5%), secondary school (18.5%) and Primary school (9.3%).[6] The reasons for having more voice problems in primary teachers is that teachers have to take long duration of class, more number of students in class and noise production in class made by students which all provokes the teachers to speak in louder intensity that leads to voice disorder. In this study smokers had more voice problem than non smoker ($p<0.039$). Precaido et al study showed more dysphonic teachers smoked than normal ones (X^2:6.48, df: 6, $p<0.001$).[6] In this study chalk users were majority and were having more voice disorder as compared to non chalk users($p<0.001$). Precaido et al study mentioned the dust level in classroom which was not statistically significant though they have not mention the type of dust.[6] As in the case of this study majority of teachers were chalk users, continous exposure to chalk is one of the factor to create voice disorder. There was no statistical significant between voice disorder and tobacco users ($p=.408$). In the study of Behlau et al there was statistical significant between tobacco users and non users having voice disorder.[13] Alcohol and voice disorder were also not statistical significant in this study ($p=0.976$). In the study of Precaido et al there was no statistical significant between daily alcohol user and voice disorder.[6] In the study of Lee et al alcohol consumption was statistical significant with voice disorder ($p<0.008$).[7] Behlau et al study also showed significant relations with alcohol drinking and voice disorder.[13]

With the experience of teaching and voice disorder there was weak significant relationship. Experience more than 20 years were having more voice disorder than others ($p<0.051$). Precaido study has found no any association with teaching experience of teacher.[6] It has been suggested that voice abnormalities among voice-using professionals occur after 10–20 years of work.[19] Persistent poor voice adaptation, resulting from the vocal load over many years in the profession, may lead to reduction in the amplitude of mucous wave vibrations in the vocal folds and incomplete glottic closure.[20]

V. LIMITATIONS

This study was first to be conducted in the country. Videostroboscopic laryngoscopy was not available which could have detected the vocal fold movements and character. This study was cross-sectional study so the follow up and evaluation of teachers with voice problem was limited. The effectiveness of using markers, avoiding the cigarettes, alcohol and chewing tobacco in same individual could not be assessed.

VI. CONCLUSION

The prevalence of voice disorder in teachers of Morang and Sunsari district of Nepal is 61.89%. The main risk factors for the voice disorder for teachers is use of chalk as teaching material (OR= 2.69, 95% CI:1.465-4.940) .

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Impact of Post-Election Violence on Social Enterprises: A Case of Nakuru County, Kenya

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Abstract

Social entrepreneurship - the practice of responding to market failures with transformative, financially sustainable innovations aimed at solving social problems -has emerged at the nexus of the public, private, and nonprofit sectors. The recurring electoral violence in Kenya since 1992 demonstrated the fluidity of grievance and other factors, which shredded cohesion, exposed the depth of historical injustices and further polarized the country along ethno-regional lines. At the core of these grievances is the belief that political power provides the ethnic group of the president with exclusive advantages. Empirical evidence on the impact of post-election violence on social enterprises in Kenya is lacking or not systematically documented. The findings of this study will form a useful reference material to the government. The government can use it to generate plans of action that can influence growth of social enterprises after election-related violence. The purpose of this study was to assess the impact of post-election violence on social enterprises in Nakuru County, Kenya. The study applied a descriptive research design approach. Data was collected from proprietors of 30 social enterprises from across Nakuru County. Purposive and snow-ball sampling approaches were applied. The findings of the study showed that social enterprises in Nakuru County are negatively impacted by post-election violence due to massive displacement of populations and declines in economic productivity.

Keywords: Post-election violence, Social enterprises, Conflict, Peace building

1. INTRODUCTION

1.1 Post Election Violence

Post-election violence (PEV) is not a new phenomenon in the world. Violence has always had influence on growth of small-scale businesses due to its devastating effects. Violence is mainly caused by land disputes, ethnicity, economic and political inequality and poor governance (Republic of Kenya, 2006). Besides, cases of violence during and after election times in Kenya have many root courses.

The Commission of Inquiry into Post Election Violence of 2007/2008 (CIPEV) enumerates and discusses how deep these roots of election are. These factors demonstrate how and why violence has become a way of life in

Kenya, a country once known for peace, prosperity, and its potential for development (Kirimi & Njuguna, 2014). CIPEV report shows that the first is the growing politicization and proliferation of violence in Kenya over the years, specifically the institutionalization of violence following the legalization of multi-party democracy in 1991. Historically, electioneering periods in Kenya have been characterized with some level of violence, pre and post elections, for example, 1992, 1997, and 2007.

In the 2007 scenario, the announcement of the disputed presidential election in Kenya on December 27th led to what could be described as the worst political violence in Kenya`s history. No sooner were the results announced than violence broke out. Chaos erupted especially in opposition strongholds with fighting targeting communities perceived to have supported the president. In the Rift Valley, in places like Sotik, Chepilat, Eldoret, Molo, Narok and Nakuru, the violence became an all-out ethnic cleansing exercise, where some ethnic groups (specifically the Kikuyu and the Kisii) were targeted for removal ostensibly to be sent back to their "ancestral lands." The most graphic of this was the incident in a church in Eldoret, where a number of people including women, children and people with disabilities had sought sanctuary only to meet brutal fate as all were burnt to death. What makes the incident tragic and horrific is that even those who escaped from inferno were promptly thrown back into the fire where they perished (Nyanchama, 2008).

Besides large scale killings, there were also thousands of people wounded and property worth millions destroyed. Nakuru town falls in the Rift Valley region which was the most affected regions because of its key strategic importance to Kenya. According to UKAID (2013), violence affects the growth of the economy wherever and whenever it occurs.

Gertrude (2008) asserts that, many small-scale business entrepreneurs were killed during the 2007 post-election violence. This could have possibly created tension, idea diversification and reduced risk taking attitudes amongst social entrepreneurs in Nakuru town. This study sought to ascertain the impact of post election violence on social enterprises at Nakuru Township in Kenya.

1.2 Purpose of the Study

The purpose of this study was to assess the impact of post-election violence on social enterprises in Nakuru County, Kenya.

1.3 Significance of the Study

Empirical evidence on the impact of post-election violence on social enterprises in Kenya is lacking or not systematically documented. The findings of this study will form a useful reference material to the government. The government can use it to generate plans of action that can influence growth of social enterprises after

election-related violence. The study shows that PEV is bad to the economic development of the country because it has a negative influence on entrepreneurial prosperity. This study will enrich the current body of knowledge.

2. LITERATURE REVIEW

2.1 The Concept of Social Entrepreneurship

The topic of social entrepreneuship has been a hot subject of debate. Emerson and Twersky (1996) define social entrepreneurship as the use of business skills and knowledge to create enterprises that accomplish social purposes in addition to being commercially viable. Doherty, Haugh and Lyon (2014) argue that what differentiates social enterprises from their commercial counterparts is the fact that they combine profitability and social/environmental goals.

Weerawardena and Mort (2006) have also defined social entrepreneuship as the process of creating social value, through the key entrepreneurial dimensions of pro-activeness, risk management, and innovation which are constrained by and respond to the environment, sustainability objective and the social mission of the organisation.

Santos (2012) ascertains that at a basic level, the environment is responsible for the creation of social needs and thereby the social opportunities that entrepreneurs or their agents can pursue. Social entrepreneurship is therefore the process by which citizens build or transform institutions to advance solutions to social problems, such as poverty, illness, illiteracy, environmental destruction, human rights abuses and corruption, in order to make life better for many. Academics, practitioners, and philanthropists characterize it variously as a profession, field, and movement.

In deed, social entreprenuership seems to be the remnant approach for the usage of readily available resources on poverty reduction and elimination of other social issues (Roy & Roy, 2010). Social entrepreneurs have always existed. But in the past they were called visionaries, humanitarians, philanthropists, reformers, saints, or simply great leaders. Attention was paid to their courage, compassion, and vision but rarely to the practical aspects of their accomplishments (Light, 2008).

Social entrepreneurial activities mean different things to people in different places because the geographical and cultural contexts in which they appear is different (Mair & Martí, 2006). Under the “umbrella construct” of SE, other types of social entrepreneurial activities are discussed, such as: social venturing, non-profit organizations adopting business tools, hybrid organizations or social cooperative enterprises (Smallbone, Evans, Ekanem, &

Butters, 2001). Despite the different meanings, a key distinction that can be found in all definitions is social mission as the central driving force of social entrepreneurs (Leadbeater, 1997).

The main findings suggest that for social entrepreneurs, the bottom line is to maximize some form of social impact, usually addressing a social need that is being mishandled or ignored by other institutions (McMullen, 2011). In contrast, for business entrepreneurs, the bottom line may be to maximize profits or shareholder wealth (Shaw & Carter, 2007). Hence, the world needs both commercial and social entrepreneurs, due to the fact that there are often overlaps between different types of entrepreneurs.

Social entrepreneurship is a much newer concept than commercial entrepreneurship, and has been defined in many ways over the past few years. The variance in definitions has been substantial enough that one standard definition has yet to emerge clearly. However, practically all of the definitions have contained one or more of the following concepts, articulated by major writers on the subject. Social entrepreneurship addresses social problems or needs that are unmet by private markets or governments (Pomerantz, 2003).

- "Social entrepreneurship creates innovative solutions to immediate social problems and mobilizes the ideas, capacities, resources, and social arrangements required for sustainable social transformations"
- "Social entrepreneurs are people who realize where there is an opportunity to satisfy some unmet need that the welfare state will not or cannot meet"
- "Social enterprises are private organizations dedicated to solving social problems, serving the disadvantaged, and providing socially-important goods that were not, in their judgment, adequately provided by public agencies or private markets."

The perseverance of poverty, the lack of employment, and the absence of basic welfare of millions mark large parts of the African continent. In their search for effective engines of development, aid organizations such as the World Bank, the UN, and bilateral donors are increasingly regarding private sector development as key to solving many of the continent's ailments (Tvedten et al., 2012).

As part of the growing focus on private-sector-driven development, a wide range of business model hybrids has in recent years emerged and they all, in one way or another, seek to combine the efficiency and innovativeness of a commercial enterprise with the provision of developmental goods such as jobs, welfare, opportunities, education, etc. One such hybrid is called a 'social enterprise' (SE). It has emerged from the increasing convergence between the for-profit and not-for-profit spheres, bringing together the two in a marriage between social interests and market efficiency.

2.2 Post-Election Violence

Electoral violence is a kind of political violence distinguished by its timing, perpetrators and victims, objectives, and methods (Bekoe, 2012). It has been defined as an activity motivated by an attempt to affect the results of the elections – either by manipulating the electoral procedures and participation or by contesting the legitimacy of the results (Laakso, 2007); any random or organized act or threat to intimidate, physically harm, blackmail, or abuse a political stakeholder in seeking to determine, delay, or to otherwise influence an electoral process (Fischer, 2002); acts or threats of coercion, intimidation, or physical harm perpetrated to affect an electoral process or that arises in the context of electoral competition (Sisk, 2008).

A report focused exclusively on election-related killings defines them as "killings: (a) designed to influence, or to prevent attempts to influence, an election outcome; (b) that arise in the context of election processes; or (c) that seek to promote or hinder election-related activity" (UNGA, 2010). Electoral violence can occur before, during or after elections, often involves the instrumental use of coercion, can be directed against people and property, and includes such acts as killing of candidates and their supporters, fights among rival groups, riots, threats, intimidation and coercion of opponents, voters and electoral officials, destruction of property, forceful displacement, and unlawful detentions (Laakso, 2007; Sisk, 2008; UNDP, 2009).

The extant literature on electoral violence in Africa can be grouped as follows: single-case studies of various instances of electoral violence (Boone, 2009; Boone, 2011; Straus, 2011); analyses of electoral violence as a means of political parties and democratic deviants to perpetuate power, following the familiar narrative of the peculiar pathologies of the developing world (Basedau, Erdmann & Mehler, 2007; Collier, 2009); strategies for preventing electoral violence (Collier & Vicente, 2011).

These studies have implicated the following as causes of electoral violence in Africa: inattention to land rights; violence instigation by political actors and perpetration by politically connected gangs; the use of violence by the state, institutional failures, and political allegiances that are based on ethnic divisions; the trajectory of democratic transition; the depth of social cleavages; and economic stress. Additionally, Bekoe's (2012) edited volume provides foundational quantitative and qualitative accounts of this understudied phenomenon.

Economic inequality and poor economic prospects breed an atmosphere of discontent in the electorate which can then be exploited by political entrepreneurs. Such discontent is often directed at the political and economic elite, and in countries with high economic inequality these two groups are often one and the same or perceived as such. Discontent is manifested as frustrations people feel because of a gap between their aspirations and the

reality of their economic status or material well-being and can result in conflict (Hogg & Abrams, 2012; Regan & Norton, 2005).

Inequality can also act as a structural constraint that produces societal imbalances in income and land distribution, which can in turn lead to conflict (Acemoglu & Robinson, 2005). Lack of economic well-being increases the willingness to resort to violence as people feel a sense of nothing to lose. Changes that cause a general decline in welfare can lead to economic stress for individuals and groups, thus creating a climate for violence (Laasko, 2007).

The impetus for violence is exacerbated by economic inequality that occurs along the lines of certain culturally defined groups or what Stewart (2008) calls horizontal inequalities. This type of inter-group inequality can occur along ethnic lines as was seen in Kenya or along party lines as in Ghana. Cederman *et al* (2011) show that when political and economic horizontal inequalities intersect with ethnicity, the likelihood of conflict increases as some ethnic groups come out as winners and others as losers. These inequalities are transformed into group grievances through group comparison and then into violence through group mobilization.

Electoral illegitimacy is often what drives protests against an announced election result that may eventually become violent. This stems from the belief that the elections were not free and fair, were rigged, involved cheating, the will of the people was not respected, and thus the system cannot be trusted. Lindberg argues that when it comes to democratic legitimacy, "legitimacy is in the eyes of the beholders, dependent on the views of that country's people, political parties, and power elites rather than on the judgment of the [external] observer" (Lindberg, 2006). Thus electoral legitimacy is established when all involved, elite and electorate alike, consent to the rules of the game and accept electoral outcomes with the belief that the agreed-to rules have been followed.

When electoral systems, laws and constitutions are manipulated in order to favor one group over another or exclude another group, such "including" or "excluding effects" can generate violent conflict (Mehler, 2007). At the core of electoral legitimacy is a fundamental trust in the established system. When this is lacking before an election, it contributes to conditioning an environment that becomes ripe for violence after the election if the election outcome is different than expected.

Electoral illegitimacy has been implicated in past incidents of post-election violence. In a survey administered by Dercon and Gutiérrez-Romero regarding the PEV in Kenya in 2007, most survey respondents believe the

violence was in reaction to the elections being rigged (2012). Violence spread soon after the electoral commission announced the incumbent Mwai Kibaki as winner, despite the opposition leader Raila Odinga enjoying an early lead and predicted by opinion polls to be the favorite to win. Odinga supporters soon took to the streets in "an orgy of violence," which in turn led to "revenge killings" from the other side. Many of the reported deaths were also the result of police shootings during clashes with rioters. Similarly in Nigeria following the 2011 elections supporters of the runner-up, Muhammad Buhari, took to the streets when their candidate lost, which precipitated the post-election violence that resulted in hundreds of deaths. In sum, when there is a belief that the outcome of the election has been manipulated in some way and that the rules agreed to have not been followed, this increases the likelihood of violent conflict. It is fitting then that institutional design and reform programs aimed at improving the credibility of elections focus on creating rules that all concerned can accept.

Resource disputes, be they over land or other natural resources contribute to creating an environment that is primed for post-election violence. At the core of many conflicts across Africa is a struggle over control of natural resources. These so-called resource wars have become popularized by terms like "blood diamonds." These kinds of disputes have also been implicated in post-election violence. They can play out differently in different situations. In some cases electoral contests coincide with existing resource rivalries over land, marketplace rights and trade routes, such that elections become an avenue to change access to such resources with the possibility for violent clashes (Straus & Taylor, 2012). These resource disputes can sometimes remain local and become a source of clashes over local politics, sometimes national politicians can tap into these rivalries when they need the support of rival groups fighting over vital resources to win national contests.

In another scenario politicians can also politicize access to resources such as land to mobilize supporters and punish opponents. Hence land is used as a patronage resource to reward supporters and it is in turn withdrawn from opponents. This is particularly common in countries with land regimes that give the government control over mostly rural land. This kind of scenario was partly responsible for the post-election violence in Kenya in the 1990s and in 2007, in Zimbabwe in the last two decades, and in Côte d'Ivoire in the 2000s (Boone and Kriger 2012; Boone 2009; Boone, 2011). Politicians often label those to be dispossessed of their land as outsiders and non-indigenes who have no rightful claim to the land in the first place (Boone and Kriger, 2012). Use of violence is involved in the act of dispossession and sometimes violence is returned by those facing threat of dispossession.

In sum, the existence of these four factors, resource disputes, poor economic prospects, economic inequality, and electoral illegitimacy, contribute to an environment in which post-election violence can occur. These factors react with the realities of the postcolonial state to create the conditions of possibility for violence.

3. METHODOLOGY

3.1 The Design and Sample Characteristics

Research design is the plan and structure of investigation so conceived as to obtain answers to research questions (Robson, 2002). It is said to be the structure of research or the glue that holds all elements in a research project together (Kombo & Tromp 2006). This study adopted a descriptive survey research method. A survey is a measurement process used to collect information during a highly structured interview –sometimes with a human interviewer and other times without. Questions are carefully chosen or crafted, sequenced and precisely asked for each participant. The goal of survey is to derive comparable data across subsets of the chosen sample so that similarities and differences can be found. When combined with statistical probability sampling for selecting participants, survey findings and conclusions are projectable to large and diverse populations (Cooper & Schindler, 2006). The target population for the study was all the social entrepreneurs in the two major urban administrative zones of Nakuru County namely: Nakuru Town East sub-county and Naivasha sub-county. Sampling was done through snow-ball sampling technique in which case the first sampled respondent was used to generate a lead to the next respondent until the sample of 30 social enterprises was achieved.

3.2 Data Type and Sources

The study relied on primary data. Primary data was collected using structured interview guides. The interview guides helped to elicit information that could otherwise not be captured through analytical and statistical modeling.

3.3 Data Analysis

Quantitative data was analyzed using descriptive statistics such as mean, standard deviation, and percentages. Statistical Package for Social Sciences (SPSS) was used to aid in the analysis. The qualitative data collected through interview guide was analyzed through content analysis. According to Hancock (2002), content analysis involves coding and classifying data through categorizing or indexing. The basic idea is to identify from the transcripts the extracts of data that are informative in some way and to sort out the important messages hidden in the mass of each interview. Tables were used to present summary of the responses. Narratives were applied to present qualitative themes.

4. FINDINGS

4.1 Sample Profile

Data was collected from 30 respondents, 15 from Nakuru Township and 15 from Naivasha Township of Nakuru County. Emphasis was laid on those who have engaged in one form or another of a social enterprise over the past 10 years (2007 – 2016). Of the 30 respondents, 20 (67%) were male while 10 (33%) were female. All the sampled respondents were *De Jure* (usual) residents within their respective study sites.

4.2 Nature and type of social enterprises in Nakuru County

Table 1 show that a majority of the sampled respondents were cumulatively drawn from small holder agricultural support ventures (33.3%); low cost primary schools (16.7%); and green energy solutions ventures (16.7%). Others included: Low cost health care facilities (13.3%); Solid and human waste disposal ventures (13.3%); Gift shops (3.3%); and Tree-based enterprises (3.3%).

Table 1: Type of Social Enterprise Owned by the Sampled Respondent

Type of enterprise	Number of respondents	% of the total
Smallholder agricultural support ventures	10	33.3%
Low cost primary schools	5	16.7%
Green energy solutions ventures	5	16.7%
Low cost health care facilities	4	13.3%
Solid and human waste disposal ventures	4	13.3%
Gift shops	1	3.3%
Tree-based enterprises	1	3.3%
Total	**30**	**100.0%**

4.3 Triggers of PEV in Nakuru County

4.3.1 Cosmopolitan Nature of the County

Kenya came to the brink of collapsing after the 2007 December elections with one function of the political divide not accepting the outcome of the elections culminating to spontaneous chasing of members of different

communities from regions that they were living to other regions they found safer and welcomed. Nakuru being the central place for those who were fleeing from Nyanza, Western and some parts of Rift valley so a big influx of people which brought pressure on the resources which are available. According to the respondents, this brings about a conglomeration of many people with diverse political support bases and social cultural diversities.

4.3.2 Land & Government

The issue of land in Kenya is central in its history of conflict and is an example of structural violence. This is in part because of long and complex histories of land dealings among tribes. Often the members of the tribe in power were unethically given or allowed to use land, frequently at the expense of other tribes. In every electoral cycle in Kenya's history, the historic land issues between the Kikuyu and Kalenjins living in Nakuru County continue to be a major cause of conflict. In an example of the dynamic nature of conflict, Kibaki in 2008 once again called for the removal of the Kalenjins from the Mau Forest. This time, the Kalenjins lobbied Odinga as Prime Minister and part of the ODM Luo-Kalenjin alliance, to resist the executive order.

4.3.3 Ethnicity and ethnic animosity

This factor is a corollary of the foregoing and was cited by the respondents as one of the major causes of the cyclic post-election violence in Nakuru County and Kenya at large. What normally begins as a reaction to a fraudulent election soon transforms into ethnic violence because of perceived discrimination, injustices and inequality in the allocation of resources among the different ethnic groups (mainly the Kikuyus and the Kalenjins).

4.3.4 Economic and political inequality

In Kenya, belonging to the superior and government-favoured ethnic tribes gives one an edge over the less privileged tribes in accessing the political and economic resources of the country. This is no different in a County such as Nakuru County where there are a mix of tribes. Economic and political inequalities were some of the major causes of the 2007 post-election violence in Kenya. It was generally perceived that Kikuyu and Central Province had been enjoying more of the economic and political resources of Kenya before and after independence at the expense of other regions or tribes. The attempt to correct the economic and political imbalances in these arrangements between Kikuyu and the Kalenjin and Luo resulted in violence. Since economic and political dominance of one group over others often results in violence because of feelings of marginalization by the less-privileged group.

4.4 Effect of PEV on growth social enterprises in Nakuru County

4.4.1 Massive displacement of people

According to the respondents, people are displaced as a result of violence and whenever there are threats of violence. They move from their places of residence and business to places considered safe like police stations, administrative posts, churches and trading centers; or even to far away towns. Thereafter, they moved to formal camps or were integrated with their relatives and friends in urban centers or their ancestral homes. As a result of the violence, approximately 10,000 persons are displaced from their residence and or business. Some move to IDP camps. The utilization of services offered by social enterprises engaged in education and health care provision are therefore adversely disrupted. For these category of enterprises; their clientele choose to keep way due to fear, lack of transportation, and violence. For example, widespread violence associated with the 2007 election in Kenya revealed the dependence of HIV patients on a stable civil society and infrastructure to access medications.

4.4.2 Reduced Agricultural Productivity

The results indicate violence slowed down agricultural activities, delayed land preparation, disrupted routine farm management operations, impaired harvesting of horticultural products, reduced income from crop and livestock products and exposed farms to environmentally unsustainable practices. The study found out that some of the SEs that are engaged in activities that support smallholder farmers in the county either close down or scale down operations wherever an electioneering period nears. Due to fear of displacement in cases of violence, some small-scale farmers do not till their farms in the election preceding season.

4.4.3 Lost jobs and Opportunities for Growth

In Nakuru County, during election related conflicts, people choose to stay away from violence hotspots (e.g. Bahati, Rongai, Naivasha, Karai, etc). Many enterprises normally witness a sharp decline in activities and productivity and therefore take the opportunity to close down for maintenance, taking jobs away from ordinary Kenyans.

4.4.4 Social discrimination

Social enterprises thrive on social cohesion and harmony within the served populace. As a result of electoral related violence, some of the displaced people were discriminated against on the basis of their political beliefs or affiliations of their communities. The mere fact that certain tribes were associated with particular political parties was enough grounds for discrimination against them. This also leads to developments of perceptions and stereotypes that may imply that certain social themes are meant to serve members of certain communities.

5. CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

5.1 Conclusions and Implications

Over the past decades, the consequences of cyclic election related violence in Nakuru County were far reaching leading to the displacement of people without proper resettlement arrangement for these people. In some parts of the County (e.g. Kuresoi and Molo), the inability of the government to address key issues such as security, and the threat posed by tribal militias has continued to keep these people from returning home. The impacts of PEV on SEs in Nakuru are therefore summarized into: the long-term effects [including] physical disabilities to psychological trauma; the social fabric of society [is damaged to the extent that] all activities of normal life are disrupted in some regions to date; the infrastructure of society on which social entrepreneurship thrives are destroyed; PEV displaces people, making them refugees or internally displaced persons; the environment [is damaged]; PEV and the preparation for PEV, drains human, financial, and other resources away from more productive activities; and PEV fosters a culture of violence especially considering that general elections in Kenya are held every five years.

5.2 Recommendations

There is no doubt that there is a need for concerted efforts from both the civil society and the private sector to lobby for a positive course in order to create awareness amongst the local citizens and ensure the end to cyclic type of post-election crashes is achieved for Nakuru County and the rest of counties in Kenya. There is also need to have both the state and non-state actors mainstream social entrepreneurship into the conflict mitigation and peace-building initiatives.

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Influence of Women Enterprise Fund on Women Economic Empowerment in Mutuango Area at Muranga County, Kenya

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ABSTRACT: Women economic empowerment has been an important developmental agenda that has been adopted worldwide. This has led to women economic empowerment becoming a major element of developmental policy especially in Africa. In Kenya the Vision 2030 aims at improving the lives of Kenyans through five major pillars. One in particular focuses on gender, child and social development, under this pillar the Women Enterprise Fund is one of its flagship projects. This research focused on the influence of Women Enterprise fund on women economic empowerment The study was conducted in Mutuango district, Muranga County which has a population of 1119, a sample size of 92 women was be used, and which was arrived on using the Slovin formula. Self-efficacy theory and resource based theory have been used to inform the theoretical framework. A descriptive research designed was used and questionnaires were the tool of data collection. After the data was collected it was arranged categorically, the quantitative data was analyzed using descriptive analysis, measure of central tendency, measure of variability and frequency, the qualitative data was analyzed using content analysis. Reliability and validity were tested using the test- retest method. The quantitative data was presented using charts, frequency tables, and pie charts; the qualitative data was presented in the form of reports. The findings of the study shows that there was some difficulty when it came to accessing the loan, there was no interest rate on the women enterprise fund loan, trainings were poorly attended and lastly the Women enterprise fund does influence women economic empowerment.

Key Words: Women Economic Empowerment, Women Enterprise Fund, Business Delivery Services, Microenterprise Development

1. Introduction

According to UN Women (2010), women are capable of contributing to the growth of an economy, but their participant is usually hindered by lack of access to financial incentives, education, healthcare and basic human rights. This leads to women being marginalized or being side-lined when it came to economic development policies. This is greatly felt especially by women in rural areas, according to the Commission on the Status of women (2012), women farmers are considered to be at the bottom of the "value chain", and are usually secluded from opportunities and programs that would increase their capacity, yet they play a vital role in food production and security.

Most governments and organizations have established policies and programs that ensure gender mainstreaming in development and key strategies. In India the Asian Development Bank (2011) saw the need of involving women in the implementation of the urban water supply and improvement in Madhya Pradesh, because women are the ones who are most affected by lack of water and proper sanitation. The completion of the project saw women participating in municipal management and project implementation not only as beneficiaries but also leaders. Their lives were also significantly improved through access to clean water, capacity building through the Area Improvement fund and community initiatives Fund. In South Africa the National Development Plan, hopes to ensure that women are involved in all faucets of social development and capacity building through economic and social empowerment. Finally in Kenya, the government launched the Women Enterprise Fund in 2007, to help women become economically empowered and to build their capacities through loans and skills training.

The Women Enterprise Fund (WEF) was established in 2007 through a Legal Notice No 147. The fund has five mandates which are: Provide loans to Micro Finance institutes, Non- governmental organizations involved in micro – financing and savings and credit cooperative organizations (SACCO) that lend to women enterprises. Facilitate investment in micro, small and medium enterprises oriented infrastructure that will be beneficial to women enterprises. Support women oriented enterprises and to develop networks with large enterprises. Promote good and services of women enterprises in both local and global markets. Support capacity building of the beneficiaries of the fund and their institutions.

The Women Enterprise Fund has been in existence for close to ten years, within those years more than Ksh 6.3 billion has been disbursed to 63,342 women groups in 290 constituencies. However even with such an amount disbursed, little has been done to examine the impact of the Women Enterprise Fund on women economic empowerment on an individual and household level.

Some studies have shown that microcredit is actually micro debt that loans are not gifts but obligations and they tend to have negative effects such as debt and declining financial growth on targeted individuals (Adams, 1991). Little research has been done to show the impact of the fund on women at the individual level. There is no clear information on whether the fund is making a positive or negative impact at an individual level.

With the main goal of the fund being improving the economic situation of women, it is imperative that it is increasing women power and agency through economic empowerment, increased control of household resources and decision making. If the impact of the Women Enterprise Fund is not measured using household resources, individual financial position and decision making paradigms, then it will make it difficult to measure women economic empowerment, and thus make it difficult for Kenya to reach its development goals.

The main research objective of this study is to investigate the influence of the Women Enterprise Fund on women economic empowerment in Mutuango area, Muranga County. The specific objectives were to investigate the accessibility of loans from the Women enterprise fund and their influence on women economic empowerment in Mutuango area, Muranga County, to analyze the interest rates on loans from the women enterprise fund and their influence on women economic empowerment in Mutuango area, Muranga County and to evaluate the impacts of the trainings offered by the Women enterprise funds on women economic empowerment in Mutuango area, Muranga County.

2. Literature Review

2.1Theoretical Framework

2.1.1 Self - Efficacy Theory

This study is guided by the theory of Self Efficacy by Albert Bandura (1977). This theory is defined as the people beliefs in their capabilities and how these beliefs shape their performances and influence their daily lives. One of the major processes is the cognitive processes that influence human behavior. This process explains how people tend to think about how best to increase their capabilities and visualize various scenarios in order to create environments that will help reach their perceived goals. Women in Mutuango have different goals that they have set for themselves and their families. In order to reach these goals they have formed various self- help groups and applied for loans through the Women Enterprise Fund. These choices are formed from their beliefs in financial empowerment and self-improvement. Accessibility to loans and low interest rates makes it easier for these women to want to acquire loans. Business delivery services provided by the fund, tries to ensure that they gain critical skills that will enable them to have financial sustainability and economic empowerment.

The major criticism of this theory is that it is hard to generalize self -efficacy because of the multifaceted and contextual efficacy beliefs that each individual holds thus making it difficult to have an empirical study on self-efficacy and its impact. This means that each woman holds a different belief or notion of what economic empowerment is, they also have different view on the Women enterprise fund, and thus their intentions of participation are different. This makes it difficult to define the motivation for participation (Bandura, 1977).

2.1.2 Resource Based View

This theory was established in the1980s and 1990s, after the major works published by Wernerfelt on Resource-Based View of the Firm (1984), Prahalad and Hamel on the Core Competence of The Corporation (1990), Barney on the Firm resources and sustained competitive advantage (1991) among others. The theory is of the argument that a person's success is determined by the resources and capabilities they have? These resources can include financial capital, human capital, physical capital, technology and reputation. When a person has identified the resources, they use these resources to build capabilities by coordinating and utilizing them to ensure peak performance and high yields.

Women having access to the Women enterprise fund helps create capital, human resources and physical resources, which are important for the success and the financial sustainability of their businesses and the improvement of their financial situation. Major criticism of the theory is that in the real world it is not applicable because competitive sustainability cannot be empirically measured due to the ever changing dynamics of the markets.

2.2 Empirical Review

Women in rural areas experience a greater power imbalance than their counterparts in urban areas, they experience more challenges when it comes to the access to credit and financial services, access and control of assets, access to education and training, access to benefits, limited decision making power and other socio- cultural factors. These experiences hinder them from achieving economic empowerment. Rural development lies in the implementation of policies that take the unique aspects of rural areas. Policies should be tied to the environment, social spheres, cultural practices and land use. In Kenya, increasing value in agriculture is one of the programs that Vision 2030 hopes to accomplish. Vision 2030 hopes to integrate better farming practices

such as scheduled crops, improve crop standards and encourage other non-farming activities. These practices are being enacted using the Agricultural, livestock and Fisheries Act, The Land Act and the Crop Act (IFAD, 2013). These flagship projects are expected to increase the national GDP by KES 80-90 billion and to utilize an additional 1.2 million hectares of land by the year 2030 (Vision 2030, 2008). Since about 70% of the poor live in the rural areas that have medium to high potential of farming, these projects will be seen as a means of reducing poverty and bringing sustainability to these areas (Vision 2030 Progress Report, 2013).

As Taylor (1999) mentions, policy makers and governments have to establish the importance of gender mainstreaming when it comes to policy making and implementation. Gender analysis should be carried out when discussing rural development policies and women should be given a voice so as to be able to articulate their lives and their problems, since they are the majority and mostly the people who work in the small farms. As set out in the flagship projects, training farmers on smart and sustainable farming is important (Vision 2030, 2008), but there is a gender gap, since most people who have benefited from these trainings are mostly men. Vision 2030 hopes to ensure that every woman in Kenya will have access to various financial incentives that will facilitate economic empowerment.

2.2.1 Women Economic Empowerment

The Women Enterprise fund is the flagship project under vision 2030 that solemnly caters to women and women economic development. It is an economic empowerment project that gives women access to credit and other financial incentives. The flagship has five mandates which are: Provision of subsidized credit to women entrepreneurs, capacity building of women beneficiaries and their institutions, promotion of local and international markets, promotion of linkages between women owned Small Market Enterprises (SMEs) with larger companies and facilitation in infrastructure and support of investments in infrastructure that support women enterprise. The enterprise fund has given over Ksh 6.2 billion to 63,342 women groups and over 116,372 women entrepreneurs have been trained in business development and loan management (Women's role in Economic Development, 2013).The fund has been successful in improving the lives of women through increasing their economic capacity and creating better markets for them. Vision 2030 also hopes to improve the lives of women through provision of better health care, better transportation, expand markets, better education and general increase in human capabilities (Sen, 1999).

2.2.2 Women Enterprise Fund Access to Loans

Access to finance has been one of the hindrances to women economic empowerment. According to Sanusi (2012), the key barriers to access to finance is ownership to collateral due to little to no property rights for women, absence of credit history due to women not having access to bank accounts and nature of work, which majority is informal work and discrimination from banks and other financial institutes who consider them inexperienced and illiterate when it comes to money, thus making them less attractive clients. Lastly women lack of awareness of financial incentives geared for them makes it difficult for women to access loans and other financial incentives.

The Women Enterprise Fund (WEF) has tried to fill this gap by developing financial incentives and programs such as the Tuinuke Loan and the Jiimarishe loan. The Tuinuke loan has the following features: The self-help group must have 10 members and above comprising of 100% women or 70% women and 30% men. All leadership positions and account signatories must be held by women. The group must have an account in a Bank/SACCO FOSA/Post Bank/Deposit Taking Micro-finance (DTM) and must have been in existence for at least 3 months. Groups must be trained on business management skills by the WEF officers as a prerequisite for the loan application, the loan is interest free, with only 5 % administrative fee and is repayable within one year with a grace period of 2-1 months depending on amounts.1st loan amount is Kshs.100, 000, 2nd loan Kshs 200,000, 3rd loan Kshs 350,000 and maximum loan amount is Kshs 500,000.

While the Jiimarishe loan has the following features: The loan is given to individual women Self Help Groups or companies owned by women. An affordable rate of interest of 8% per annum is given on reducing balance with a repayment period of maximum 36 months. The maximum amount per borrower is Kshs.2, 000,000 repayable in 3 years with flexible security which differs depending on Financial Intermediary.

These types of loans helps women build their capital and the training they get from the fund helps them manage it. When women have capital they are able to participate in income generating activities, contribute financially to their households and have more decision making power because they are financially independent (Cheston & Kuhn, 2002). This is not to say that access to credit guarantees that women will be economically empowered, some studies have shown that some women actually get into even deeper financial problems after having access, creating challenges for both the women and the financial institutions.

According to Ondoro and Omena (2012), when people living in poverty have access to financial services, not only do they save, but they also have a higher repayment rate when they borrow than people in middle class. SIDA (2015) also echoes the same sentiments and adds that when women have access to non – collateral credit not only do they start and grow businesses, but they also improve household spending which benefits mostly children. Even with the knowledge that women having access to credit is known and emphasized, access often seems strained especially for women in rural areas. Sanusi (2012) mentions that women face challenges such as, lack of collateral and startup capital, property rights and control over assets, cultural norms and family

responsibilities, lack of awareness, biased attitudes and formal employment. In the case of Kenya, the major impediment in accessing credit was lack of property.

Mwobobia (2012) and FIDA (2013), mentions that only 1% of women in Kenya own property and 5% share with men. This is due to cultural practices and discriminatory Land and property ownership rights. According to FIDA (2013), there are 75 land laws, and they tend to create great confusion. These land laws are also linked to customary law, which invokes that men are the ones who should own and control land. The second major hindrance to women accessing credit is lack of knowledge on the existence of loans and the cost of getting this information (Sanusi, 2012). Lack of knowledge is usually attributed to lack of civic education or clear communication from financial institutions or government.

Kiraka, Kobia and Katwalo (2013), found out that lack of knowledge on the Women Enterprise Fund was caused by lack of dissemination of information and pushing of other loans by banks and loan officers. Since the fund gives interest free loans, officers from different banks and other financial institutions would try to sell other loans that had interests in order to make a sale, thus hindering access to the WEF loans.

2.2.3 Women Enterprise Fund loan interest

WEF has two major loans that they offer to various groups of women. The Tuinuke Loan is geared towards women in MSEM and in women groups. While the Jiimarishe loan targets mostly individual women and women in groups who want to expand their business and take part in open markets. It is known as an incubator fund for those women who have outgrown the subsidized loans. The Tuinuke loan is an interest free loan with a 5% administration fee that is usually disbursed through the Constituency Women Enterprise Scheme (CWES). The first loan given is Kshs.100, 000; second loan Kshs 200,000, third loan Kshs 350,000 and maximum loan amount is Kshs 500,000. Jiimarishe loan is an incubation loan that helps facilitate women involvement in the market. It has an 8% interest rate with a maximum loan amount of Ksh 2 million, payable in 2 years. Tuinuke loan is the most popular of the two, with over Ksh 6.3 billon disbursed, with a 89% repayment rate, Ksh 4.5 billion paid and Ksh 5 billion due (Women Enterprise Fund Report, 2016).

Some of the major challenges with WEF loan noted from various studies were that, (i) the loans are often too small to facilitate startup capital or growth, (ii) the loan was used for other purposes such as paying medical bills, paying school fess and clearing debts (iii) timing of the loan distribution takes long, changing the use of the money (Ijara, Mwangi & Nge'tich, 2014). With the amount given ranging from Ksh 100,000 to Ksh 500,000, many women felt that ones the money was divided and each member got their cut, it was not enough, leading to them not starting or growing their businesses. Diversion of loans to non-business activities is high among the loan beneficiaries, because they might become available when there are more pressing financial matters.

Sometimes the group might decide to invest the full some of money, but one group member might have a pressing financial matter and decides to borrow the full amount from the group, thus diverting the use of the money for its intended purpose (Kiraka, Kobia & Katwalo, 2013). WEF intends to address these challenges by training women and ensuring that they understand the purpose of the loans and also teach them loan management and other business development services (WEF Strategic Plan, 2009).

2.2.4 Women Enterprise Fund Business Delivery Services

Business development services are non-financial or "soft" skills that help in capacity building. They include business training such as bookkeeping, loan management, marketing, human resource management, organizational structuring, ICT training, entrepreneurship and innovative financial sustainability measures. According to Mwobobia (2012), access to credit alone without business development services can be detrimental, because these services help in creating awareness and equipping individuals with skills that would help them improve their business, thus increasing growth and human capacity. Studies have shown that adequate knowledge of products, availability of markets and business skills can facilitate women access to better jobs and markets, therefore improving their economic status.

Community awareness marketing campaigns also help both men and woman by strengthening networks and creating economic opportunities (CESO, 2013). WEF business delivery services include but not limited to: Business training, education and awareness, monitoring of business growth, exposure to role models, marketing, product certification, networking and asset Building.

The main challenged faced by the WEF business delivery services is low participation. According to Ijaza, Mwangi and Ng'etich (2014), the reason for low participation in trainings is because beneficiaries cannot be forced to attend, even though it is a requirement. Kiraki, Kobia and Katwalo (2013), bring up the question of whether the vetting process is thorough, if majority of beneficiaries do not attend trainings yet it is a requirement. Raising the issue of whether the role of the divisional women enterprise fund committee (DWEFC) is clearly defined.

3. Methodology

A research design according to Kombo and Tromp (2006) is a blue print which is used to ensure that all major components of a study come together. In this study, the researcher used a descriptive research design, because the information will be collected using questionnaires which will touch on people's attitudes and opinions. A descriptive design made it possible to show the relationship between the independent variable which in this case is Women enterprise fund and the dependent variable which is women economic empowerment which will generate answers for the research problem.

Mutuango is a village in Kiharu sub County in Muranga County. Muranga is bordered to the North by Nyeri, to the South by Kiambu, to the West by Nyandarua and to the East by Kirinyaga, Embu and Machakos counties. It has a population of 1119 inhabitants, majority being young and elderly women. The area under study is rural and agriculture mostly small scale is its main economic activity. The area was chosen for the study because of its geographical location, and market economy which is similar to most rural areas in Kenya. This made it easier to replicate the study in other areas.

This study focused on women in Mutwango in Murang'a County who are the age of 20 -35 years. Mutwango is a small village in Muranga County in Central Kenya. The population is 100% Kikuyu and has 1119 inhabitants (Muranga integrated plan, 2013). Their main source of income is farming especially coffee and tea. Most of the population comprised of old people and young women, who have are mostly the home keepers and also the laborers of small parcels of land that are usually inherited from their husbands families. A sample size of 92 respondents was studied, this was arrived at by using the Slovin formula (1960) criterion of; $n=N/1+Ne^2$.where n is the sample size, N is the total population and e is error of tolerance and 95% response rate.

N (Total population) = 120

e (Margin of error) = 0.05

$n=N/1+Ne^2$.

$n = 120/ (1+120\times0.05*0.05)$

n = 92

Table 1: Stratified Proportionate Sample Size

SECTOR	TARGET POPULATION(N_1)	SAMPLE SIZE (Pn)
Farming	50	32
Small businesses	70	60
Total	120	92

A sampling technique according to Mugendi and Mugendi (2003) is a procedure that the researcher uses to select the subjects or cases to be included in a sample. This is very important because the generalization of the study depends on the accuracy of the sampling technique. This study used stratified random sampling technique because of the homogeneous nature of the subjects; researcher ensured that the subjects are women and are beneficiaries of the Women Enterprise Fund.

Data for the study was collected using questionnaires. According to Mugendi and Mugendi (2003), a questionnaire should be able to address the study objective. Sarantakos (1998) adds, what makes questionnaires effective is the minimal interference on the part of the research personnel. They are consistent and uniformed, anonymous, have a wider coverage, and are completed at the subject's convenience with minimal error and biases. The questionnaires were handed out to subjects and will be collected after two weeks.

A letter of introduction was obtained from the Catholic University of Eastern Africa through the committee of post-graduate studies and a permit to conduct the research from the National Council of Science and Technology of Kenya (NACOST). Permission was then obtained from all relevant authorities beforehand to ensure the research goes smoothly. Thereafter the researcher trained the research assistant on how to administer the questionnaires, how to interact with subjects and how to conduct themselves according to the code of ethics. Afterwards, the research together with the research assistant administered the questionnaires to the relevant subjects, ensuring that they understand the purpose of the study. After two weeks the researcher together with the research assistant collected the questionnaires and assured the subjects that the information gathered was for purely academic purposes, and after the data is arranged and analyzed, findings would be made available to them.

After the completion of data collection, data was arranged and grouped according the three study objectives. Analysis of study variables to answer the research questions was done using descriptive statistics of frequency tables, charts, graphs and percentages and inferential statistics helped assess the relationship between the independent variable (Women enterprise fund) and the dependent variable (Women economic empowerment), and ensured generalization of findings using Pearson correlation. Quantitative data was analyzed using Statistical Packages for Social Sciences. The SPSS package was used because it is effective

in handling large amount of data for analysis. Qualitative data was analyzed through content analysis which in turn was analyzed by organizing the data into themes, patterns and sub topics.

In order to ensure external reliability, the questionnaire was assessed using the test/retest method. This method involves conducting the same test twice over a period of time to the same group keeping all conditions constant. The scores from the two tests are established and compared and a correlation coefficient is obtained. If the coefficient is high then the instrument is producing a high test – retest reliability (Mugendi & Mugendi, 2003). The researcher ensured validity by giving the questionnaires to research experts and supervisors who confirmed and ascertained that the questions are in line with the topic under study and that questions are formulated using the research objectives as the guide.

Various ethics committees were created to ensure that researchers, research assistants and participants adhere to set out ethics codes and parameters during research. The researcher sort permission from the National Council of Science and Technology and Catholic University of Eastern Africa. Participation in the study was free and voluntary. The researcher informed the respondents that the data collected was purely for academic purposes and assured them of confidentiality and anonymity. Lastly, the researcher made sure that there is accountability in the collection, dissemination and reporting of the data by ensuring there is no plagiarism and misrepresentation.

4. Summary of Findings, Conclusions and Recommendations

4.1 Summary of the findings

4.1.1 Influence of accessibility of loans

The findings show that all women were part of the Tuinuke loan which is interest free and is repayable within a year. 75% of the women found the application process to be neural, while 25 % found it to be difficult and tedious, though all women agreed that the loan officer was very helpful and the information they got influenced their decision to apply for the loan.

When asked how they found out about the loan, 51% said they got the information from their respective women's group. Media had the lowest influence (12%) when it came to dissemination of information about the loan. When the beneficiaries were informed about the WEF, they took it upon themselves to be part of it.

The loan being accessible gave the participants awareness about how best to increase their capabilities and how to use this resource to empower themselves financially. These women have taken part in self-efficacy by identifying WEF loan as a tool that would help them reach their perceived goals.

4.1.2 Interest rate

Women in the research were all part of the Tuinuke loan, which is an interest free with a 5% administration fee. This loan is disbursed through the constituency women enterprise scheme (CWES). The first loan given is Ksh 100, 000 and after the repayment of the first loan, the women can apply for a second loan of Ksh 200, 000, a third of Ksh 350, 000 and that of Ksh 500,000.

The research showed that 64% were first time loan applicants so they received ksh 100, 000 while 33% were second time applicants who had ksh 200, 000. The beneficiaries all agreed that their repayment period was adequate and the amount was manageable. Due to the interest free option, this is the most popular loan at the Women enterprise fund with a repayment rate of 89% (Women enterprise fund, 2016).The 0 % interest rate on the loan made it attractive and hence why all the beneficiaries were part of the loan.

This study is in agreement with the Resource based theory, because he women identified what resource (type of loan), that they needed to utilize in order to build their capabilities. They also identified a source of capital that has shown when properly utilized does create financial empowerment at the individual level.

4.1.3 Training

The research shows that even though trainings are mandatory according to the requirements by the WEF, only 25 % (23 beneficiaries) attended the trainings offered this supports Ijaza, Mwangi and Nge'tich (2014) research on poor training attendance of WEF beneficiaries. When asked if they applied what they had leant through the training, 4 out of 23 said they always applied it, 11 said often and 7 said sometimes.

The research also shows that those who attended the trainings felt that the WEF has improved their lives in one way or another. According to Kiraki, Kobia and Katwalo (2013), this begs the question of whether the vetting process is thorough and whether the importance of trainings is emphasized especially in the initial stages of loan application. WEF should find out what are the underlying issues that are causing low participation in trainings, and ones they have identified these issues, they design training programs that help solve these issues.

4.2 Conclusion

Women Enterprise fund is one of the flagship project that gears towards accomplishing vision 2030 and also shows Kenya's commitment towards the United Nations Sustainable Development Goals (SDG), especially SDG 5, 8& 10. The magnitude of the fund should not be overlooked because it is a fund that has a lot of money and can make a great impact if implemented efficiently.

The research shows that the attitude towards the WEF loan does not influence the use of the WEF products. It also shows that there is a slight influence of the fund of women economic empowerment at the household level, especially for those beneficiaries who used the money from the loan for business and farming.

The least impact was felt by those women who diverted the money for domestic and personal use. Lastly the research shows that WEF trainings are very poorly attended and more time and effort should be placed on finding a solution to encourage and increase attendance. This research adds to the body of knowledge because it has looked at the influence of the Women Enterprise Fund through three different lenses and how they impact women at an individual level, by examining the impact each has on women economic empowerment.

4.3 Recommendations

Given the importance of the Women Enterprise fund on economic empowerment, it is imperative that the fund is able to touch the lives of as many women in Kenya as possible. This can be made possible through:

4.3.1 The WEF ensuring that all members of women groups attend mandated trainings, by taking attendance and using individual incentives to encourage attendance.

4.3.2 The WEF training women group leaders or chairpersons to be trainers, and using group meetings to train members and address challenges faced by individuals.

4.3.3 A more cohesive partnership between the Women Enterprise Fund, Women representatives, the County government first lady offices, and other women oriented organization to help encourage women participation.

4.3.4 The National government using Women's day, International girl child day and other recognized days to have public service announcements on the importance of the fund and the benefits of being a beneficiary.

4.3.5 The Women Enterprise Fund should include beneficiaries and non-beneficiaries of the fund in round table discussions from all parts of the country, and using these discussions to come up with tailor made solutions on how to improve the impact of the fund and participation.

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GEOCHEMICAL AND PALYNOLOGICAL EVALUATION OF LIMESTONE IN OHAFIA AREA, SOUTHEAST NIGERIA

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Abstract: Late Maastrichtian to Danian limestone of Nsukka Formation in Ohafia and its environs were studied to understand the geological processes that affected the rock after its deposition. The Nsukka Formation in the studied area consists of two facies associations; limestone-shale and cross bedded sandstone. The limestone-shale facies association consists of the following lithofacies; rippled clayey sandstone, carbonaceous shale, heterolithic sandstone-shale, laminated grey shale, fossiliferous limestone, fine grained sandstone, silty shale, medium grained sandstone and carbonaceous sandstone. The cross bedded sandstone facies association consists of only cross bedded sandstone. Palynological analyses of some of the samples indicated that the limestone of Nsukka formation is of Late Maastrichtian in age due to the abundance of *Spinizoncolpites baculatus* and *Lonapertites marginatus* species, with co-occurrence of typical Late Maastrichtian dinoflagellate cysts assemblage, such as, *Dinogymnium acuminatum*, *Senegalinium* sp., *Andalusiela* sp. and *Paleocystodinium* sp. The major geochemical element in the limestone samples that was analyzed includes CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, Na_2O, SO_3 and LOI. The limestone consists of CaO as the major constituent followed by SiO_2 while Al_2O_3, Fe_2O_3 and MgO form the minor constituents. Given the values (42.66% – 94.57%) quoted for calcium carbonate equivalence (CCE). The Ohafia – Ozu Abam – Arochukwu limestone has good potentials for use as petrofertilizers in liming processes.

Key words: Limestone, Geochemistry, Palynology, Petrofertilizer, Cretaceous, Ohafia, Nsukka, Nigeria.

INTRODUCTION

The studied area lies between longitudes 5^o22` to $5^o40$`E and latitude 7^o42` to $7^o55$`N within the Ohafia-Ozuabam-Arochukwu areas of southeastern Nigeria (Fig. 1). Limestone is a sedimentary rock composed largely of the mineral calcite ($CaCO_3$), which is formed either by organic or inorganic processes (Serra 2006). It is formed either by direct crystallization from water (usually sea water) or accumulation of shell or shell fragments. Most limestones are formed with the help of living organisms. Many marine organisms such as mussels, clams, oysters and corals extract calcium carbonate from sea water to make shells or bones. Microscopic organisms such as foraminifera are also involved in limestone production. Limestones can also be formed without the aid of living organisms. If water containing calcium carbonate is evaporated; the calcium carbonate is left behind and will crystallize out of solution.

Nigeria is endowed with large deposits of limestones in various parts of the country. Some appreciable deposits of limestones also occur in the Nsukka and Imo Formations. From the proposed study, these limestone deposits which occur in association with shales, fine grained sandstones and siltstones trend in a northwest to southeasterly direction from Onukwu to Ndi Uduma Ukwu in the north, through Ndi Okorie and Ndi Okereke to Asaga village in Southern Arochukwu which have a southward extension into the Obotme area (Ekwere *et al*, 1994) of the Calabar Flank. Reyment (1965) observed that the Nsukka Formation outcropping southwards of Okigwe consist of bands of fossiliferous limestones interbedded with sandstones, shales and sandy shales.

This paper deals with the evaluation of geochemical, palynological and depositional environment of limestone sediment in Ohafia-Arochukwu Areas of southeastern Nigeria.

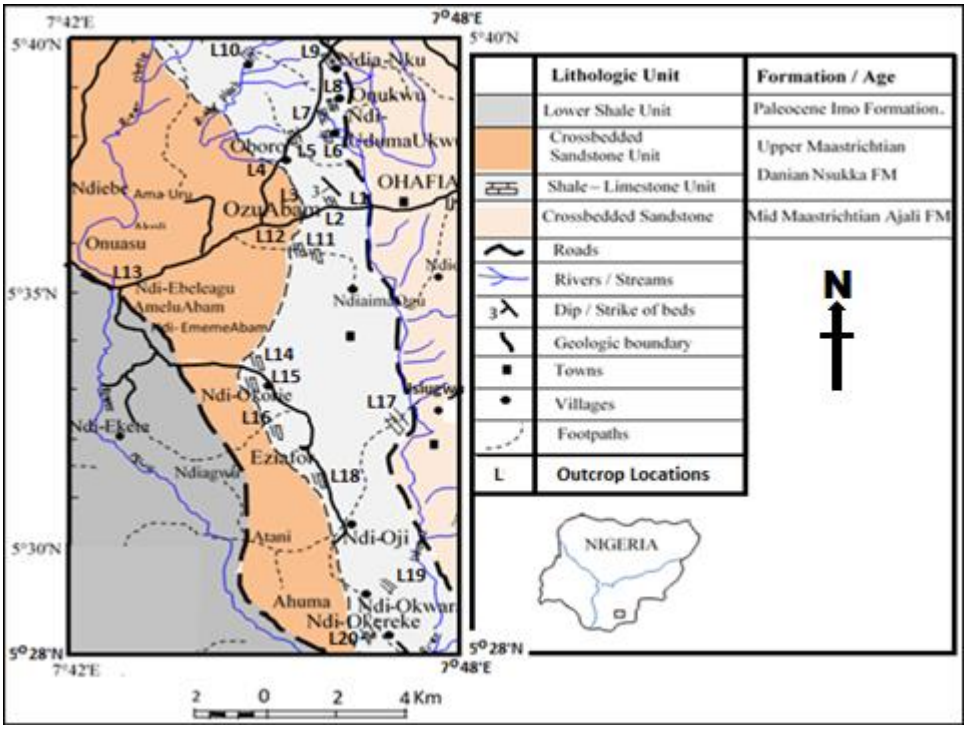

Fig.1: Geologic map of the studied area showing outcrop locations [in set: map of Nigeria showing location of the studied area (modified from Ephraim and Odumodu, 2015)].

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STRATIGRAPHICAL SETTING

The oldest Sedimentary basin in Nigeria, the Benue –Abakaliki Trough originated in the Early Cretaceous as the failed rift associated with the opening of the South Atlantic (Reyment, 1965). The Benue Trough was filled by the Coniacian time. Some tectonic movements culminated into the Santonian epierogenic uplift and folding of the Albian-Coniacian sediment into the Abakaliki Anticlinorium along a NE-SW axis. The structural inversion of the trough led to the subsidence of the Afikpo Sub Basin and Afikpo Syncline on the west and southeast of the anticlinorium respectively.

Ojoh (1990) had noted that basin subsidence in the southern Benue Trough was spasmodic, being a high rate in pre-Albian time, low in the lower Cenomanian, and very high in the Turonian, which was related to the important phase of platform subsidence. This is taught to be the actual time of initiation of the Afikpo sub-basin creation, a process that gained momentum in the Coniacian and climaxed during the Santonian thermo-tectonic event. Thus the localized subsidence on the western reach of the southern Benue Trough and the continued sea level rise into the Coniacian, led to the installation of the Anambra Basin (Ojoh 1990).

Afikpo sub basin is sandwiched between Benue Trough and the Niger Delta. The main implication is that, after the Santonian thermo-tectonic event, there must have been a thermal decay, i.e. a detumescent stage that produced sag on which at least part of the Afikpo sub basin became superimposed. In the same manner, the establishment of the Niger Delta sedimentary regime from the Paleocene must have taken advantage of continued thermal sag. According to McKenzie (1978), there is usually a distinct thermal sag stage involved in post rift basin formation in response to the cooling and contraction of the lithosphere and the asthenosphere that were thermally perturbed during the earlier rifting process.

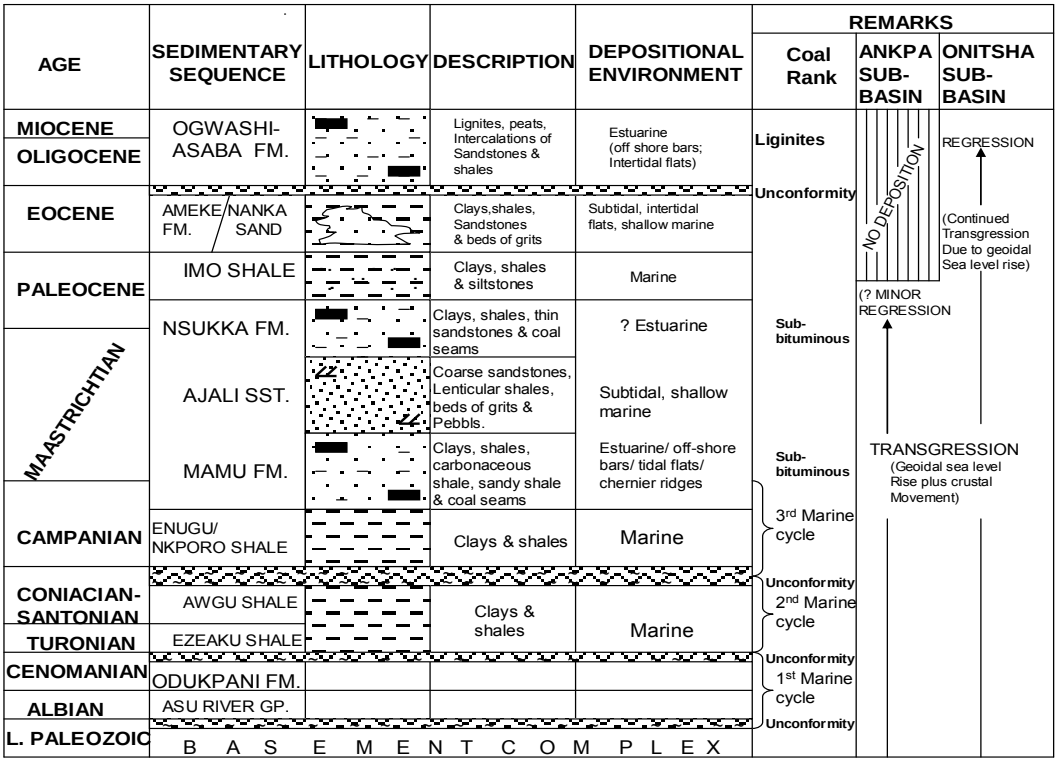

Fig. 2: The stratigraphy of the Anambra Basin, Nigeria (After Uzoegbu et al., 2013).

These newly subsided sedimentary basins, including the Afikpo Syncline, received sediments from the Campanian to Paleocene (Fig. 2). Sedimentation began subsequently in the Anambra Basin during post-Santonian times (Murat, 1972; Petters, 1978) after the deformation and uplift of the Abakaliki-Benue Trough. The uplifted Abakaliki anticlinorium supplied sedimentary detritus that were used to fill the basins from the Late Cretaceous to Early Tertiary times. The basal sedimentary formation in the Afikpo sub basin and the Afikpo Syncline is the Nkporo Formation. The Nkporo Formation is successively overlain by the Mamu Formation which in turn is overlain by the Ajali Sandstone. This Transgressive cycle is capped with the deposition of the Late Maastrichtian Nsukka Formation. The Nsukka Formation is successively overlain by the Paleocene Imo Formation, Eocene Ameki Formation and the Ogwashi Asaba Formation which have lateral continuities with the formations in the Niger Delta Basin.

MATERIALS AND METHODS

A total of sixteen representative samples of limestones were collected from the studied area and were subjected to laboratory analyses for geochemical and palynological studies. For palynological analysis the samples were treated with hydrochloric acid (HCL) to remove any carbonate and then thoroughly washed with distilled water after decanting the HCL. The addition of hydrofluoric acid (HF) to the samples was to dissolve and wash the silicates. The samples were further treated first with warm 36% HCL and then cold HCL to remove the fluoride gels. The separation of pollens and spores were done by adding 0.5% HCL and transfer the samples into small 15cc. Centrifuge tubes. The 0.5% HCL is decanted after centrifuging and the zinc bromide (s.g 2.2) was added and properly stirred with glass rod. The floating top part consisting of organic material was gently decanted into another tube. The organic material is then thoroughly washed with distilled water, dried and prepared for microscopic identifications.

The same number of samples was subjected to geochemical analysis and loss on ignition (LOI). Determination of geochemical information was performed by pressed rock-powder pellets using an XRF method developed and calibrated for carbonate rocks. 5g of the rock powder of each of the sample was weighed out and mixed with a few drops of polyvinyl alcohol and was spread for drying and to form a "puck". Further, a boric acid (backing) was placed on top of the rock powder and a pellet formed by applying pressure of 15 tons for about 15 seconds. After drying, the pellets were placed in the sample holder of the XRF spectrometer, and the fluorescence was measured at eight elements include SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, and SO_3. For the loss on ignition (LOI), 1.0 g of each powdered sample was weighed into a porcelain crucible. Crucibles containing the samples were loaded on a silica tray and placed in a furnace that had been preheated to $350^{O}C$. The temperature was raised to $1100^{o}C$ and the samples were held at this temperature for 2.5 – 3 hours. The furnace was allowed to cool to approximately $650^{o}C$ and the samples were removed and placed in a dessicator.

When cooled to room temperature, the crucibles were weighed and the weight loss (LOI) recorded. The %LOI was added to the total % element oxides and the sum was found to be close to 100. The detection limit for all the major element oxides is 0.01%. The only exceptions are Fe_2O_3 and K_2O which have a detection limit of 0.04%.

RESULTS AND DISCUSSION

The limestone outcrops trend in a northwest – southeasterly direction from Ndi Uduma Ukwu in the north through Ndi Okorie to Ndi Okereke in the south. The limestones occur as beds or boulders within the shale-limestone unit. The outcrops are observed at road cuts, track roads, stream and river beds/channels and farmlands. Macroscopic examination of the limestones has revealed the presence of several fossils such as gastropods and bivalves. The limestones are also milkish white to light grey in colour, fine to medium grained with fossils and clay balls forming a coarse fraction. In the northern part of the studied area especially around Onukwu and Ndi Uduma Ukwu the limestones contain a lot of detrital input which appears to decrease southwards.

Palynology

The photomicrograph indicates some key palynomorphs species observed from the studied samples (Fig. 3). The samples 11, 16 and 26 were dated Late Maastrichtian age on the basis of high abundance of the *Spinizoncolpites baculatus* and *Lonapertites marginatus* species, with co-occurrence of typical Late Maastrichtian dinoflagellate cysts assemblage, such as, *Dinogymnium acuminatum*, *Senegalinium* sp., *Andalusiela* sp., and *Paleocystodinium* sp. (Table 1, 2). Sample 19 was assigned to Paleocene age based on high dominance of *Proxapertite operculatus*, with low occurrence of *Longapertites marginatus* and *Spinizonocolpites baculatus* species (Table 2), (Germeraad *et al*., 1968). The age however was further strengthened by the absence of a typical Late Maastrichtian species, *Dinogymnium acuminatum*, in the above samples.

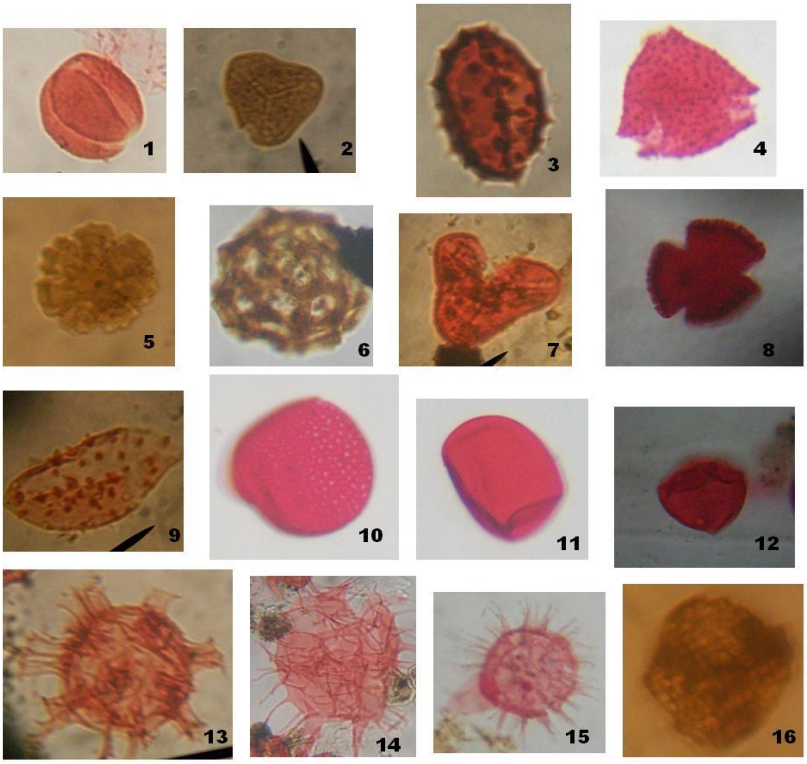

Fig. 3: The photomicrographs of some palynomorphs from the studieded samples (Numbers represent the individual species such as 1. *Proxapertites operculatus,* 2. *Foveotriletes margaritae,* 3. *Spinizonocolpites echinatus,* 4. *Echitriporites trianguliformis,* 5. *Ctenolophonidites costatus,* 6. *Buttinia andreevi,* 7. *Cyathidites minor,* 8. *Retitricolporites irregularis,* 9. *Mauritidiites crasibaculatus,* 10. *Proxapertites cursus,* 11. *Laevigatosporites ovatus,* 12. *Monoporites annulatus,* 13. *Oligosphaeridium complex,* 14. *Apectodinium homomorphum,* 15. *Coronifera oceanic,* 16. *Dinogymnium acuminatum*).

Reijers et al. (1997) in a study of the Afikpo sub basin suggested that the depositional environment of the Nsukka Formation was mainly a fluvial setting with some marine incursions that mixed in shoreface sedimentation. Mode (2004) using lithofacies with microfaunal data and suggested that the formation was deposited in a foreshore to shoreface and inner shelf environments. Adekoya et al (2011) and Nwajide (2005) studied lithofacies and palynofacies of the formation and concluded that the sediments were deposited in paralic and marine settings. Odumodu and Ephraim (2007), based on pebble morphometric results inferred a

Table 1: The occurrence and distributions of terrestrial sporomorphs in the studied samples.

Palynomorph Species	**Sample 16**	**Sample19**	**Sample 26**	**Sample 28**
Terrestrial Species				
Schizosporis parvus	1	0	0	1
Verrucatosporites usmensis	0	3	2	0
Laevigatosporites ovatus	7	5	4	5
Cyathidites minor	0	0	3	4
Leiotriletes adriennis	5	0	3	2

Cyathidites austrialis	1	1	1	0
Distaverrusporites simplex	2	0	3	0
Cingulatisporites ornatus	2	0	2	4
Foveotriletes margaritae	1	0	0	1
Spinizonocolpites echinatus	1	2	0	1
Spinizonocolpites baculatus	7	1	9	5
Proxapertites cursus	1	3	0	0
Retitricolporites irregularis	2	2	0	0
Ctenolophonidites costatus	0	3	0	0
Proxapertites operculatus	0	12	2	1
Pachydermites diederixi	3	0	0	0
Tricolpites hians	2	0	1	2
Longapertites marginatus	5	1	7	7
Psilatricolporites operculatus	1	0	1	0
Echiperiporites icacinoides	0	0	1	0
Mauritidiites crassibaculatus	3	2	4	0
Liliacidites nigeriensis	0	2	0	4
Striatopollis catatumbus	1	0	0	1
Monocolpites marginatus	3	0	2	4
Monoporites annulatus	0	1	0	2
Psiltricolporites minutes	0	2	0	0
Psiltricolporites crassus	0	3	1	0
Scabratriporites simpliformis	0	2	0	0
Syncolpites marginatus	0	0	0	2
Retibrevitricolpites triangulates	1	3	0	0
Psilatriporites rotundus	0	1	0	0
Retidiporites magdalenensis	0	0	1	3
Echitriporites trianguliformis	1	0	3	1
Proteacidites dehaani	2	0	2	1
Inaperturopollenites hiatus	0	1	0	0
Striamonocolpites rectostriatus	1	0	0	0
Constructipollenites ineffectus	2	0	1	2
Buttinia andreevi	2	0	3	1

beach depositional environment, with considerable fluvial influence for the sandstone facies of the Nsukka Formation in Ozuabam area. Oti (1983) investigated the mineralogy, petrology and phosphate mineralization of these limestones. Kumaran and Rajshekhar (1992) studied the foraminiferal linings in the limestones. Mbuk et al (1994) discussed the fossil contents of the Nsukka Formation in the Ohafia-Ozu Abam area.

Table 2: The occurrence and distribution of marine species in the examined samples.

Marine Species	**sample 16**	**sample 19**	**sample 26**	**sample 28**
Dinoflagellate cysts				
Dinogymnium acuminatum	3	0	1	2
Spiniferites ramosus	2	2	0	1
Ceratiopsis sp.	2	0	3	5
Operculodinium centrocarpum	0	1	1	0
Andalusiella sp.	2	0	4	1
Glaphyrocysta ordinata	1	1	1	0

Palaeocystodinium sp.	2	0	3	2
Oligosphaeridium complex	0	1	0	0
Cordosphaeridium inodes	0	0	1	0
Achomosphaera ramulifera	0	0	2	0
Diphyes colligerum	0	1	0	3
Apectodinium homomorphum	0	10	0	0
Damassadinium californica	0	0	0	0
Senegalinium sp.	3	0	3	1
Cleistosphaeridium sp.	0	0	0	0
Coronifera oceanic	0	0	3	1
Adnatosphaeridium multispinosum	0	0	0	2
Hafniasphaera septata	0	0	0	0
Cyclonephelium deckonincki	0	2	0	0
Turbiosphaera filose	0	2	0	0
Lingulodinim machaerophorum	0	0	2	0
Kallosphaeridium brevibarbatum	0	3	0	1
Adnatosphaeridium vittatum	1	1	0	0
Exocosphaeridium sp.	0	0	2	0
Fibrocysta sp.	0	3	0	0
Areoligera senoniensis	2	0	3	5
Histrichokolpoma rigaudae	0	1	0	0
Achilleodinium biformoides	0	0	0	0
Cometodinium whitei	1	0	2	1
Phelodinuim sp.	2	0	1	3
Forams test lining	1	0	0	2

Table 3 described and explained the percentage of individual pollens and spores as well as the depositional environments. Simpson (1956) and Reyment (1965) in their different studies simply described the Nsukka Formation as a paralic sequence. Mode and Odumodu (2014) in their studies on the lithofacies and ichnology of the Late Maastrichtian-Danian Nsukka Formation in the Okigwe area suggested the presence of five lithofacies association that were deposited in several environments ranging from lagoon/bay, upper to lower shoreface through to the proximal offshore.

Table 3: Summary of the *Palynomorphs* % frequency distribution and their paleoenvironmental inferences.

SAMPLE N0.	**PALYNOMORPHS % FREQUENCY**			**PALEOENVIRONMENTS**
	Spores	**Pollen**	**Dinocysts**	
16	23	50	27	Marginal marine (near-shore/mangrove swamp)
19	11	52	37	Marginal marine (proximal estuary)
26	20	43	37	Marginal marine (near-shore/mangrove swamp)
28	20	46	34	Marginal marine (near-shore/mangrove swamp)

Geochemistry

The major element in the limestone sample that was analyzed includes CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, Na_2O, SO_3 and LOI. The limestone consists of CaO as the major constituent, next to SiO_2 while Al_2O_3, Fe_2O_3 and MgO form the minor constituents. Among the oxides Na_2O is almost to nonexistent while K_2O occurs in traces (Table 4).

From simple stoichiometric composition employing a (CaO and $CaCO_3$) ratio of 0.56, the CaO content of the rock translate to calcite ($CaCO_3$), values of between 43 and 92 weight %. The measured chemical species that have been analyzed and the results presented as correlation coefficient and as co variation plot. Examination of changes of the measured chemical species with respect to CaO displayed positive correlation, while most of the major insoluble residue components, notably, SiO_2, Al_2O_3, Fe_2O_3 and K_2O are significantly decreased with increasing CaO content of the rock. Also strong positive correlation amongst SiO_2, Al_2O_3, Fe_2O_3 and K_2O are observed in Figure 4.

The chemical composition of the limestone reflects observed mineralogical compositions. The negative correlation existing between CaO and SiO_2 suggests that the rock comprises distinct silicate and carbonate fractions. The positive relationships existing between CaO and MgO (Fig. 5) together with distinct negative relationships displayed between MgO and major insoluble residue components, such as SiO_2 and K_2O reflects the presence of dolomite as part of the carbonate phases of the rock. The strong positive correlation exiting between CaO and LOI can

Table 4: Geochemical result obtained from the studied samples.

Sample N0.	Sample Name	Chemical Composition (%)								LOI (%)	$CaCO_3$ (%)
		SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	K_2O	Na_2O		
1	Osusu Nkwu	46.41	3.70	3.60	25.06	0.34	0.20	1.60	0.02	18.12	47.06
2	Oboro	29.08	4.18	4.65	33.68	1.10	0.55	1.09	0.01	24.77	60.78
3	Ndi Okereke	3.06	0.98	1.67	49.94	1.38	0.16	0.06	0.00	41.96	92.82
4	Isi Ugwu	7.50	2.02	5.58	46.24	1.07	0.44	0.13	0.00	35.96	81.08
5	Kalayi	3.91	1.29	1.95	50.27	0.80	0.13	0.08	0.00	40.38	89.73
6	Ozuabam Ohafia Road	8.87	2.19	4.14	46.12	1.16	0.78	0.24	0.00	35.64	80.64
7	Ndi Ukpeze	36.12	3.33	4.69	31.19	0.68	0.32	1.39	0.02	22.21	55.69
8	Oduenyi (Imo Shale)	3.80	0.60	1.13	50.74	0.75	0.13	0.14	0.01	41.64	90.01
9	Ozuabam Ohafia Road	9.56	2.21	3.89	45.76	1.09	0.78	0.26	0.00	35.14	78.70
10	Orua Stream	4.51	1.10	2.48	49.34	1.47	0.17	0.13	0.00	40.39	77.78
11	Oboro	30.88	4.33	5.12	32.05	1.72	0.68	1.14	0.01	23.87	56.41
12	Ndi Okereke	5.61	1.17	1.84	49.49	1.25	0.20	0.17	0.00	39.39	91.47
13	Ndi Ukpeze	36.07	3.21	4.12	31.66	0.53	0.57	1.38	0.02	22.44	55.86
14	Ozuabam Ohafia Road	10.09	1.86	3.55	45.70	1.33	0.78	0.32	0.00	35.49	83.29
15	Kalahi	3.33	0.98	1.31	51.25	0.92	0.17	0.07	0.00	41.29	90.90

16	Isi Ugwu –Ndi Oji Abam	6.90	1.72	4.41	46.90	1.05	1.38	0.13	0.00	36.57	82.56

be explained by considering that a significant proportion, if not all of the LOI is due to the carbonate phase. The strong negative correlation existing between CaO and the various insoluble residues suggest the relevance of the alumino silicates in the evolutionary history of a rock. A similar observation was made during the study of the geochemical signatures of the Nsofang marble in the Mamfe Embayment of south eastern Nigeria (Ephraim, 2012). Furthermore, limestones of Ohafia Ozu Abam area, the corresponding to low Al_2O_3 values measured in deposits of most of the studied locations having elevated concentrations of SiO_2 rule out the considerations of high detrital input in the limestones. Accordingly, significant amount of insoluble components such as SiO_2, Al_2O_3, Fe_2O_3, K_2O and Na_2O (Fig. 4) are most likely not sources from alumino silicate phase but probably introduced through skeletal remains given the fossiliferous nature of the limestones.

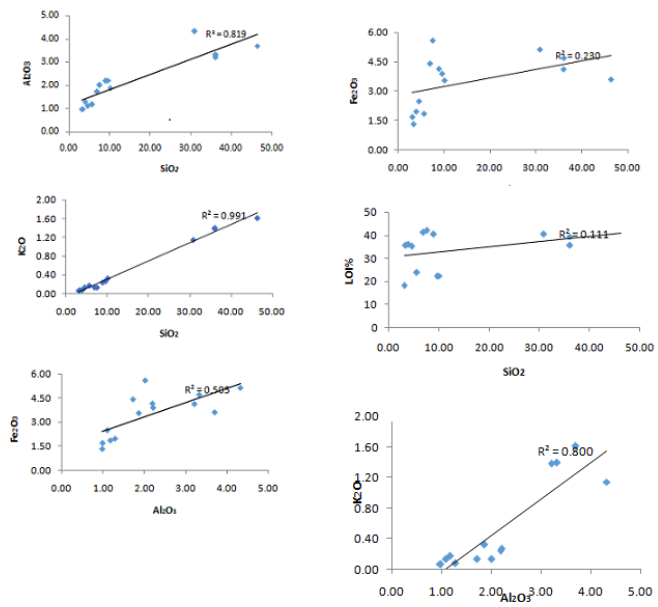

Fig. 4: Scattered plot diagrams of selected major elements and LOI (R^2: coefficient of determination) of the analyzed limestones

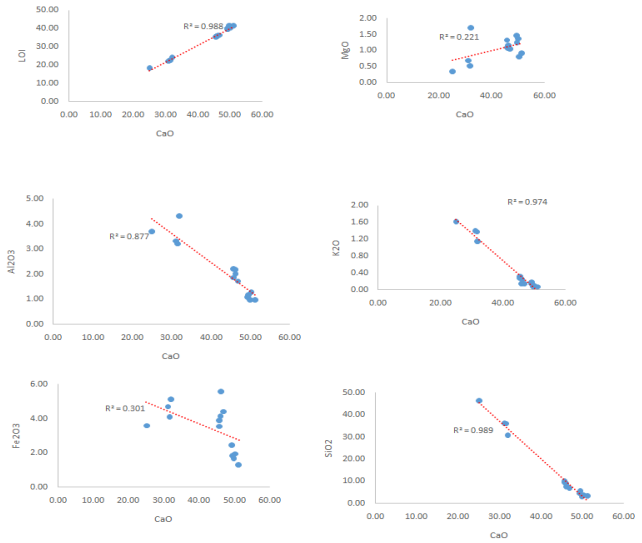

Fig. 5: Scattered plot diagrams of CaO versus selected major elements and respective coefficients of determination (R^2) of the analyzed limestones.

Ibe and Ogezi (1997 and1999) worked on the chemical and industrial characteristics of the carbonate rocks of the Nsukka Formation in the Ohafia Area. Odumodu et al, (2015) discussed the characterization of diagenetic processes of the Late Maastrichtian to Danian limestone in Ohafia areas of Southeastern Nigeria.

CONCLUSION

Late Maastrichtian age on the basis of high abundance of the *Spinizoncolpites baculatus* and *Lonapertites marginatus* species, with co-occurrence of typical dinoflagellate cysts assemblage, such as, *Dinogymnium acuminatum*, *Senegalinium* sp., *Andalusiela* sp., and *Paleocystodinium* sp. Also, Paleocene age has been assigned based on high dominance of *Proxapertite operculatus*, with low occurrence of *Longapertites marginatus* and *Spinizonocolpites baculatus* species. This was further strengthened by the absence of a typical *Dinogymnium acuminatum*, in some samples. The individual pollens and spores described the limestone sediment depositional environments as marginal marine (near-shore/mangrove swamp).

The geochemical composition indicates significant amount of insoluble components such as SiO_2, Al_2O_3, Fe_2O_3, K_2O and Na_2O are most likely not sources from alumino silicate phase but probably introduced through skeletal remains given the fossiliferous nature of the limestones.

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INFLUENCE OF MANAGERIAL TRAINING ON THE PERFORMANCE OF MICRO AND SMALL ENTERPRISES IN KISII COUNTY

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ABSTRACT: The main aim of this study was to establish the relationship between training and the performance of micro and small enterprise in Kisii County, Kenya. The objective of the study was to establish the relationship between managerial training and the performance of MSEs in Kisii County. A descriptive survey design was used to carry out the study. The target population was 12,772 owner managers. The sample size was 384 which obtained through simple stratified random sampling where 9 strata were studied. Data was collected using questionnaires, interview schedules and observation checklist. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 computer software. The hypothesis was also tested using the t- test. Results of the managerial training were found to be satisfactory in explaining performance of micro and small enterprises in Kisii County. This was supported by coefficient of determination also known as the R square of 75.7%. This means that independent variable explain 75.7% of the variations in the dependent variable which is performance of micro and small enterprises in Kisii County. The ANOVA results indicate that the overall model was statistically significant. This was supported by an F statistic of 214.536 and the reported p value (0.000) which was less than the conventional probability of 0.05significance level. Regression of coefficients showed that managerial training and performance of micro and small enterprises in Kisii County had a positive and significant relationship (r=2211681.748 p=0.000. The R^2 before moderation was 75.7% but after moderation the R^2reduced to 49.6%. This implies that legal requirements reduce the performance of micro and small and enterprises in Kisii County. The study concluded that managerial training influences the performance of micro and small enterprises in Kisii County. It was recommended that that more managerial training should be organized for Micro and Small Enterprises in Kisii County.

Keywords: Managerial training, Performance, Results Oriented

1. Introduction

This study focused on Managerial training and the performance of micro and small enterprises in Kisii County. Micro and small enterprises have become economic drivers in not only our country Kenya but also Kisii County. However, critics of micro and small enterprises argue that despite the much resource the country and counties have spent in training MSEs the gains have not been commensurate with the huge sums of money spent during the training process. MSEs still continue dying every year according to a survey carried out in 2016 by the Kenya National Bureau of Statistics. This trend continues to worry not only the country's policy makers but also county policy makers.

Simpson et al. (2012) indicated that there is no or little consensus on how to measure performance of MSEs, which best suited for particular business organization Thus, Performances are variously measured and the perspective are tied together and consistently monitored from the organization's context. Approaches which best suits to measure small business performance, conceivably lacks universality. However, the selection of performance measures that reflect the true situation of small business with some degree of certainty and reliability is indeed a crucial process. Financial and non-financial measures of performance includes but not limited to: profitability, total assets, return on investment, sales volume, employment size, capital employed, market share, customer satisfaction, productivity, turnover, delivery time, employees turnover and other.

Ghimire and Abo (2013) in their study entitled an empirical investigation of Ivorian MSEs access to bank finance came up with various factors that constrained demand side issues related to the firm: size, age, location, ownership structure of the enterprise,

gender, level of education and length of relationship between the firm and the bank, length of loan period, collateral and availability of financial information. Ijeoma and Ezejiofor (2013) asserted that corporate governance has contributed significantly in ensuring accountability and transparency in order to improve performance of MSEs and facilitating achievement of their social responsibilities in its environment. Furthermore corporate governance assist in providing structures which the objective of the MSEs is set and means of attaining those objectives and monitoring performances to ensure that effective and efficiency in operations are achieved.

Njoora and Kyalo (2014) in their study asserted that credit influenced the growth MSEs. They recommended that more formal credit facilities be availed to MSEs under favorable conditions. They further said that the Kenyan government should strengthen and built the capabilities of institutions that generate and implement programmes for MSEs development. Msipah, Chavunduka, Jengeta, Mufudza and Nhemachena (2013) asserted that the secret behind successful business venture largely depends on entrepreneurial skills. They noted that there is need for government and other relevant stakeholders to put in efforts in training artisanal engineers in business management skills and technical skills to enhance their sustainability. They further noted that entrepreneurs require training and advice on specific areas such as: compiling a business plan, market research, identifying business and market opportunities, marketing and advertising, entrepreneurial skill trainings, financial and cash flow planning, networking opportunities among others.

Howieson (2007) provide a list of reasons why MSEs are reluctant to adopt a broad structure, these are: cost in terms of money and time, creating additional work, the fear of being naïve or ignorant by other directors or shareholders and belief that a bureaucracy will destroy the ability to respond quickly. The last few decades have witnessed several changes in the world economic system: consolidating trend of globalization and liberalization of economies. Economic downtown indicated further that it is not the big companies which are only efficient machineries to rotate the economic cycle: rather MSEs are the most trusted vehicles that lead any economy towards salvation but the realization has possibly not brought everything best for MSEs, rather it has opened up a sea of challenges. There are new business orders in the advent of information technology – opening up or market dominated by medium and big domestic companies, transnational companies which has brought new line of business strategies and supply chain, hitherto unknown to traditional business model which dominates the MSEs sector. Africa is plagued with corruption. African countries are ranked among the world's highest rate of corruption.

This creates an environment in which according to Taylor (2012) hinders the performance of even the basic business functions. Akinruwa, Awolusi and Ibojo (2013) examined the determinants of Micro and Small Enterprises (MSEs) Performance in Ekiti State, Nigeria: A Business Survey Approach. The result finds that government focus should be on provision of all determinants that will enhance the thriving of MSEs performance, creates avenue that will give room for sharing experience among business owners finally, adequate information should be made to create awareness and need to patronize the home made product. Aworemi, Abdul-Azeez, and Opoola (2010) examined the Impact of Socio-Economic Factors on the Performance of Small-Scale Enterprises in Osun State, Nigeria. The result finds that integrated approach to the development of individual entrepreneurial capacity and promotion of sustainable small-scale enterprises.

Donglin (2009) measured the performance of MSEs in the Information and Communication Technology Industries. The result shows that an effective performance management system for Information Communication Technology (ICT), MSEs should help the companies to formulate right strategies that can especially manage the uncertainty of the external environment in their development. Krishna et al. (2012) in their study on the factors affecting the performance of MSEs in Malaysia proved that there is a significant positive relationship between the use of marketing information as well as the application of information technology and the performance of MSEs.

Eniola (2014) examined the role of MSEs firms performance in Nigeria. The result shows that the role MSEs performance in the national growth in Nigeria cannot be overemphasized. The performance of MSEs and its contributions has manifested and shown that they are a major area to be researched to assist the policy makers and the MSEs, owners to encourage an enabling and conducive environment for MSEs to perform more. SitiNur and Nelson (2011) explored a literature analysis on business performance for MSEs – Subjective or Objective Measures? The result shows that examining and expanding the taxonomy of business performance and in shedding light on future research in any discipline that focuses on measuring performance (Eniola, Entebang and Sakariyau 2015).

Kamunge, Njeru and Tirimba (2014) in their study found out that availability of management experience is a key factor affecting the performance of MSEs in Limuru Town Market. This has the potential of leading to improved business performance. The other key factors that were found to affect performance of MSEs in Limuru Town Market positively were: access to business information, government policy and regulations, access to infrastructure and access to finance.

According to Micro and Small Enterprises Act (2012), it made it mandatory that training programmes for MSEs on technological modernization be undertaken to improve their performance. Despite the many training programmes to MSEs at both national and County Governments, MSEs performance is still below par. Various reasons have been advanced for this scenario. Poor management skills are still highlighted as one of the significant contribution facts in the failure of MSEs. They found that less than 20% of MSEs last more than 6 years. This means that more MSEs fail to prosper. This study sought to establish the relationship between managerial training and the performance of Micro and Small Enterprises in Kisii County.

2. Literature Review

Ans (2011), Mohammed and Obeleagu (2014) and Agbim (2013) explains management training as the acquisition of management skills regarding business planning, organizing, directing and quality control of assets and human resources. They said that for MSEs to succeed they need to train their employees the best practices in management. Jayawarna and Macpherson (2006) noted that poor management skills are still highlighted as one of the significant contributory factors in the failure of the MSEs. In his study, he found out that less than 20% of MSEs last more than 6 years a confirmation that management training could be an important component in MSEs growth.

Arafat and Ahmed (2012) found out that MSEs play a vital role in economic growth, poverty alleviation and rapid industrialization of the developing countries. MSEs are significant in underlying countries economic growth, employment generation and acceleration of industrialization. The government of Bangladesh discovered the importance of MSEs hence highlighting it in the industrialization policy, 2010. They found out that MSEs in Bangladesh would face intense competition from the international markets. Human resource is the greatest asset that MSEs need to succeed. A well trained workforce is critical in the growth of MSEs. This study has not however considered the fact that in management training of MSEs, only training the workforce and ignoring the other management aspect is preparing to fail completely.

Tiftik and Zincirkiran (2013) asserted that knowledge and skill of enterprise managers and mid scaled companies against management activities and growing management scale are gradually becoming complex in environment where there are globalization, information economy, rapidly changing information and communication technologies, new market opportunities and economic crisis makes adaptation to change very complicated. Since entrepreneurs are inadequate by means of time and information level emerging new specialization areas, information being vital value, relations of enterprise environment gaining importance and organization structures becoming complex enterprise also needs other managers. They further noted that there is need for managers to comprehend changes and to respond to these changes with new approaches.

Gholami, Sulaiman and Ramayah (2013) holds that training MSEs in innovation is a good idea but management training of MSEs need to be broadened to include other managerial issues that are extremely critical to MSEs survival which their study failed to address. They also realized that knowledge sharing has a higher factor loading compared with other knowledge management practices, and financial performance has higher factor compared with other organizational components. They further noted that MSEs knowledge management practices can play a significant role in improving productivity, financial performance, staff performance, innovation, work relationships, and customer satisfaction and thus improving MSEs organization performance. They further suggested that knowledge management practices are the critical elements for promoting the performance of MSEs. This study concentrated on knowledge management and has thus failed to address critical management training issues that hinder MSEs performance such as team building among others.

Srinivas (2013) and Jerome (2013) in their studies on quality management practices in rural and urban MSEs found that rural firms are performing at a higher level of sophistication and experience in quality management practices. They further said that total quality management is the major drive for quality management practices implementation. Managing quality at the expense of other management aspects will imply low budgetary applications to these other management aspects and consequently poor programmes in management training of MSEs that will be a disaster to MSEs growth and survival.

3. Methodology

The study used a descriptive survey design, which deals with the collection of data from the members of a sample for the purpose of estimating one or more population parameters. Descriptive survey design like the scientific model, will be based on precise definition of the problem to be studied, standardized research methods, representative samples and other smaller groups with a view of making generalizations of the population under study. By using the descriptive survey method, questions in questionnaires were posed to respondents thus facilitating investigations that will answer the stated research questions.

According to the director of revenue, Kisii County has a population of 12,772 registered micro and small enterprises; thus the population of study will be 12,772 owner managers. These MSEs will be situated in all the 9 sub-counties that make up Kisii County as shown in table 1:

Table 1: Distribution of micro and small enterprises in Kisii County by sub-counties

sub-county	trade	manufacturing	services	total number of MSEs
Bonchari	634	0	733	1,367
South Mugirango	153	0	197	350
BomachogeChache	203	0	211	414
BomachogeBorabu	113	0	264	377
Bobasi	192	0	271	463
NyaribariMasaba	248	0	266	514
NyaribariChache	2109	5	2311	4,425
KitutuChache North	137	0	246	383
KitutuChache South	2997	4	1478	4,479
TOTAL	6786	9	5977	12,772

Source: record from the directorate of Revenue, Kisii County, 2016

This study has nine strata, with a total population of 12,772 MSEs. This therefore means that simple stratified random sampling was employed when conducting the study. The table 1 indicates the population distribution per stratum. The study adopted stratified random sampling technique which is aimed at selecting a group of subjects for the study in such a way that their attributes represented the larger group from which they are to be drawn. According to Mugenda and Mugenda, (2013) the size of a sample influences the detection of significant differences, relationships and interactions. Critical factors in determining sample size include the population size, the desired level of precision, the level of confidence and the degree of variability of attributes being measured Since the population of the required characteristics was estimated at 50% (p=0.5), the sample size was determined as follows according to Saunders *et al.* (2009):

$$\frac{n = Z^2pq}{d^2}$$

where: n = estimated sample size if the target population is greater than 10,000.

Z = standard normal deviate at the required confidence level (value for selected alpha level (1.96)

p= the proportion of the target population estimated to have characteristics being measured.

q=1-P

d = the level of statistical significance set (0.05).

Executing the formula, the distribution of the target population and the corresponding sample size will be 384. In order to get proportionate allocation of the sample in the different sub-counties, the following formula was used;

$$\text{Sample size in the Sub-County} = \frac{\text{Number of enterprises in the Sub-county}}{\text{Number of enterprises in the County} \times \text{sample size}}$$

This formula was repeated for each sub-county and the corresponding sample size given as follows.

Table 2: Sample sizes per Sub-county

Sub-county	Number of MSEs	Sample sizes (3%)
Bonchari	1367	41
South Mugirango	350	10
BomachogeChache	414	12
BomachogeBorabu	377	12
Bobasi	463	14
NyaribariMasaba	514	15
NyaribariChache	4425	133
KitutuChache North	383	12
KitutuChache South	4479	135
TOTAL	12,772	384

Primary data was collected using a questionnaire whereas secondary data was got from published reports. The researcher obtained permission to commence his study from the National Commission for Science Technology and Innovation (NACOSTI) upon production of introductory letter from the Director School of Graduate Studies and an approved proposal. The research permit was produced to the CEC trade and all the sub county commissioners for permission to collect data in the sub counties. Similarly, chiefs, Assistant chiefs and clan elders were informed about the intended visit to collect data and research work in their respective arrears. The study targeted respondents in their business premises and working places. Out of 384 MSEs selected from Kisii County 38 were used in piloting. They were selected randomly to include all the 9 strata that were studied.

This study used the Cronbach's alpha as a measure of internal consistency. Cronbachs Alpha Coefficient value of 1.0 indicates a perfect reliability while that of below 0.70 will indicate low reliability. Content validity was ensured through piloting. Construct validity was achieved through the review of the theories that formed the major themes of the study and will establish the existence of the constructs and finally external validity was achieved through generalization of the findings of the studies.

This study yielded both qualitative and quantitative data which was analyzed using descriptive and inferential statistics. In this study, measures of central tendency and spread were analyzed descriptively using the mean, mode, median and the standard deviation. Relationships between the variables were analyzed inferentially using Regression Analysis. The data collected was first edited to correct the errors if any, coded and then analyzed using the Statistical Package of Social Sciences (SPSS) version 20.0 computer software which enabled in the manipulation and transformation of variables into desired forms for the purpose of analysis. The analyzed data was then presented using tables, pie charts and graphs such as bar graphs, histograms and ogives.

Regression analysis was conducted to determine the relationship between training and the performance of micro and small enterprises. Regression analysis was also conducted to examine the weight of each variable against the dependent variable. Performance of micro and small enterprises was regressed against managerial training. The equation was expressed as follows;

$$Y_p = \beta_0 + \beta_1 X_1 + \varepsilon \quad \text{.....equation (1)}$$

Where:

Yp = performance of micro and small enterprises.

βo =constant (co efficient of intercept)

X1 = managerial training

ε = error term

4. Summary of Findings, Conclusions and Recommendations

4.1 Summary of Findings

The number of questionnaires, administered to all the respondents, was 384. A total of 350 questionnaires were properly filled and returned from the respondents. This represented an overall successful response rate of 91.1%. According to Mugenda and Mugenda (2003), a response rate of 50% or more is adequate. Babbie (2004) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Further, Cooper and Schindler (2003) also argues that a response rate exceeding 30% of the total sample size provides enough data that can be used to generalize the characteristics of a study problem as expressed by the opinions of the respondents in the target population. Based on these assertions, the response rate of 91.1% was adequate for the study.

Table 4.1: Pilot Test Results

Variable	Cronbach alpha	Critical value	conclusion
Management training	.863	7	Reliable

To establish the relationship between managerial training and the performance of MSEs in Kisii County, a Likert scale of 1 to 5 (1 = strongly disagree, 2 = Disagree 3 = Neutral, 4 = Agree, 5 = strongly agree) was used and the mean response rate from the micro and small enterprise owners calculated. For the purposes of interpretation 4 & 5 (agree and strongly agree) were grouped together as agree, 1 & 2 (strongly disagree and disagree) were grouped as disagree while 3 was neutral. The results of this study are as depicted in the Table .Regarding the statement that the enterprise owner can now plan how to do the business well based on the training that was given on how to run my business, majority of the respondents 92.8% (78.3% +14.3%) agreed to the statement.

The results had a mean response of 4.0 with a standard deviation of 0.5. This means that there was low variation in the responses from the respondents implying that most of the respondents could now plan for their business based on the training given. Majority of the respondents 90.5% (55.1% + 35.4%) agreed that the business is more organized than it was before due to the training that they attended. The results had a mean response of 4.2 with a standard deviation of 0.7.This means that there was a low variation in the responses from the respondents with regard to organization of the business.

Table 4.2: Managerial training and the performance of MSEs in Kisii County

Statement	strongly disagree	disagree	not sure	agree	strongly agree	Mean	SD
I can now plan how to do my business well based on the training I have been given on how to run my business	0.3%	1.4%	5.7%	78.3%	14.3%	4.0	0.5
My business is more organized than it was before due to the training that I attended	0.3%	1.1%	8.0%	55.1%	35.4%	4.2	0.7
The training that I attended has enabled me give better directions to my employees	0.0%	1.7%	6.9%	69.4%	22.0%	4.1	0.6
The training that I attended has helped me in controlling my business operations	0.0%	0.9%	6.3%	57.6%	35.2%	4.3	0.6
The training that I attended has helped me know how to motivate my staff	0.3%	1.1%	8.3%	60.0%	30.3%	4.2	0.7
I have improved on time management due to the management training that I took	0.0%	1.7%	8.3%	54.3%	35.7%	4.2	0.7
I can now recruit competent staff due to the management training I took.	0.3%	2.0%	7.1%	59.4%	31.1%	4.2	0.7
I can appraise employee performance due to the management training I took	0.0%	0.9%	11.7%	45.1%	42.3%	4.3	0.7
I can monitor the attendance of employees due to the management training I took	0.0%	1.7%	6.9%	61.1%	30.3%	4.2	0.6
The management training I have undertaken has improved the performance	0.0%	0.9%	5.1%	50.6%	43.4%	4.4	0.6

of my business		
Average	4.2	0.6

Another 91.4% (69.4% + 22.0%) of the respondents indicated that the training that they attended has enabled them to give better directions to my employees. The results had a mean response of 4.1with a standard deviation of 0.6.This means that there was a low variation in the responses from the respondents with regard to giving give better directions to my employees. The study also sought to find out the extent to which training had helped respondents in controlling their business operations.

Results of the study showed that 92.8 % (57.6%+35.2%) of the respondents agreed to the statement. The results had a mean response of 4.1 with a standard deviation of 0.6. This means that there was low variation in the responses from the respondents with regard to controlling their business operations. With regard to the statement that the training that they attended had helped me know how to motivate my staff 90.3% (60.0% + 30.3%), agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Further, regarding the statement I have improved on time management due to the management training that I took. Majority of the respondents 88.0% (54.3%+35.7%) agreed to the statement.

The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Further the respondents were asked to respondent on the statement that they can now recruit competent staff due to the management training they took. Majority of the respondents 88.0% (59.4%+31.1%) agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Regarding the statement that they can appraise employee performance due to the management training they took, majority of the respondents 87.4% (45.1%+42.3%) agreed to the statement. The results had a mean response of 4.3 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents.

Further, the respondents were asked to respond on the statement that respondents can now monitor the attendance of employees due to the management training they took,majority of the respondents 91.4% (61.1% +30.3%) agreed to the statement. The results had a mean response of 4.3 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Finally regarding the statement that the management training I have undertaken has improved the performance of my business, majority of the respondents 94.0% (50.6% +43.4%) agreed to the statement. The results had a mean response of 4.4 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. The results agree with that of Arafat and Ahmed (2012) that a well trained workforce is critical in the growth of MSEs.

Jayawarna and Macpherson (2006) also noted that poor management skills are still highlighted as one of the significant contributory factors in the failure of the MSEs. The results agree also with that of Magableh and Al-Mahrouq (2007) management skills and entrepreneurship skills affect SMEs performance and success. The results are also in agreement with Mungai (2012) that business management training had a positive effect on the entrepreneurs and as such, new products and services were introduced in the enterprise after the training. Overall, the average mean of the responses was 4.2 which means that majority of the respondents were agreeing to the statements in the questionnaire. The standard deviation was 0.6 meaning that the responses were clustered around the mean response.

The results presented in Table 4.3 present the fitness of model used of the regression model in explaining the study phenomena.

Table 4.3 Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.749[a]	.562	.560	4470385.13486

a. Predictors: (Constant), management training

Management training was found to be satisfactory in explaining performance of micro and small enterprises in Kisii County. This is supported by coefficient of determination also known as the R square of 56.2%. This means that Management training explain 56.2%of the variations in the dependent variable which is performance of micro and small enterprises in Kisii County. Results of the model fitness back up the study by Srinivas (2013) and Jerome (2013) that quality management practices influences performance of rural and urban MSEs.

This indicates that there is a close relationship between management training and performance of micro and small enterprises. The results are also in agreement with Mungai (2012) that business management training had a positive effect on the entrepreneurs and as such, new products and services were introduced in the enterprise after the training.

Table 4.4: Analysis of Variance

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	8906974501288114.000	1	8906974501288114.000	445.698	.000[b]
Residual	6954551452386170.000	348	19984343253983.246		
Total	15861525953674284.000	349			

Table 4.4 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variable is a good predictor of MSEs performance in Kisii county. This was supported by an F statistic of 445.698 and the reported p value (0.000) which was less than the conventional probability of 0.05significance level. The results agree with that of Arafat and Ahmed (2012) that a well trained workforce is critical in the growth of MSEs. Jayawarna and Macpherson (2006), noted that poor management skills are still highlighted as one of the significant contributory factors in the failure of the MSEs. Regression of coefficient results is presented in Table 4.5.

Table 4.5 Regression of Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	58395836.704	3114151.488		18.752	.000
I can now *plan* how to do my business well based on the training I have been given on how to run my business	515669.638	512665.821	.047	1.006	.015
My business is more *organized* than it was before due to the training that I attended	857172.585	515603.727	.074	1.662	.047
The training that I attended has enabled me give better *directions* to my employees	1482720.152	503257.325	.128	2.946	.003
The training that I attended has helped me in *controlling* my business operations	854775.148	519201.650	.076	1.646	.001
The training that I attended has helped me know how to *motivate* my staff	1994053.316	496808.729	.177	4.014	.000
I have improved on *time management* due to the management training that I took	1402686.327	503636.806	.126	2.785	.006
I can now r*ecruit competent staff* due to the management training I took.	883683.279	513076.965	.079	1.722	.036
I can *appraise employee performance* due to the management training I took	1095575.065	502465.348	.097	2.180	.030
I can *monitor the attendance of employees* due to the management training I took	2674428.572	500535.406	.239	5.343	.000
The management training I have undertaken has improved the performance of my business	912069.112	489578.401	.085	1.863	.053

Regression of coefficients showed that planning as a result of training and MSE performance had a positive and significant relationship (r=515669.638, p=0.015).The results also revealed that organization skills as a result of training and MSE performance had a positive and significant relationship (r=857172.585, p=0.047). The results also revealed that give better directions to employees because of the training received and MSE performance had a positive and significant relationship (r=1482720.152, p=0.003). The results also revealed that controlling the business operations as a result of the training received and MSE performance had a positive and significant relationship (r=1994053.316, p=0.000).

The results also showed that motivating staff and MSE performance had a positive and significant relationship (r=1994053.316, p=0.000). The results further showed that time management and MSE performance had a positive and significant relationship (r=1402686.327, p=0.006). The results also revealed that recruiting competent staff as a result of the training received and MSE performance had a positive and significant relationship (r=883683.279, p=0.036). The results also showed that appraising employee performance and MSE performance had a positive and significant relationship (r=1095575.065, p=0.030).

The results further showed that monitoring attendance of employees and MSE performance had a positive and significant relationship (r=2674428.572, p=0.000). Finally, that management training undertaken and MSE performance had a positive and significant relationship (r=912069.112, p=0.053).

The results agree also with that of Magableh and Al-Mahrouq (2007) management skills and entrepreneurship skills affect SMEs performance and success. The results are also in agreement with Mungai (2012) that business management training had a positive effect on the entrepreneurs and as such, new products and services were introduced in the enterprise after the training.

Table 4.6:.Optimal Model for managerial training

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-23995660.894	1301485.978		-18.437	.000
	Managerial training	5727167.449	271281.212	.749	21.112	.000

Regression of coefficients showed that management training and MSE performance had a positive and significant relationship (r=5727167.449, p=0.000). This was supported by a calculated t-statistic of 21.112 which is larger than the critical t-statistic of 1.96. The results agree with Gholami, Sulaiman and Ramayah (2013), that training MSEs in innovation is a good idea but managerial training of MSEs need to be broadened to include other managerial issues that are extremely critical to MSEs survival which their study failed to address.

Srinivas (2013) and Jerome (2013) in their studies on quality management practices in rural and urban MSEs found that rural firms are performing at a higher level of sophistication and experience in quality management practices. They further said that total quality management is the major drive for quality management practices implementation.

$Y = -23995660.894 + 5{,}727{,}167.449X_1$

WhereY = MSE performance

X_1 is managerial training

The Hypothesis to be tested was that is no significant relationship between managerial training and the performance of MSEs in Kisii County. The hypothesis was tested by using simple linear regression and determined using p-value The acceptance/rejection criteria was that, if the p value is greater than 0.05, we fail to reject the Ho_1 but if it's less than 0.05, the Ho_1 is rejected. Therefore the null hypothesis is that there is no significant relationship between managerial training and the performance of MSEs in Kisii County.

The null hypothesis was that there is that is no significant relationship between managerial training and the performance of MSEs in Kisii County. Results in Table 7 show that the p-value was 0.000. This was supported by a calculated t-statistic of 21.112 which is larger than the critical t-statistic of 1.96. The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that there is a significant relationship between managerial training and the performance of MSEs in Kisii County. The findings agree with those of Mungai (2012) that business management training has a positive effect on SME performance.

4.2 Conclusions

The study concluded that managerial training and MSE are positively and significantly related. For MSEs to succeed they need to train their employees the best practices in management. Poor management skills are highlighted as one of the significant contributory factors in the failure of the MSEs. In conclusion, the aspects of managerial training that are important to performance include training on planning, organizing, directing, controlling, motivating, time management, Recruitment, Appraising and monitoring.

4.3 Recommendations

It was found that management training influences the performance of micro and small enterprises in Kisii County. It is recommended that business management trainings are organized for micro and small enterprise owners. This will enable them to acquire management skills regarding business planning, organizing, directing and quality control of assets and human resources. For MSEs to succeed they need to train their employees the best practices in management.

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RELATIONSHIP BETWEEN TECHNICAL TRAINING AND THE PERFORMANCE OF MICRO AND SMALL ENTERPRISES IN KISII COUNTY

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ABSTRACT: The objective of the study was to establish the relationship between technical training and the performance of MSEs in Kisii County. A descriptive survey design was used to carry out the study. The target population was 12,772 owner managers. The sample size was 384 which obtained through simple stratified random sampling where 9 strata were studied. Data was collected using questionnaires, interview schedules and observation checklist. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 computer software. The hypothesis was also tested using the t- test. Results of the Technical training were found to be satisfactory in explaining performance of micro and small enterprises in Kisii County. This was supported by coefficient of determination also known as the R square of 75.7%. This means that independent variable explain 75.7%of the variations in the dependent variable which is performance of micro and small enterprises in Kisii County. The ANOVA results indicated that the overall model was statistically significant. This was supported by an F statistic of 214.536 and the reported p value (0.000) which was less than the conventional probability of 0.05significance level. Regression of coefficients showed that managerial training and performance of micro and small enterprises in Kisii County had a positive and significant relationship (r=2211681.748 p=0.000. The R^2 before moderation was 75.7% but after moderation the R^2 reduced to 49.6%. This implies that legal requirements reduce the performance of micro and small and enterprises in Kisii County. The study concluded that Technical training influences the performance of micro and small enterprises in Kisii County. It was recommended that that more technical training should be organized for Micro and Small Enterprises in Kisii County.

Keywords: technical training, performance, results oriented

1. Introduction

According to the Ministry of Trade and Industry Interim Draft report on National Trade Policy of August (2007), the following were identified as some of the characteristics of small scale enterprises in Kenya: Small scale units providing and distributing goods and services some of whom employ family labour or hired workers or apprentices, they operate with inadequate capital, use low level of technology and skills, hence operating at low level of productivity, provide low and irregular incomes and highly unstable employment, unregistered and unrecorded in official statistics, they tend to have little or no access to organized markets and credit, public services and amenities, they are not recognized and protected, and supported or regulated by the government, and often compelled by circumstances to operate outside the framework of the law, they live and work in appalling, dangerous and unhealthy conditions, they rely on self-supporting and "informal" institutional arrangements, they obtain credit from sources outside the formal sector and often on much more unfavorable terms, they acquire skills through their own informal apprenticeship shares, they have to rely on family or group solidarity or unofficial organization to access social security, they operate beyond the law and receive little or no legal protection, they are vulnerable to the ambivalent authorities and the formal enterprises. Information gathered from 2008-2012 Strategic Plan of the Ministry of Trade printed in April, 2009 stated that in the recent past, all sectors of the economy recorded improved performance, which was attributed to favorable business environment, availability of credit from financial instruments and increase in investment opportunities in the country.

However, small scale enterprises did not fully realize their potential due to a number of factors, such as poor infrastructure and poor access, restrictive legislation and regulation, unaffordable finance, and poor access to land, poor market linkages between small and large enterprises, inadequate market information and limited skills. All this pose a challenge to vision 2030. A survey carried out in

2016 by the Kenya National Bureau of Statistics (KNBS) indicated that 400,000 MSEs are dying annually. The report also indicated that some MSEs do not celebrate their second anniversary in the last five years raising concern over their sustainability.

The National Trade Policy of August (2007) report further indicated that a total of 2.2 million micro enterprises have been closed in the last five years, 2016 inclusive. Most of these enterprises closed because of increased operating costs, declining income and losses incurred from the business, an indication that the country's state of economy has not been as impressive as it should be. This also raises questions whether or not the many training to MSEs in management, finances, technology, networking, governance and ethics have been helpful. In Kisii County, according to the Directorate of Revenue report of 2016, MSEs have not fully realized their potential due to a number of factors such as poor infrastructure, restrictive legislation, unfriendly regulations, poor management, unaffordable finance, poor access to land, poor market linkages between small and large enterprises, inadequate market information, limited technical skills, poor governance and unethical practices. This has necessitated that this study be undertaken.

The above studies reveal that managerial training in deed plays a significant role in contributing to Micro and Small Enterprises (MSEs) success that eventually results in economic growth and sustainable development. A survey carried out in 2016 by the Kenya National Bureau of Statistics (KNBS) indicated that 400,000 MSEs are dying annually. In the last five years 2.2 Million micro enterprises have been closed, 2016 inclusive. Most of these enterprises are normally closed because of increased operating costs, declining income and losses incurred from the business, an indication that the country's state of economy is not as impressive as it should be. This also raises questions whether or not the much training to MSEs in management, finances, technology, networking and governance have been helpful to this group of investors.

The national government has invested heavily in protecting MSEs. In particular the national government has consistently allocated sufficient funds in the budget to train and provide conducive environment for MSEs growth. In the recent past the national government has formed MSEs authority to deal with strategic issues of this group of investors. The Strategic Plan of the Micro and Small Enterprises Authority (MSEA) has been developed in cognizance of Kenya's Vision 2030, Millennium Development Goals, the Constitution of Kenya, the MSE Act No. 55 of 2012 and the Sessional Paper No. 2 of 2005 among other legal and policy documents. The implementation of this Strategic Plan is based on stakeholder participation, good governance and a professional approach to institutional management. According to the controller of budget of Kisii county in the financial years 2014/2015,2015/2016 and 2016/2017, MSEs were allocated Ksh.30 million, Ksh. 25 million and Ksh. 25 million respectively to enable them access soft loans at lower interest rates to boost their businesses. Since the county's inception, Ksh. 20 million has been used to train MSEs in Kisii County. This is massive investment compared with the county's revenue stream which has consistently remained low in the last three years.

Rezaee (2009) observes that MSEs are the engine of growth in prosperous and growing economy and play an important role in creating an economic growth. MSEs contribute to economic development by creating employment for rural and urban population, providing flexibility and innovation through entrepreneurship and increase international trade by diversifying economic activity. Their role in income generation and economic growth for developing countries is critical. In the developing countries MSEs are major contributors to gross domestic product and private sector employment contributing as much as 60% to workforce. In developing countries they employ more than 70% of labour force.

Wanjohi (2011) stated that despite the role played by the MSEs sector it has been faced by a number of challenges such as lack of adequate business skills. This is mainly attributed to low levels of education. MSEs in Kenya suffer from constraints that lower their resilience to risk and prevent them from growing and attaining economies of scale. Challenges associated with access to financial resources are constrained by both internal and external factors.

Magableh et al. (2011) observed that in spite of their diversity and relative abundance of studies conducted so far little efforts have been devoted to fully analyze the determinants of training process before assessing its impact. These studies have not taken governance into consideration and yet this is a major characteristic that MSEs need to be trained on; given that most of them are either form four dropouts or college dropouts whose managerial skills are wanting. It was therefore necessary to conduct a study to determine the relationship between managerial training and the performance of MSEs in Kisii County, Kenya. This study sought to establish the relationship between technical training and the performance of Micro and Small Enterprises in Kisii County.

2. Literature Review'

Tijani, Okhale, Oga and Tags (2012) and Baileti (2012) in their studies revealed that there is need for all stakeholders including government and other participants in the crusade for entrepreneurship programme to redirect and rethink with emphasis on technical entrepreneurship development with technology based oriented in African countries compared with the Asian countries entrepreneurship development strategy. They further revealed that commercial entrepreneurial skills can only provide a short-run economic solution without economic development but technical entrepreneurial development for the country, visa-vi attainment of

Millennium Development Goals for the country by 2020. This shows that technical training in MSEs is a major area of concern in developing countries.

Ndegwa (2012) in his study found that managers of MSEs who do not apply the latest technology in their businesses will grossly affect not only their productivity but also their growth and profitability. In this regard technical skills play pivotal role in MSEs survival. Kiveu (2008) found that MSEs seem to be ill equipped with technical skills to embrace opportunities presented while confronting challenges of globalization. Globalization of MSEs opportunities to participate in the regional and international markets while internationalization presents opportunity for growth and development beyond the local market. However, globalized production by multinationals presents new threats in the form of increased competition. The ability of MSEs to survive in an increasingly competitive growth environment is largely dependent upon their capacity to embrace technical training.

Njoroge and Gathugu (2013), established that majority of entrepreneurs did not have skills and experience in areas such as business planning, financial reporting, strategic planning and financial management. They noted that the MSEs expressed desire for training that would enable them improve their businesses. The study further established that entrepreneurs were able to market their products and do a market research. They were also able to meet the needs of their customers. This however is not attributed to training because they never received entrepreneurial training. The results of the study further revealed that they were able to do daily book keeping of their transactions. However, most of these entrepreneurs were not able to prepare serious accounting practices such as preparation of profit and loss account and a balance sheet. Suffering from such issues may lead to business failure an obvious issue in MSEs. Technical training will therefore handle such issues in depth to help MSEs in daily business activities.

Abdulahi et al. (2015) in their study found that there is significant influence of training on business success in Nigeria. The study signified the benefit of training on business success, and at the same time it helps the MSEs to cope with the latest management concepts, accounting systems, production techniques and information technology. In addition to training, other factors such as relevant education and experience are recognized as a requirement to cope with work and environmental change. Technical aspects in this study seemed to be ignored and success was 0.197 percent which means that for each unit increase in training, business access increases by 0.197 percent. This indicates that there is a huge gap when it comes to technical training which is one of the areas that bridge MSEs competition and environmental challenges.

Kisaka (2014),in his study concluded that there is a strong relationship between level of education, training , business experience, access to credit and entrepreneurial behavior (risk taking, innovativeness, knowledge of results and responsibility). The study however concentrated on behavior only ignoring serious technical training aspects in MSEs like hands-on experiences that make entrepreneurs more responsive and proactive in their business endeavors.

3. Methodology

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The study used a descriptive survey design, which deals with the collection of data from the members of a sample for the purpose of estimating one or more population parameters. Descriptive survey design like the scientific model, will be based on precise definition of the problem to be studied, standardized research methods, representative samples and other smaller groups with a view of making generalizations of the population under study. By using the descriptive survey method, questions in questionnaires were posed to respondents thus facilitating investigations that will answer the stated research questions.

According to the director of revenue, Kisii County has a population of 12,772 registered micro and small enterprises; thus the population of study will be 12,772 owner managers. These MSEs will be situated in all the 9 sub-counties that make up Kisii County as shown in table 1:

Table 1: Distribution of micro and small enterprises in Kisii County by sub-counties

sub-county	trade	manufacturing	services	total number of MSEs
Bonchari	634	0	733	1,367
South Mugirango	153	0	197	350
BomachogeChache	203	0	211	414
BomachogeBorabu	113	0	264	377
Bobasi	192	0	271	463
NyaribariMasaba	248	0	266	514
NyaribariChache	2109	5	2311	4,425
KitutuChache North	137	0	246	383
KitutuChache South	2997	4	1478	4,479
TOTAL	6786	9	5977	12,772

Source: record from the directorate of Revenue, Kisii County, 2016

This study has nine strata, with a total population of 12,772 MSEs. This therefore means that simple stratified random sampling was employed when conducting the study. The table 1 indicates the population distribution per stratum. The study adopted stratified random sampling technique which is aimed at selecting a group of subjects for the study in such a way that their attributes represented the larger group from which they are to be drawn. According to Mugenda and Mugenda, (2013) the size of a sample influences the detection of significant differences, relationships and interactions. Critical factors in determining sample size include the population size, the desired level of precision, the level of confidence and the degree of variability of attributes being measured Since the population of the required characteristics was estimated at 50% (p=0.5), the sample size was determined as follows according to Saunders *et al.* (2009):

$$n = \frac{Z^2pq}{d^2}$$

where: n = estimated sample size if the target population is greater than 10,000.

Z = standard normal deviate at the required confidence level (value for selected alpha level (1.96)

p= the proportion of the target population estimated to have characteristics being measured.

q=1-P

d = the level of statistical significance set (0.05).

Executing the formula, the distribution of the target population and the corresponding sample size will be 384. In order to get proportionate allocation of the sample in the different sub-counties, the following formula was used;

$$\text{Sample size in the Sub-County} = \frac{\text{Number of enterprises in the Sub-county}}{\text{Number of enterprises in the County}} \times \text{sample size}$$

This formula was repeated for each sub-county and the corresponding sample size given as follows.

Table 2: Sample sizes per Sub-county

Sub-county	Number of MSEs	Sample sizes (3%)

Bonchari	1367	41
South Mugirango	350	10
BomachogeChache	414	12
BomachogeBorabu	377	12
Bobasi	463	14
NyaribariMasaba	514	15
NyaribariChache	4425	133
KitutuChache North	383	12
KitutuChache South	4479	135
TOTAL	12,772	384

Primary data was collected using a questionnaire whereas secondary data was got from published reports. The researcher obtained permission to commence his study from the National Commission for Science Technology and Innovation (NACOSTI) upon production of introductory letter from the Director School of Graduate Studies and an approved proposal. The research permit was produced to the CEC trade and all the sub county commissioners for permission to collect data in the sub counties. Similarly, chiefs, Assistant chiefs and clan elders were informed about the intended visit to collect data and research work in their respective arrears. The study targeted respondents in their business premises and working places. Out of 384 MSEs selected from Kisii County 38 were used in piloting. They were selected randomly to include all the 9 strata that were studied.

This study used the Cronbach's alpha as a measure of internal consistency. Cronbachs Alpha Coefficient value of 1.0 indicates a perfect reliability while that of below 0.70 will indicate low reliability. Content validity was ensured through piloting. Construct validity was achieved through the review of the theories that formed the major themes of the study and will establish the existence of the constructs and finally external validity was achieved through generalization of the findings of the studies.

This study yielded both qualitative and quantitative data which was analyzed using descriptive and inferential statistics. In this study, measures of central tendency and spread were analyzed descriptively using the mean, mode, median and the standard deviation. Relationships between the variables were analyzed inferentially using Regression Analysis. The data collected was first edited to correct the errors if any, coded and then analyzed using the Statistical Package of Social Sciences (SPSS) version 20.0 computer software which enabled in the manipulation and transformation of variables into desired forms for the purpose of analysis. The analyzed data was then presented using tables, pie charts and graphs such as bar graphs, histograms and ogives.

Regression analysis was conducted to determine the relationship between training and the performance of micro and small enterprises. Regression analysis was also conducted to examine the weight of each variable against the dependent variable. Performance of micro and small enterprises was regressed against managerial training. The equation was expressed as follows;

$$Y_p = \beta_0 + \beta_1 X_1 + \varepsilon \quad \text{.....equation (1)}$$

Where:

Yp = performance of micro and small enterprises.

βo =constant (co efficient of intercept)

X1 = technical training

ε = error term

4. Findings, Conclusions and Recommendations

4.1 Findings

The objective of this study was to determine the relationship between technical training and the performance of MSEs in Kisii County**.** To establish the relationship between technical training and the performance of MSEs in Kisii County, a Likert scale of 1 to 5 (1 = strongly disagree, 2 = Disagree 3 = Neutral, 4 = Agree, 5 = strongly agree) was used and the mean response rate from the micro and small enterprise owners calculated. For the purposes of interpretation 4 & 5 (agree and strongly agree) were grouped together as agree, 1 & 2 (strongly disagree and disagree) were grouped as disagree while 3 was neutral. The results of this study are as depicted in Table 4.1.

Regarding the statement that I have learnt how to keep the records of my business from the training I attended, majority of the respondents 89.9% (72.4%+17.5%) agreed to the statement. The results had a mean response of 4.1 with a standard deviation of 0.6. This means that there was low variation in the responses from the respondents implying that most of the respondents could keep records.

Majority of the respondents89.4% (53.6% + 35.8%) agreed that they are now able to gather important information concerning my competitors to enable me make informed decisions as a result of the training they received. The results had a mean response of 4.2 with a standard deviation of 0.7.This means that there was a low variation in the responses from the respondents with regard to the statement.

Table 4.1: Technical training and performance of MSEs in Kisii County

Statement	strongly disagree	disagree	not sure	agree	strongly agree	Mean	SD
I have learnt how to keep the records of my business from the training I attended	0.3%	1.1%	8.6%	72.4%	17.5%	4.1	0.6
I am now able to gather important information concerning my competitors to enable me make informed decisions as a result of the training I received	0.0%	2.6%	8.0%	53.6%	35.8%	4.2	0.7
Due to the training I attended, I can multitask	0.0%	1.7%	9.2%	59.8%	29.3%	4.2	0.7
The training I attended has enabled me improve in my selling skills	0.0%	1.7%	8.0%	52.3%	37.9%	4.3	0.7
I have improved in my marketing skills as a result of attending a training forum	0.0%	1.2%	10.4%	54.2%	34.3%	4.2	0.7
I nowadays make less mistakes in running my business because of the training I underwent	0.0%	1.7%	10.0%	52.7%	35.5%	4.2	0.7
I now can operate my business with ease due to the technical training I did	0.3%	0.9%	7.4%	59.3%	32.1%	4.2	0.6
My products have increased due to the technical training I took	0.6%	2.0%	7.7%	57.3%	32.4%	4.2	0.7
I now understand that technology is important in business due to technical training I did	0.3%	1.4%	6.0%	53.3%	39.0%	4.3	0.7
Average						4.2	0.7

Another 89.1% (59.8% + 29.3%) of the respondents indicated that due to the training they attended, they can multitask. The results had a mean response of 4.2 with a standard deviation of 0.7.This means that there was a low variation in the responses from the respondents with regard to multitasking. The study also sought to find out whether the training attended had enabled them to improve in their selling skills. Results of the study showed that 90.2 % (52.3%+37.9%) of the respondents agreed to the statement. The results had a mean response of 4.3 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents.

With regard to the statement that I have improved in my marketing skills as a result of attending a training forum 88.5% (54.2% + 34.3%), agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Further, regarding the statement I nowadays make fewer mistakes in running my

business because of the training I underwent. Majority of the respondents 88.2% (52.7%+35.5%) agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents.

Further the respondents were asked to respondent on the statement that I now can operate my business with ease due to the technical training I did. Majority of the respondents 91.4% (59.3%+32.1%) agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.6. This means that there was low variation in the responses from the respondents. Regarding the statement that my products have increased due to the technical training I took, majority of the respondents 89.7% (57.3%+32.4%) agreed to the statement. The results had a mean response of 4.2 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents. Finally, the respondents were asked to respond on the statement that I now understand that technology is important in business due to technical training I did, 92.3% (53.3% +39.0%) agreed to the statement. The results had a mean response of 4.3 with a standard deviation of 0.7. This means that there was low variation in the responses from the respondents.

This means that there was low variation in the responses from the respondents. The results agree with that of Ndegwa (2012) that technical skill play pivotal role in MSEs survival. Tijani, Okhale, Oga and Tags (2012) and Baileti (2012) in their studies revealed that commercial entrepreneurial skills can only provide a short-run economic solution without economic development but technical entrepreneurial development for the country, visa-vi attainment of Millennium Development Goals for the country by 2020.

Abdulahi et al. (2015), in their study found that there is significant influence of training on business success in Nigeria. The study signified the benefit of training on business success, and at the same time it helps the MSEs to cope with the latest management technical requirements in order to run a success business. This shows that technical training in MSEs is a major area of concern for economic development. Technical training is important in the growth of SMEs.

Overall, the average mean of the responses was 4.2 which means that majority of the respondents were agreeing to the statements in the questionnaire. The standard deviation was 0.7 meaning that the responses were clustered around the mean response

The results presented in Table 4.2 present the fitness of model used of the regression model in explaining the study phenomena.

Table 4.2: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.821[a]	.674	.673	3855142.88058

Technical training was found to be satisfactory in explaining performance of micro and small enterprises in Kisii County. This is supported by coefficient of determination also known as the R square of 67.4%. This means that technical training explain 67.4%of the variations in the dependent variable which is performance of micro and small enterprises in Kisii County. The results of the model fitness agree with that of Ndegwa (2012) that technical skill play pivotal role in MSEs survival. This implies that we have a close relationship between technical training and performance of micro and small enterprises. Technical training is important in the growth of MSEs.

Table 4.3: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	10689505886555570.000	1	10689505886555570.000	719.245	.000[b]
	Residual	5172020067118714.000	348	14862126629651.477		
	Total	15861525953674284.000	349			

Table 4.3 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variable is a good predictor of MSEs performance in Kisii county. This was supported by an F statistic of 719.245and the reported p value (0.000) which was less than the conventional probability 0.05 significance level.

Regression of coefficient results is presented in Table 4.4. Regression of coefficients showed that keeping records as a result of training and MSE performance had a positive and significant relationship (r=857754.085, p=0.021).The results also revealed that gathering important information as a result of training and MSE performance had a positive and significant relationship (r=830733.639, p=0.003). The results also revealed that multitasking is possible as result of the training received and MSE performance had a positive and significant relationship (r=1045558.220, p=0.044).

The results also revealed that selling skills as a result of the training received and MSE performance had a positive and significant relationship (r=2179664.453, p=0.000). The results also showed that marketing skills as a result of training and MSE performance had

a positive and significant relationship (r=1029963.706, p=0.051).The results agree with that of Ndegwa (2012) that technical skill play pivotal role in MSEs survival. Abdulahi et al. (2015), in their study found that there is significant influence of training on business success in Nigeria.

The study signified the benefit of training on business success, and at the same time it helps the MSEs to cope with the latest management technical requirements in order to run a success business. This shows that technical training in MSEs is a major area of concern for economic development. Technical training is important in the growth of MSEs.

Table 4.4: Regression of Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	54009375.404	3058437.337		17.659	.000
I have learnt how to keep the records of my business from the training I attended	857754.085	522335.709	.076	1.642	.021
I am now able to gather important information concerning my competitors to enable me make informed decisions as a result of the training I received	830733.639	508580.237	.075	1.633	.003
Due to the training I attended, I can multitask	1045558.220	517632.136	.095	2.020	.044
The training I attended has enabled me improve in my selling skills	2179664.453	515711.443	.199	4.227	.000
I have improved in my marketing skills as a result of attending a training forum	1029963.706	526027.312	.099	1.958	.051
I nowadays make less mistakes in running my business because of the training I underwent	881771.258	507971.153	.080	1.736	.053
I now can operate my business with ease due to the technical training I did	912665.695	519314.019	.079	1.757	.040
My products have increased due to the technical training I took	1208165.885	518504.760	.111	2.330	.020
I now understand that technology is important in business due to technical training I did	1023795.732	522408.550	.091	1.960	.051
The technical training I have undertaken has improved the performance of my business	1745582.829	503973.376	.163	3.464	.001

The results further showed that reduced mistakes in the business and MSE performance had a positive and significant relationship (r=881771.258, p=0.053). The results also revealed that easing of operating business as a result of the training received and MSE performance had a positive and significant relationship (r=912665.695, p=0.040). The results also showed that product variety and MSE performance had a positive and significant relationship (r=1208165.885, p=0.020). The results further showed that importance of technology in business operation and MSE performance had a positive and significant relationship (r=1023795.732, p=0.051).

Finally, that technical training undertaken and MSEs performance had a positive and significant relationship (r=1745582.829, p=0.001). The results agree with that of Ndegwa (2012) that technical skill play pivotal role in MSEs survival. Tijani et al. (2012) and Baileti (2012) in their studies revealed that commercial entrepreneurial skills can only provide a short-run economic solution without economic development but technical entrepreneurial development for thecountry, visa-vi attainment of Millennium Development Goals for the country by 2020.

Abdulahi et al. (2015), in their study found that there is significant influence of training on business success in Nigeria. The study signified the benefit of training on business success, andat the same time it helps the MSEs to cope with the latest management technical requirements in order to run a success business. This shows that technical training in MSEs is a major area of concern for economic development. Technical training is important in the growth of SMEs.

Table 4.5: Optimal Model for technical training

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

	B	Std. Error	Beta		
(Constant)	-25707773.791	1090591.449		-23.572	.000
Technical training	6274578.432	233962.480	.821	26.819	.000

Regression of coefficients showed that technical training and MSE performance had a positive and significant relationship (r=6274578.432, p=0.000). This was supported by a calculated t-statistic of 26.819which is larger than the critical t-statistic of 1.96. Results agree with Abdulahi et al. (2015) who found that there is significant influence of training on business success. The study signified the benefit of training on business success, and at the same time it helps the MSEs to cope with the latest management concepts, accounting systems, production techniques and information technology.

$Y = -25707773.791 + 6{,}274{,}578.432X_1$

Where Y = MSE performance

X_1 is technical training

The first Hypothesis to be tested was that there is a significant relationship between technical training and the performance of MSEs in Kisii County. The hypothesis was tested by using simple linear regression and determined using t-value. The acceptance/rejection criteria was that, if the p value is greater than 0.05, the Ho_1 is not rejected but if it's less than 0.05, the Ho_1 fails to be accepted. Therefore the null hypothesis is that there is no significant relationship between technical training and the performance of MSEs in Kisii County.

The null hypothesis was that there is that there is no significant relationship between technical training and the performance of MSEs in Kisii County. Results show that the p-value was 0.000. This was supported by a calculated t-statistic of 26.819 which is larger than the critical t-statistic of 1.96. The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that there is a significant relationship between technical training and the performance of MSEs in Kisii County. The findings agree with those of Rogerson (2000) in South Africa that successful clothing entrepreneurs were those who had undertaken a number of business and technical training programmes.

4.2 Conclusions

The study further concluded that technical training and MSE are positively and significantly related. There is need for all stakeholders including governance and other participants in the crusade for entrepreneurship programme to redirect and rethink with emphasis on technical entrepreneurship development. In conclusion, the aspects of managerial training that are important to performance include training on record keeping, information gathering, multitasking, selling skills, marketing skills, ease of doing business, more products and importance of technology.

4.3 Recommendations

It was found that technical training influences the performance of micro and small enterprises in Kisii County. It is recommended that there is need for all stakeholders including government and other participants to crusade for entrepreneurship programme to redirect and rethink with emphasis on technical entrepreneurship development among small and medium enterprises.

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