

**AWARENESS AND PERCEPTIONS OF CLIMATE CHANGE AMONG
EXTENSION WORKERS OF AGRICULTURAL DEVELOPMENT PROGRAMME
(ADP) IN PART OF NIGER STATE**

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Abstract

Given the devastating effects of climate change on agriculture, it is pertinent to determine the level of awareness and perception of climate change among extension workers of the Agricultural Development Programme (ADP) in Niger State. Therefore, the aim of this paper is to determine the level of awareness and perception of climate change among extension workers of the Agricultural Development Programme (ADP) in part of Niger State. The paper used both primary and secondary data. The methods of data analysis used include both qualitative and quantitative data analysis methods. The Data analysis was analysed utilizing SPSS 22.0. The study shows that conference source ranked the highest with 255 sampled population affirming it, radio source ranked second with 252 sampled population affirming it while cell phone ranked the least with 9 sampled population affirming it. This shows that the major source of climate change information for ADP workers was conference organized by both the government and non governmental organizations. The study also revealed that the major perceived cause of climate change is cutting down of trees. The study also shows that reduced crop yield was the major perceived effect of climate change in the study area which is a factor of decrease soil fertility and increased crop pests and diseases in the study area. The paper concludes that agricultural extension agents in Niger State are aware of climate change but lack sufficient knowledge about it, and thus require training on a variety of climate change-related topics, most notably basic climate change concepts, the use of cultural practices to mitigate and adapt to climate impacts, and environmentally friendly management practices to reduce climate change impact within the study area.

Keywords: Awareness, Perception, Climate Change, Agricultural Development Programme and Extension Workers

Introduction

Agricultural production greatly depends on climate elements such as rainfall and temperature. Evidence from studies shows the increasing impacts of recurrent inconsistencies of climate variables on agricultural production (Nkomwa *et al.*, 2014). Due to climatic inconsistencies, the global environment could be continually subjected to storms, floods, droughts, and other climate change threats with intense impacts on agricultural yields. However, extreme weather events could cause increased heat stress to crops and livestock, fire outbreaks, which threatens to graze, and livestock rearing, loss of suitable land for production and reduced length of growing seasons (Madzwamuse, 2016). Other implications on agricultural production include problems related to evaporation and absorption of nutrients; shortage or excessive soil moisture which can damage the realization of crop-yield potential (Eitzinger *et al.*, 2010). High temperatures coupled with wet conditions create conducive environments for the breeding and growth of pests and pathogenic organisms thereby increasing incidences of pests and diseases on crops, livestock and poultry (Terdoon *et al.*, 2014).

Climate change is a global problem and its impact is made visible especially in the agricultural sector where it has significantly affected production in most developing countries (Elum *et al.*, 2017). This has made citizens of most African countries highly vulnerable to food insecurity. Agriculture is one of the most important sectors that contribute immensely to the economies of most African countries including Nigeria where it constitutes about 40% of the countries' Gross Domestic Product (GDP) and about 70% of the populace depends on it as a source of their livelihood (Ola, 2019).

Over the years, several agricultural programmes have been introduced to reduce abject poverty among rural dwellers, mostly farmers, sub-Saharan African. Some of these programmes include among others, the United Nations Development Programme (UNDP), Food and Agricultural Organization (FAO), The Directorate of Food, Roads and Rural Infrastructure (DIFRRI), Green Revolution (RV), Operation Feed the Nation (OFN) and Agricultural Development Programme (ADP) (Abdulhamid, 2015).

ADP is one of the structural platforms established by the Federal Government of Nigeria in the year 1963 after independence to support the State Government efforts in the development of agricultural projects; the main aim of this programme was to increase the production of agricultural products in Nigeria and to increase the income of most farmers that operates on a small scale through the provision of assistance such as giving them fertilizers, improved seed for a good harvest; this programme has to be of great importance to both the small and medium-scale farmers in Nigeria (Ajayi and Ajala, (2017). There are noticeable consequences of climate change in Nigeria such as intense thunderstorms, widespread floods and incessant droughts. Odey (2009) points out that climate change impacts pose great dangers with consequences such as desertification, sea-level rise, flooding, water salinization, among others. Additional impacts include threats to health as rising temperature could bring about

diseases such as chronic heat rashes, cerebral-spinal meningitis (CSM), stroke, malaria and other related diseases (Sagoe, 2006). Climate change will affect every citizen, every part of our environment and our natural resources. Given the devastating effects of climate change on agriculture, it is pertinent to determine the level of awareness and perception of climate change among extension workers of the Agricultural Development Programme (ADP) in Niger State. Therefore, the aim of this paper is to determine the level of awareness and perception of climate change among extension workers of the Agricultural Development Programme (ADP) in part of Niger State.

Niger State is located in the Middle Belt of Nigeria, it covers 76,363 square kilometres. It is the largest Nigerian State by land area. As of 26th August 1991 (Before the merger of Borgu and Agwara LGAs), The State covered a land area of 74,244 Square Kilometres, which is about 8% of the total land area of Nigeria. With the merger, the land mass is now 76,469.903 Square Kilometers (About 10% of the total land area of Nigeria) out of which about 85% is arable (Niger State Statistic Year Book, 2021).

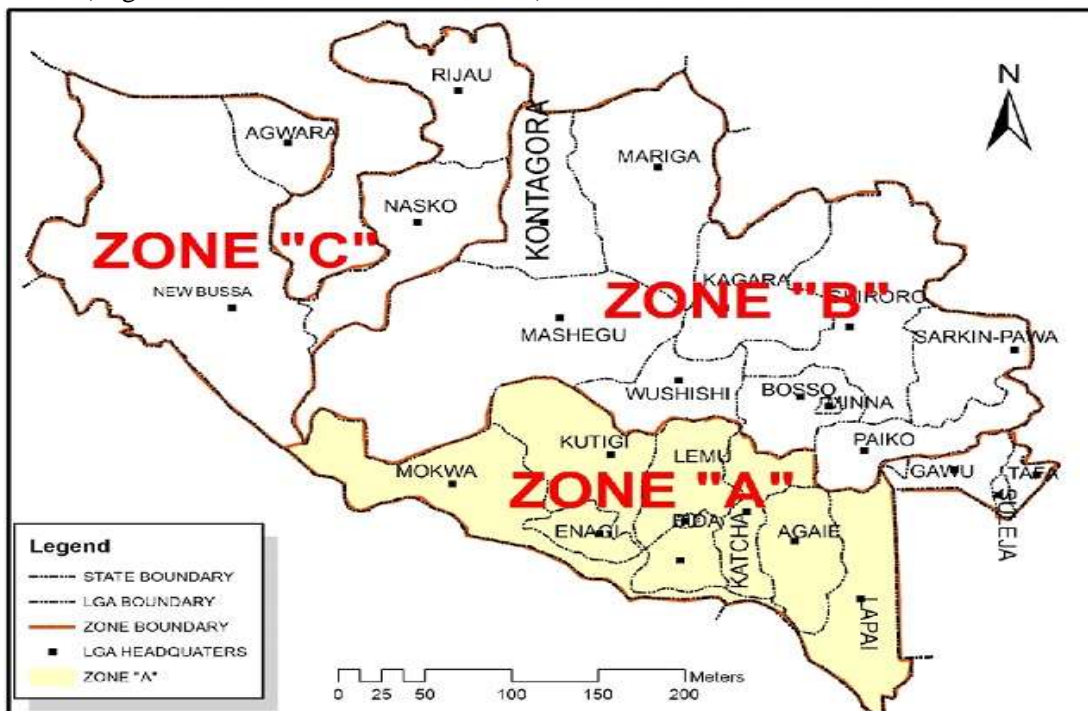


Figure 1: Map showing three (3) administrative zones of Niger State

Source: Niger State Geographical Information System (2021)

Materials and Methods

The sources of data used include primary and secondary. The primary data include reconnaissance survey, questionnaire administration and oral interview. In order to develop

detailed and comprehensive literature review, the information were obtained from written documents. To achieve this therefore, data were sourced from the gazettes, internet facilities, text books, journals, published and unpublished thesis from University library with regards to determining the level of awareness and perception of climate change among extension workers of the Agricultural Development Programme (ADP) in part of Niger State. The methods of data analysis used include both qualitative and quantitative data analysis methods. The Data analysis was analysed utilizing SPSS 22.0.

Results and Discussion

Figure 2 shows the presence of sources of climate change information needed by ADP extension workers in the study area. The sampled population who agree constitute 97% while those who disagree constitute the remaining 3% of the entire sampled population. This revealed that the selected sampled population have different sources of climate change information needed to enhance their service delivery to farmers.

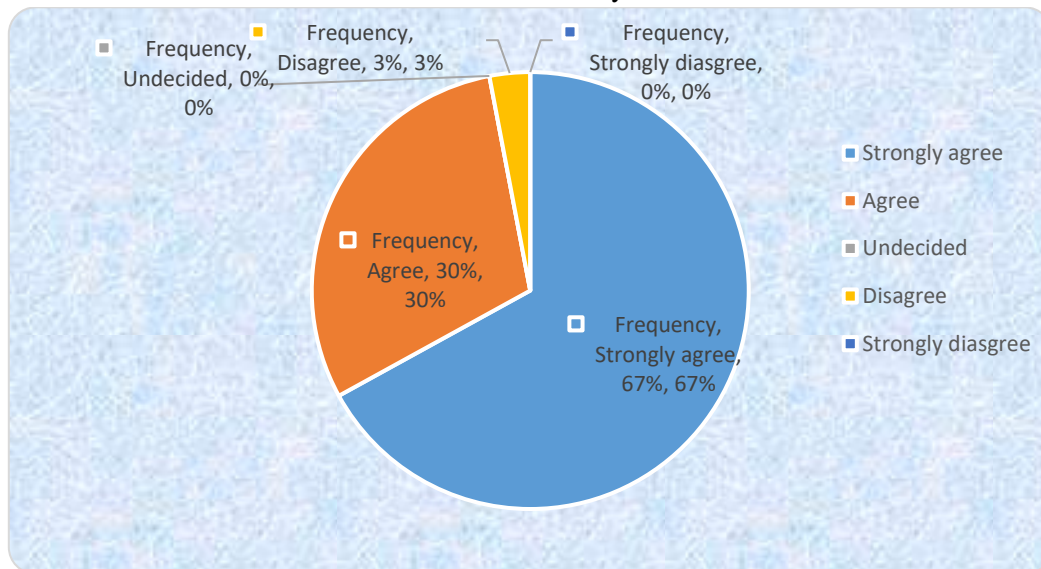


Figure 2: Presence of sources of climate change information needed by ADP workers

As shown in Figure 3 of the study, 75.7% of the sampled population agree that they used different sources of information to get knowledge about climate change while the remaining 24.3% of the sampled population have limited sources of climate change information. This shows that majority have access to sources of climate change information. The sources of climate change information include seminars, workshops, conferences, newspapers, Agricultural Research Institute, Internet, radio programmes related to climate change, symposium and bulletins.

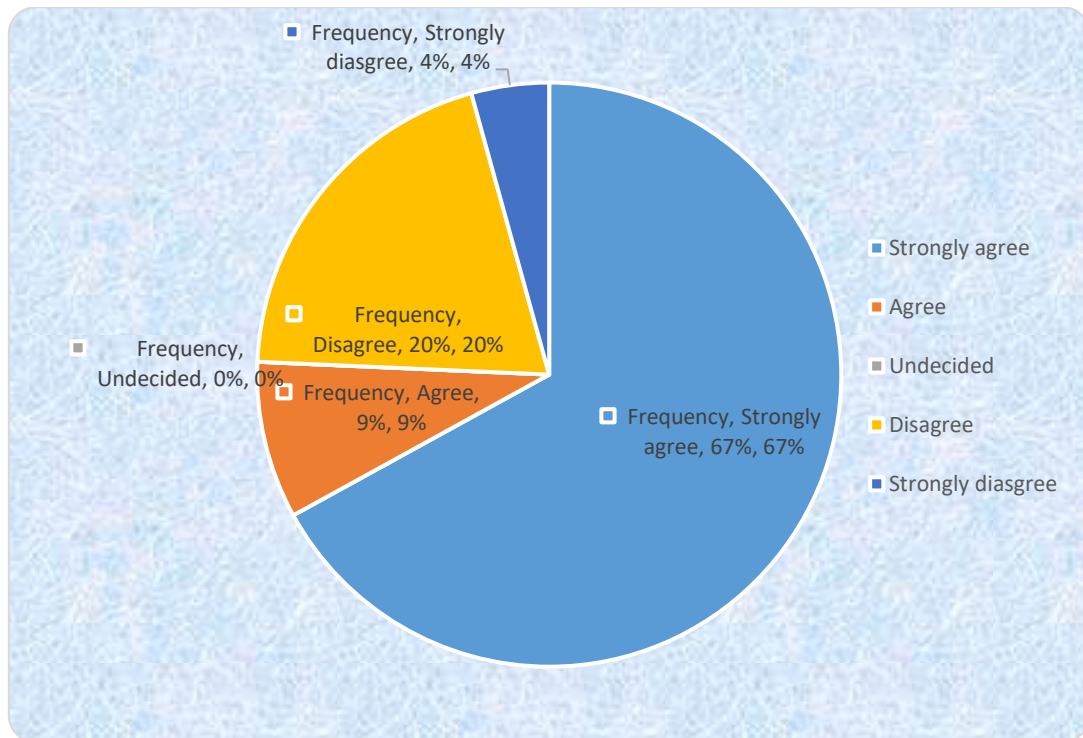


Figure 3: Distribution of sources of climate change information needed by ADP workers

Table 1 revealed the distribution of sources of climate change information for ADP workers in the study area. Conference source ranked the highest with 255 sampled population affirming it, radio source ranked second with 252 sampled population affirming it while cell phone ranked the least with 9 sampled population affirming it. This shows that the major source of climate change information for ADP workers was conference organized by both the government and non governmental organizations.

Table 1: Sources of climate change information for ADP workers

S/N	Sources	SA	A	D	SD	Total
1	Radio	122	130	16	7	275
2	Newspaper	45	39	156	35	275
3	Television	21	11	235	8	275
4	Cooperative societies	103	75	67	30	275
5	Billboards	111	140	20	4	275
6	Cell phones	0	9	220	46	275
7	Internet	130	79	51	15	275
8	Bulletins	109	70	60	36	275

9	Non Governmental Organizations (NGOs)	120	130	17	8	275
10	Universities	3	56	193	23	275
11	Agricultural Research Institute	96	146	19	14	275
12	Meetings	100	123	10	42	275
13	Seminars	111	140	20	4	275
14	Conferences	120	135	13	7	275
15	Symposium	130	81	49	15	275
16	Farmers Association	102	76	64	33	275
17	Monthly Training Review Meeting	84	97	55	39	275

As revealed in Table 2 of the study, moderate knowledge ranked the highest with 72.7% of the sampled population, high knowledge ranked second with 16.4% of the sampled population and little knowledge ranked the least with 10.9% of the sampled population. This revealed that majority of the sampled population have moderate level of knowledge in climate change issues.

Table 2: Level of knowledge in climate change issues

Options	Frequency	Percentage (%)
Little knowledge	29	10.9
Moderate knowledge	194	72.7
High knowledge	44	16.4
Total	275	100

As shown in Table 3 of the study, moderate relevance ranked the highest with 72.7% of the sampled population, little relevance ranked second with 16.4% of the sampled population and highly relevance ranked the least with 10.9%. This revealed that majority of the sampled population believe that climate change knowledge is of relevance to ADP workers across the study area.

Table 3: Relevance of climate change to ADP workers

Options	Frequency	Percentage (%)
Agree	275	100
Disagree	0	0
Level of relevance		
Little relevance	44	16.4
Moderate relevance	194	72.7
Highly relevance	29	10.9
Total	275	100

Table 4 shows the perception of ADP workers on the causes of climate change in Niger State. The perceived causes of climate change include bush burning, cutting down of trees, burning of firewood for cooking, over grazing of farmland, ozone layer depletion and use of fertilizer/herbicide/pesticide as indicated in Table 4 of the study.

Table 4: Perceived causes of climate change in the study area

Causes	Strongly agree	Agree	Disagree	Strongly disagree
Bush burning	41%	56%	3%	0
Cutting down of trees	51%	49%	0	0
Burning of firewood for cooking	29%	47%	20%	4%
Over grazing of farmland	34%	47%	18%	1%
Ozone layer depletion	11%	63%	10%	16%
Use of agro chemicals	27%	56%	17%	0

As shown in Table 4 of the study, cutting down of trees ranked the highest perceived cause of climate change with 100% sampled population, bush burning ranked second with 97% sampled population, use of agro chemicals ranked third with 83% sampled population and ozone layer depletion ranked the least with 74% of the entire sampled population. This revealed that the major perceived cause of climate change is cutting down of trees.

Figure 4 shows the perceived indicators of climate change across the study area. The perceived indicators include excessive sunlight/heat, high humidity, irregular rainfall pattern, intense thunderstorm, drying up of stream/river, drought and increased flood occurrence as indicated in Figure 4 of the study. Irregular rainfall pattern ranked the highest with 29% of sampled population, excessive sunlight/heat ranked second with 21% of sampled population, increased flood occurrence ranked third with 19% of sampled population and drought (meteorological drought) ranked the least with 5% of the sampled population. This revealed that irregular rainfall pattern was the major perceived cause of climate change in the study area.

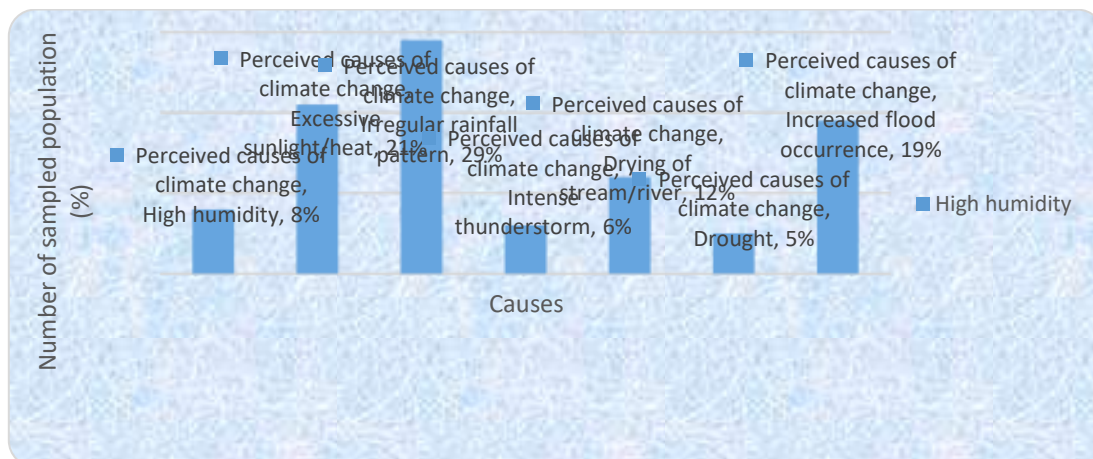


Figure 4: Perceived causes of climate change in the study area

Figure 5 shows the perceived effects of climate change across the study area. Reduced crop yield ranked the highest constituting 35% of sampled population, decreased in soil fertility ranked second constituting 20% of sampled population, increased crop pests and diseases ranked third constituting 17% of sampled population and loss of aquatic organisms ranked the least constituting 7% of the sampled population. This shows that reduced crop yield was the major perceived effect of climate change in the study area which is a factor of decrease soil fertility and increased crop pests and diseases in the study area. This agreed with the finding of Ibrahim (2017).

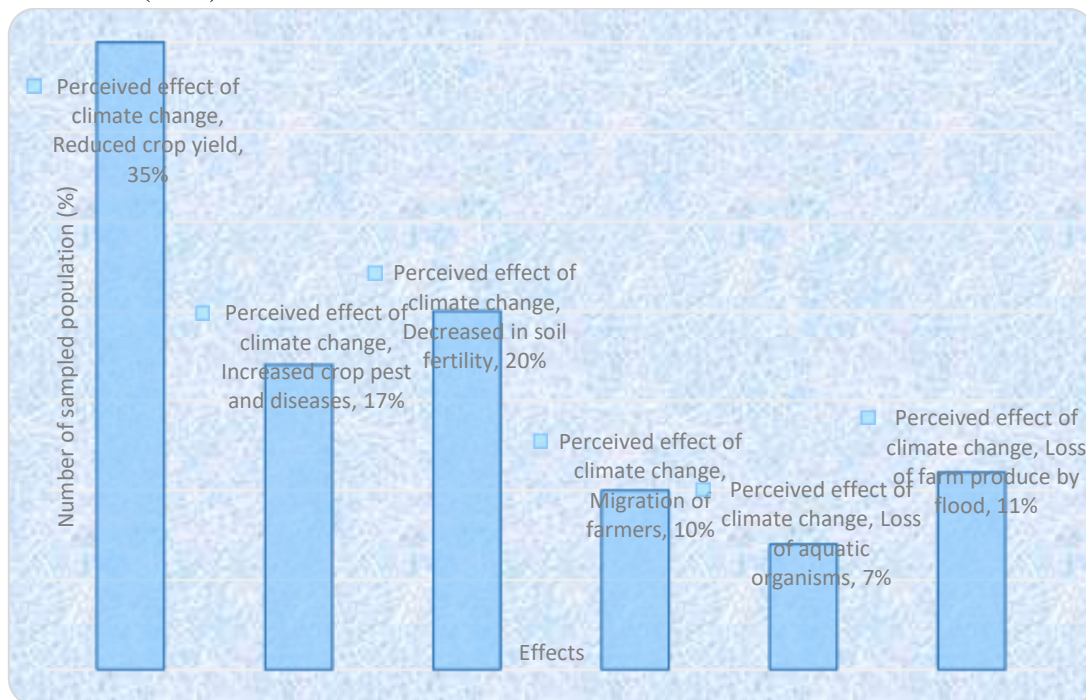


Figure 5: Perceived effects of climate change in the study area

As shown in Table 5 of the study, the perceived constraints in accessing climate change information include insufficient fund to support myself for training, inadequate financial support from my organization to attend climate change conferences, inability to access financial support from other funders outside my organization, Organization's rejection of my application to travel for trainings and excessive workload and limited time to attend workshop/seminars/conferences. Inability to access financial support from other funders outside my organization ranked the highest perceived constraints with 89.8% of the sampled population affirming it, inadequate financial support from my organization to attend climate change conferences ranked second with 83.5% affirming it, insufficient fund to support myself for training ranked third with 77.8% affirming it and the least perceived constraint was

excessive workload and limited time to attend workshop/seminars/conferences with 33.7% affirming it. This revealed that the major perceived constraint was inability to access financial support from other funders outside my organization and the least was excessive workload and limited time to attend workshop/seminars/conferences.

Table 5: Perceived constraints in accessing climate change information by ADP workers

Constraints	SA	A	D	SD
Insufficient fund to support myself for training	51.3%	26.5%	15%	7.2%
Inadequate financial support from my organization to attend climate change conferences	43.2%	40.3%	12.5%	4%
Inability to access financial support from other funders outside my organization	48.5%	41.3%	7.5%	2.7%
Organization's rejection of my application to travel for trainings	7.2%	35.5%	27.6%	29.7%
Excessive workload and limited time to attend workshop/seminars/conferences	13.2%	20.5%	51.3%	15%

Conclusion

The world leaders have for some years now been brainstorming on what or how to contend with the biggest threat of the moment, irregular change of climate otherwise known as climate change. This changes is negatively affecting the overall survival of human race and other living organisms on the surface of the earth, because lives of all living organisms depends on water, humidity, air, soil to survive. The air pollution occasioned by emission of gases from factories, vehicles, domestic use of fire woods, etc greatly affects the Ozone Layer and the earth crust thereby causing reduction in rainfall, humidity, and increases carbon dioxide concentration on earth which in turn lead to poor agricultural produce. However, the machinery put in motion by the government at all levels, international organizations and NGOs in the state to create awareness and encourage ADP workers to utilize given information yielded good results as the ADP workers level of awareness, access and utilization levels of information on climate change are moderate, therefore the State has no reason not to be at the fore front of this governments economic diversification with agriculture as the focus, thereby improving the socio-economic activities of its populace who are literally farmers.

The paper concludes that agricultural extension agents in Niger State are aware of climate change but lack sufficient knowledge about it, and thus require training on a variety of climate change-related topics, most notably basic climate change concepts, the use of cultural practices to mitigate and adapt to climate impacts, and environmentally friendly management practices to reduce climate change impact within the study area. Extension agents face significant financial barriers to obtaining climate change training. Governments at all levels should

increase their budgetary allocation to agriculture and provide accessible credit facilities to farmers to enable them insure their farms so as to minimize the burden of loss as a result of effects of climate change.

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RELATIONSHIP BETWEEN TEACHERS' JOB SATISFACTION AND JOB PERFORMANCE IN YOBE STATE PUBLIC SENIOR SECONDARY SCHOOLS, NIGERIA WITH PARTICULAR REFERENCE TO SCHOOLS IN POTISKUM AND DAMATURU ZONAL INSPECTORATE DIVISION

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ABSTRACT

The study investigated the Relationship between Teachers' Job Satisfaction and Job Performance in Senior Secondary Schools in Yobe State - Nigeria. The problem in which the researcher intends to investigate is to examine whether there is a significant relationship between teachers' job satisfaction (such as salary packages, in-service allowance, promotion and housing facilities) and job performance (such as mastering of subject matter, classroom management, punctuality, good lesson delivery and update of school records) in senior secondary schools in Yobe State, Nigeria. The objectives of the study are to examine: the relationship between teachers' salary packages and job performance in senior secondary schools in Yobe state of Nigeria; the relationship between teachers' promotion and job performance in senior secondary schools in Yobe state, Nigeria; the relationship between teachers' in-services allowances and job performance in senior secondary schools in Yobe State, Nigeria; the relationship between teachers' housing facilities and job performance in senior secondary schools in Yobe state, Nigeria. The methodology used for the study adopt correlational research design, the population of the study was all the teachers in senior secondary school, 359 teachers was used as sample for the study and the researcher adopt simple random sampling techniques and structured questionnaire was used as the research instrument, the questionnaire was validated by the supervisor and other lecturers, descriptive statistics and simple regression analysis was used in analyzing the data. The following are the findings of the study: Salary package is high in senior secondary schools in Yobe State with a grand mean of 4.03; Promotion is high in senior secondary schools in Yobe State with a grand mean of 4.12; Incentive is high in senior secondary schools in Yobe State with a grand mean of 3.74; Housing facility is high in senior secondary schools in Yobe State with a grand mean of 3.76; Teachers 'job performance is high in senior secondary schools in Yobe State with a grand mean of 4.12; Salary package and teachers 'job performance were found to have a statistically significant positive relationship in senior secondary schools in Yobe State, Nigeria

(r value = 0.737); Promotion and teachers' job performance were found to have a statistically significant positive relationship in senior secondary schools in Yobe State, Nigeria (r value = 0.707); Incentive and teachers' job performance were found to have a statistically significant positive relationship in senior secondary schools in Yobe State, Nigeria (r value = 0.798); Housing facility and teachers' job performance were found to have a statistically significant positive relationship in senior secondary schools in Yobe State, Nigeria (r value = 0.707). This study suggested that similar study should be conducted in junior secondary schools in Yobe State, Nigeria. This is also suggest that, relationship between motivation and teachers 'job performance could be investigated in senior secondary schools.

Keywords: Teachers' Job Satisfaction, Teachers' Job Performance, Salary package, Promotion, In-service allowance, Housing facilities.

INTRODUCTION

Education is regarded as an important and indispensable social service and the main source Of personal and social progress obtained in school. Bulogun .(2010) stated that education is the light, without which, the world would be in darkness. According to Ugwuanyi (2003) education is the process by which society establishes to assist the young to learn and understand the heritage of the past, participate productively in the society and contribute meaningfully for the development of the society. Emeka (2008) citing Kneller (2000) sees education as a process by which any society through schools; colleges, universities and other institutions deliberately transmit knowledge, values and skills from one person to another. It is in this view that the bases for modernity, scientific and technological breakthrough, which have made all nations of the worlds, develop priority to education.

To gain respect from the society one should be educated. The importance of education for every person is to live independently and to gain freedom. Effective education is a learning experience. Education brings about an inherent and permanent change in person thinking and capacity to do things. Many people have a superficial concept of education equating it with doing a particular course or obtaining a particular qualification but real education is very different to just having access to (or being exposed to) information about something rather embeds things into ones brain and anyone who understands learning will understand that this comes from repeated exposure and use of information or skills. Education will not be effective without a teacher. A teacher has been defined differently by many scholars.

A teacher has also been defined as a person i.e. "an expert who is capable of imparting knowledge that will help learners to build, identify and to acquire skills that will be used to face the challenges in life. The teacher a\so provides to the learners' knowledge, skills and values that enhance development. An educated person is capable, of private and public sectors, the educated person can easily secure employment as him/her to interact well in the society"

(Senge;2000). Moreover, a teacher has been defined as a person who has knowledge, skills and special training in teaching, explaining and educating the teacher is the person who is capable of creating psychomotor as well as effective domain (Mbise, 2008). However, these teachers will not be effective and efficient in performing their job if they are not well satisfied. Therefore, teachers' job satisfaction and job performance are very important to discuss in this context.

Weiss (2002) defines job satisfaction as feelings of contentment derived from the appraisal of one's job and the understanding that the job is assisting in achieving one's goals. Job dissatisfaction is the unpleasant affections that one feels if one appraises the job as a barrier in achieving one's values. People have set goals and values in mind. If their job assists them in achieving those goals, they are satisfied. Robbins (2005) defines job satisfaction as a set of emotions that one feels about one's job. For the purpose of this study, the researcher refers to job satisfaction as salary package, promotion, in-service allowance and housing facilities. Salary package: this refers to remuneration given to teachers such as salaries, allowances and bonuses on a monthly or quarterly basis. Promotion refers to when a teacher is lifted or moved from a lower level to the next higher level in every three or four years leading to a proportionate increase in the teacher's earnings as well. In-service allowance with regards to this study refers to the grants which teachers are eligible to receive when furthering their education which is separate from their salaries and other allowances. Housing facilities on the other-hand refers to proper accommodation as well as good social and basic amenities such as furniture, electricity, pipe-borne water etc. that a teacher should be provided with within school environment or not too far from the school environment.

Job satisfaction of teachers seems to be a popular area for researchers in the recent years. Yezzi and Lester (2000) examined job satisfaction among teachers and found age and need for achievement as predictors of job satisfaction using a multiple regression-exclusive method. Jabnoun and others (2001) presented a study which identified the factors affecting job satisfaction among "teachers at selected secondary schools in Malaysia. Evaluation of teacher satisfaction with intrinsic and extrinsic components of the job found demographic variables to be significant. Rasku and Kinnunen (2003) compared the work situation of Finnish upper secondary school teachers to that of average European teachers and to examine to what extent various job conditions and coping strategies explain their well-being. Job demands and control had only main effects on well-being: high demands explained low job satisfaction and burnout and high control explained high job satisfaction and high personal accomplishment. Van Dick (2004) found in a study that organizational identification leading to job satisfaction, in turn predicts turnover intentions. Cetin (2006) carried a research to find out if there is a significant difference between job satisfaction, (occupational and organizational commitment of 132 academics and found a significant relationship between satisfaction and performance. Zhang Jin, Zheng Wei (2009) developed new insights into the mechanism

through which job satisfaction relates to job performance. Affective commitment was tested as a potential mediator between job satisfaction and job performance, and traditionalistic was used as a potential moderator between job satisfaction and affective commitment. A survey study was conducted on 292 employees from seven companies in China. The study findings suggest that affective commitment serves as one of the mechanisms through attachment by which job satisfaction influences job performance. In the study conducted by Indhumathi (2011), investigating the job satisfaction and performance of 444 teachers at the secondary level were selected randomly, it was found that there was a significant relationship between job satisfaction and performance and the teachers in different categories of schools differed significantly in both job satisfaction and teaching performance.

However, teacher job performance cannot be ascertained until when teachers are satisfied with their jobs. In this regard, teachers' job performance could refer to a well-done job in relation to satisfaction. Mohammed and Garba (2019) define teachers' job performance as "mastery of subject matter, punctuality, lesson delivery, class-room management and update of school record". Therefore, this study intends to find the relationship between teachers' job satisfaction

Statement of the Problem

The problem in which the researcher intends to investigate is to examine whether there is a significant relationship between teachers' job satisfaction (such as salary packages, in-service allowance, promotion and housing facilities) and job performance (such as mastering of subject matter, classroom management, punctuality, good lesson delivery and update of school records). The issue of poor quality teaching and learning in Nigeria senior secondary schools has been of great concern to the educationist and stakeholders. As a result of the inability of the government to satisfy teachers with regard to their job which in turn results to low performance in their job such as poor lesson delivery, lateness to school, absent from the class, among others. Adelabu (2005) investigated teachers' motivation and incentives in Nigeria and found out that various state governments had instituted a policy of granting a revolving loan for teachers in order to assist them build their own houses. The study further discovered that the majority of the teachers did not receive the housing loans. The researcher recommended that this policy should be implemented to motivate the teachers to enhance their job performance. The study was more concerned with teacher motivation and incentives in Nigeria unlike the present research that was more concerned with the teacher's job satisfaction and teachers job performance -in senior secondary schools in Yobe state -Nigeria.

In a similar way, Adeyemi (2008) analyzed organizational climate and teachers' job performance in primary schools in Ondo State, Nigeria. The study findings revealed that most of the schools sampled had an open climate type of organization. The level of organizational climate and teacher job performance were found to be equally low. A significant relationship between organizational climate and teacher job performance were established. The researcher

recommended that head teachers should always create a favorable school climate to enhance better job performance among teachers. It was further recommended that there is need for regular supervision of teachers and provision of all the necessary facilities and resources in schools. Whereas the present study is concerned with teacher's job satisfaction and job performance in senior secondary school in Yobe state Nigeria. However, From the above similar studies on subject of teachers job satisfaction, None of these studies have been conducted to explain or show the relationship between variable such as salary packages, promotion, in-service allowance, and housing facilities in Yobe State Nigeria. Therefore, this study was undertaken to fill such gaps.

Objectives of the Study

The objectives of the study are to examine extent of:

- 1) the relationship -between teachers' salary packages and job performance in senior secondary schools in Yobe state, Nigeria.
- 2) the relationship between teachers' promotion and job performance in senior secondary schools in Yobe state, Nigeria.
- 3) the relationship between teachers' in-services allowances and job performance in senior secondary schools in Yobe State, Nigeria.
- 4) the relationship between teachers' housing facilities and job performance in senior secondary schools in Yobe state, Nigeria.

Research Questions

- 1) What is the extent of teachers' salary package and job performance in senior secondary schools in Yobe state Nigeria?
- 2) What is the extent of teachers' promotion and job performance in senior secondary schools in Yobe state Nigeria?
- 3) What is the extent of teachers' in-services allowance and job performance in senior secondary schools in Yobe state Nigeria?
- 4) What is the extent of teachers' housing facilities and job performance in senior secondary schools in Yobe state Nigeria?

Hypotheses of the Study

- Ho1: There is no significant relationship between teachers' salary packages and job performance in senior secondary schools in Yobe state Nigeria.
- Ho2: There is no significant relationship between teachers' promotion and job performance in senior secondary schools in Yobe state Nigeria.
- Ho3: There is no significant relationship between teachers' in-service allowance and job performance in senior secondary schools in Yobe state Nigeria.

Ho4: There is no significant relationship between teachers' housing allowance and job performance in senior secondary schools in Yobe state Nigeria.

Significance of the Study

The study is of the benefit to Ministry of Education, schools principals, teachers and researchers.

Is beneficial to ministry of education to help the ministry to structure its training programme to ensure that teachers are been well satisfied with their job.

Is also of great significant to schools principals which will help them to update their personal management skills and competence which could reduce incidence of low morale and poor performance of job among teachers in senior secondary schools in Yobe state Nigeria.

Is of benefit to the teachers as it will provide them with good salary packages, terminal promotion, in-services allowance, and good housing facilities.

Finally, it is also beneficial to researchers as it will provide them, with existing body of literatures for their studies.

1. Teachers' Job Satisfaction: Are Salary packages, in-services allowances, promotion and housing facilities.
2. Teachers' Job Performance: Are mastering of subject matter, punctuality, good lesson delivery, classroom management and update of school records.
3. Salary package: this refers to remuneration given to teachers such as salaries, allowances and bonuses on a monthly or quarterly basis.
4. Promotion: this is when a teacher is lifted or moved from a lower level to the next higher level in every three or four years leading to a proportionate increase in the teacher's earnings as well.
5. In-service allowance: In this study, in-service allowances refer to the grants which teachers are eligible to receive when furthering their education which is separate from their salaries and other allowances.
6. Housing facilities: this refers to proper accommodation as well as good social and basic amenities such as furniture, electricity, pipe-borne water etc. that a teacher should be provided with within school environment or not too far from the school environment.

Theoretical Framework

The study adopted Abraham Maslow (1954) hierarchy of need theory which states that there are five basic levels of human needs and this need are;

1. Physiological needs
2. Safety needs
3. Love and belonging needs

4. Esteem needs
5. Self-actualization needs

Maslow's hierarchy was developed to explain human motivation in general. However, its main tenants apply to the work setting and have been used to explain job satisfaction. Within an organization or school system, financial compensation and healthcare are some of the benefits which help teachers to meet their basic needs. Safety needs can manifest itself through teachers feeling physically safe in their work environment, as well as job security. When this is satisfied, the teachers can focus on feeling as though they belong to the workplace. This can come in the form of positive relationship between principals and the teachers. Once satisfied, the teachers will seek to feel as they are valued and appreciated by their principals and their organization. The final step is where the teachers seek to self-actualise, where they need to grow and develop to become everything they are capable of becoming

Concept of Teachers' Job Satisfaction

Work occupies a significant position in our lives and, in so doing, fills most of our rousing moments. Work is important to man in that it provides a means of supplying the basic necessities of life. In addition, it enables man to consciously act on his surroundings and observe the outcomes of his behavior. This process can be very satisfying. The process of work places individuals in an organizational network in which efforts of others are combined to achieve a common purpose. In addition, people are involved in using technological resources to help accomplish various tasks. These various aspects of the work-place exert influences on job attitudes. As a result, these attitudes play a definite part in influencing life satisfaction and family relationships.

Weiss (2002) defines job satisfaction as feelings of contentment derived from the appraisal of one's job and the understanding that the job is assisting in achieving one's goals. Job dissatisfaction is the unpleasant affections that one feels if one appraises the job as a barrier in achieving one's values. People have set goals and values in mind. If their job assists them in achieving those goals, they are satisfied. Robbins (2005) defines job satisfaction as a set of emotions that one feels about one's job. Job satisfaction reflects happiness or positive emotions originated from one's work experience, in which individual's happiness in working will impact the individual tasks positively. Positive attitude and happiness lead to whether supporting or not supporting the experience gone through by employees. Job satisfaction is one-way staff appreciates himself/herself and his/her work. In addition, job satisfaction is about individual's positive or negative feeling towards various factors or dimensions in the tasks Wexley (2003). Theoretically, there are various factors influencing job satisfaction, such as leadership style, work productivity, organizational behavior, control locus, meeting expectation, and work effectiveness. Job satisfaction itself is categorized into two parts: (1) staff factor, i.e.

intellectual, area of expertise, age, gender, working environment, educational level, work experience, working hour, personality (emotion), thinking style (perception), and working attitude; and (2) task factor, i.e. type of job, organizational structure, status, quality control, financial guarantee, promotion opportunity, social interaction, and work relationship (Mangkunegara, 2004). Being more specific to teacher's job satisfaction, it has a positive or negative effect on organizational functioning due to teacher's job satisfaction has been found affecting for teacher quality of the job and productivity. Teacher's job satisfaction leads to their behavior and profession as a teacher. It also has the effect of teaching quality assurance in which the teaching quality assurance has an effect on teaching effectiveness.

Concept of Teachers' Job Performance

The word performance may mean different things to different people depending on the perspective from which one approaches it. It may imply efficiency, economy, results, or return (profits) on investment (Summermatter & Siegel, 2009; Herath & Rosli, 2013). Some scholars (Armstrong, 2003; Fengi, 2010) have viewed performance as the behavioural aspect that defines the way in which organizations, teams and individual employees get work done; it is the output record of a specific job function or activity at a given time (Armstrong, 2003). Performance is the degree to which an employee's and organizational goals are met (Fengi, 2010). It comprises both behaviour and outcomes (Armstrong, 2008; Fengi, 2010). Behaviour comes from the worker who transforms performance from abstraction into action leading to a product or an outcome (Kalyani, 2006). Fengi (2010) opines that performance can be viewed from three different -angles, that is, result-oriented performance, conduct-oriented performance and the integration of conduct and result-oriented performance. Bouchaet and Halligan (2008) (in Summermatter & Siegel, 2009) view performance in the public sector from three levels, that is: micro performance that refers to individual public sector organizational performance; the meso performance which refers to performance of a policy; and macro performance which refers to performance of the government as a whole.

Several researchers throughout the evolution of organizational theory and management science have focused on the best way to measure individual and organizational performance and realized that it is a dynamic concept that varies across geographical space, time and scholarly schools of thought. Performance and its crucial dimensions changes and differs over time and space depending on the relations between inputs, activity, output and effect (Summermatter & Siegel, 2009). Summermatter and Siegel (2009) analyzed over 300 papers from 14 journals and found out that the word performance, as applied in management, has several dimensions, subsumed terms and categorizations. The categorization shows that performance is a multi-dimensional concept that is applicable to governments, government agencies, policies, projects, processes, programmes, industrial establishments, the private sector and individual employees. The research findings by Summermatter and Siegel (2009)

revealed that the most common dimensions of performance are outcome, output, efficiency, requirements, input, effectiveness, and quality; but there is not a one-size-fits-all definition of performance in the development of the principles and practice of management. The study findings also revealed that outcomes as a performance dimension were prominent in the USA and inferior in Britain where the dimension of -efficiency is more pronounced. Katarasibwa (2006) echoes by looking at teacher performance as the extent to which teachers in a school achieve the requirements of their job in an effort to fulfill school objectives. Teacher performance must be geared towards promoting the process of teaching and learning for the benefit of the pupils. In this study, teacher performance is conceptualized as the extent to which the teacher achieves school objectives through lesson preparations which involve making schemes of work, lesson plans, record of work done, preparing and using learners' registers, actual classroom teaching, assessment and evaluation of the learners, attending staff meetings, management of learners' discipline, involvement in co-curricular activities, counseling and guidance. In this regard, the researcher refers to teachers' job performance as mastery of subject matter, effective lesson delivery, classroom management, punctuality and update of school records (such as lesson note, lesson plan, student register, student diary etc.).

Methodology

Correlational research design was used for the study. Correlational research design can be defined as a type of non-experimental study in which relationships are assessed without manipulating independent variables or randomly assigning participants to different conditions. The design was suitable in examining the relationship between teachers' job satisfaction and teachers' job performance in senior secondary schools in Yobe State Nigeria. Because it was used in obtaining information that is related to the degree of relationship between two or more variables. (Kerlinger & Lee 2000, Cohen & Manion, 2009).

Population and sample of the Study

The population of the study was 3,522 participants comprising 48 principals and 3,474 Teachers of senior secondary schools within the three education zones of Yobe State. (Directorate for planning, research and statistics, Yobe State Teaching Service Board Damaturu, 2017).

The sample size for the study was 359 participants comprising 20 principals and 339 teachers computed using Taro Yamane's method. The researcher used stratified random sampling technique to draw the sample needed for the study in two education zones in the state (Potiskum and Damaturu Education Zone). The three education zones in the study area will be used as strata. Hence, simple random sampling by lucky dip will be employed to select 20 participating schools for this study. Odekunle (2013) stated that sampling is very necessary when there is infinitely large number to be managed within the time and financial constraint.

Structured questionnaire was used to collect the data from the field. The questionnaire was divided into three sections: the first section solicit for information on demographic data, the second section was on teachers' job satisfaction and the third section was on teachers' job performance. In determining the validity of the instrument 'however, the researchers supervisor and other professional in the department of education, school of post-graduate, Yobe State University will validate the content of the instrument.

The reliability of the two instruments was determined through trial testing in GDSS Gashua and GSS Gashua Yobe State, Nigeria, with the help of one research assistant from each school who were staff of the school. The instrument was administered to the respondents after getting permission from the appropriate authorities of senior secondary' schools in Yobe State through a letter of introduction which the researcher received from Head of Department of Education, Yobe State University, Nigeria. The respondents were asked to complete the instruments on the spot and collected back by the researcher through the research assistants. This enabled the researcher or the research assistant explained any point to the respondents who did not understand the contents of the instruments very well and eliminated the probability of misinterpretation of the questions. The reliability coefficient was obtained using Cronbach's Alpha method to determine the internal consistency of the instrument. The reliability index of 0.84 was obtained for teachers' job satisfaction questionnaire (TJS) and 0.89 for job performance Questionnaire (TJPQ) respectively.

The four (4) research questions was analyzed using descriptive statistic (mean and standard deviation) while the (4) hypotheses was analyzed using simple regression analysis at 0.05 level of significance. It's therefore, suitable for correlating the teachers" job satisfactions variables (salary packages, promotion, in-service allowance and housing facilities) with teachers' job performance variable (mastering of subject matter, lesson delivery, punctuality and updates of schools records).

Data Analysis and Result

Appropriate statistical tools that were used to answer the research questions and hypotheses that was formulated. Results were also discussed in this section.

Research question 1: What is the extent of salary package in Senior Secondary Schools in Yobe State, Nigeria?

Table 1: Mean scores and standard deviation of teachers' opinion on extent of salary package in senior secondary schools in Yobe State, Nigeria.

S/N	Item	n	Mean (\bar{x})	Std	Remark
1.	Sufficient salary paid promptly to teachers in school	359	4.30	1.20773	H

2.	Available financial rewards is paid to teachers in school	359	4.06	1.28475	H
3.	Teachers receive ₦30000 minimum wages as salary in this school	359	4.10	1.21343	H
4.	Teachers receive leave grant allowances every year in this school	359	3.80	1.34933	H
5.	Teachers are paid other financial entitlements regularly in this school	359	3.90	1.2958	H
GRAND MEAN			4.03		H

Key: HL= High Extent, M= Moderate level, R = Remark s and n = Valid number of the respondents

Table 1 shows the mean and standard deviation of respondents' opinion on the extent of salary package in Senior Secondary Schools in Yobe State. A grand mean of 4.03 indicates that the salary package is high.

Research question 2: What is the extent of promotion in Senior Secondary Schools in Yobe State, Nigeria?

Table 2: Mean scores and standard deviation of teachers' opinion on extent of promotion in senior secondary schools in Yobe State.

S/N	Item	n	Mean (\bar{x})	Std	Remark
1.	Teachers are promoted after every three years in this school	359	4.2000	99655	H
2.	Teachers' salary increase after promotion are implemented in this school	359	4.0333	1.12903	H
3.	Promotion are done through teachers' performance appraisal in this school	359	4.0667	1.14269	H
4.	Teachers are promoted to next position in relation to well don job performance in school	359	4.1667	1.01992	H
5.	Principal recommends teachers that perform better for promotion in this school	359	4.1333	1.19578	H
GRAND MEAN			4.12		H

Key: HL= High Extent M= Moderate level, R = Remark s and n = Valid number of the respondents

Table 2 shows the mean and standard deviation of respondents' opinion on the extent of promotion in Senior Secondary Schools in Yobe State. A grand mean of, 4.12 indicates that the promotion is high.

Research question 3: What is the extent incentive in Senior Secondary Schools in Yobe State, Nigeria?

Table 3: Mean scores and standard deviation of teachers' opinion on extent of in-service allowance in senior secondary schools in Yobe State.

S/N	Item	n	Mean (\bar{x})	Std	Remark
1.	Examination allowance is paid regularly in this school	359	3.6667	1.15470	H
2.	Responsibility allowance is paid to teachers regularly in this school	359	3.7667	.81720	H
3.	Leave grant allowances is paid regularly to teachers in this school	359	3.7000	.98786	H
4.	Medical allowances paid often to teachers in this school	359	3.8667	.93710	H
5.	Transport allowance is paid often to teachers in this school	359	3.7000	.98786	H
	GRAND MEAN		3.74		H

Key: HL= High extent, M= Moderate level, R = Remarks and n = Valid number of the respondents

Table 3 shows the mean and standard deviation of respondents' opinion on the level of incentive in Senior Secondary Schools in Yobe State. A grand mean of 4.12 indicates that the incentive is high.

Research question 4: What is the extent of housing facilities in Senior Secondary Schools in Yobe State, Nigeria?

Table 4: Mean scores and standard deviation of teachers' opinion on extent of housing facilities in senior secondary schools in Yobe State.

S/N	Item	n	Mean (\bar{x})	Std	Remark
1.	Teachers receive housing loan in this school	359	3.9333	.78492	H
2.	Teachers access furniture loan regularly in this school	359	3.2000	.88668	H

3.	Government provides comfortable housing for teachers in this school	359	3.9667	.61495	H
4.	Government provides teachers with fittings in this school	359	3.7667	.77385	H
5.	Staff quarters are renovated regularly in this school	359	3.9667	.85029	H
	GRAND MEAN		3.76		H

Key: HL= High extent, M= Moderate level, R = Remarks and n = Valid number of the respondents

Table 4 shows the mean and standard deviation of respondents' opinion on the extent of housing facilities in Senior Secondary Schools in Yobe State. A grand mean of 3.76 indicates that the housing facility is high.

Research question 5: What is the extent of teachers' job performance in Senior Secondary Schools in Yobe State, Nigeria?

Table 5: Mean scores and standard deviation of principals' opinion on extent of teachers' job performance in senior secondary schools in Yobe State, Nigeria.

S/N	Item	n	Mean (\bar{x})	Std	Remark
1.	Payment of sufficient salary enhances teachers' punctuality in this school	9	2.3659	1.11440	M
2.	Availability of financial rewards promotes teachers class room management in this school	9	2.3598	1.21855	M
3.	Payment of ₦30,000 minimum wages as salary motivate teachers to update school records in this school	9	2.0610	1.34867	M
4.	Payment of teachers leave grant allowances facilitates teachers' writing of lesson plan regularly in this school	9	2.0152	1.31205	M
5.	Payment of teachers' entitlements enhances teachers' mastery of subject matter in this school	9	2.1951	1.12181	M
6.	Promoting teachers after every three years facilitates teachers to update school records	9	3.3018	1.07105	M
7.	Promotion motivates teachers to update lesson plan in this school	9	3.5549	1.06517	H

8.	When promotion are done through performance appraisal it enhance teachers' mastery of subject matter in school	9	3.0610	1.04454	M
9.	Promoting teachers to next position motivate teachers' punctuality in school	9	2.9878	.98296	M
10.	Principal promoting teachers to next position enhance teachers' ability to mastery of subject matter	9	3.4726	1.11667	H
11.	Payment of examination allowances motivate teachers update school records	9	2.2256	1.42424	M
12.	Payment of responsibility allowances facilitates teachers' to update lesson plan in school	9	2.2805	1.42948	M
13.	Payment of leave grant allowances promotes teachers' mastery of subject matter	9	2.3720	1.43634	M
14.	Prompt payment of medical allowances facilitates teachers' punctuality in school	9	2.6098	1.48185	M
15.	Granting transport allowances motivate teachers' to be punctual to class	9	2.4146	1.41379	M
16.	Granting housing loan to teachers' enhances teachers' punctual class	9	3.3018	1.07105	M
17.	Accessing furniture facility by teachers facilitates update of lesson plan in school	9	3.5549	1.06517	H
18.	Provision of comfortable housing for teachers enhances teachers' ability to update school records	9	3.0610	1.04454	M
19.	Provision of fittings in staff quarters enables teachers update lesson plan in school	9	2.9878	.98296	M
20.	Conducive staff quarters promotes teaching delivery in school	9	3.4726	1.11667	M
	GRAND MEAN		2.78		HL

Key: HL- High extent M= Moderate level, R = Remark s and n = Valid number of the respondents

Table 5 shows the mean and standard deviation of respondents' opinion on the extent of teachers' job performance in Senior Secondary Schools in Yobe State. A grand mean of 4.12 indicates that the teachers' job performance is high.

H_{01} : There is no significant relationship between salary package and teachers' job performance in senior secondary schools in Yobe State, Nigeria.

Table 6a: Summary of the model of salary package and teachers' job performance

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	0.737 ^a	.543	.540		.99464

b. Predictors: (Constant), SALARYTJP

The result in Table 6 shows how the independent variable explains the variance in the dependent variable. The result shows that salary package and teachers' job performance were found to have a strong positive significant relationship which is indicated by r value = 0.737.

Table 6b: Summary of ANOVA of salary package and teachers' job performance

Model	Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	170.551	1	172.395	.000 ^b
	Residual	143.449	145		
	Total	314.000	146		

a. Dependent Variable: SALARY

b- Predictors: (Constant), SALARYTJP

The results show that there is a statistically strong positive significant relationship between salary package and teachers' job performance $F(1, 145) = 172.395$ $p < 0.001$ since the p -value (0.001) is less than 0.05 levels of significance, the null hypothesis was rejected here, there is statistically significant relationship between salary package and teachers' job performance in senior secondary schools in Yobe State, Nigeria.

H_{02} : There is no significant relationship between promotion and teachers' job performance in senior secondary schools in Yobe State, Nigeria.

Table 7a: Summary of the model of promotion and teachers' job performance

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.707 ^a	.500	.497		.75565

b. Predictors: (Constant), promoTJP

The result in Table 7 shows how the independent variable explains the variance in the dependent variable. The result shows that promotion and teachers' job performance were found to have a strong positive significant relationship which is indicated by r value = 0.707

Table 7b: Summary of ANOVA of promotion and teachers' job performance

Model	Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	83.363	1	145.992	.000 ^b
	Residual	83.367	146		
	Total	166.730	147		

a. Dependent Variable: promotion

b. Predictors: (Constant), promotTJP

The results show that there is a statistically strong positive significant relationship between promotion and teachers' job performance $F(1, 146) = 145.992, p < 0.005$ since the p - value (0.001) is less than 0.05 levels of significance, the null hypothesis was rejected. Therefore, there is statistically significant relationship between promotion and teachers' job performance in senior secondary schools in Yobe State, Nigeria.

H_{03} : There is no significant relationship between incentive and teachers' job performance in senior secondary schools in Yobe State, Nigeria.'

Table 8a: Summary of the model of incentive and teachers' job performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.798 ^a	.637	.637	.58363

b. Predictors: (Constant), incentive TIP

The result in Table 8a shows how the independent variable explains the variance in the dependent variable. The result shows that incentive and teachers' job performance were found to have a positive significant relationship which is indicated by r value = 0.798.

Table 8b: Summary of ANOVA of in-service allowance and teachers' job performance

Model	Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	87.741	1	257.590	.000 ^b
	Residual	50.071	147		
	Total	137.812	148		

a. Dependent Variable: inservice allowance

b. Predictors: (Constant), incentive TJP

The results show that there is a statistically strong positive significant relationship between in-service allowance and teachers' job performance $F(1, 147) = 257.590$, $p > 0.005$ since the p -value (0.001) is less than 0.05 level of significance, the null hypothesis was rejected. Therefore, there is statistically significant relationship between in-service allowance and teachers job performance in senior secondary schools in Yobe State, Nigeria

H_0^4 There is no significant relationship between housing facility and teachers' job performance in senior secondary schools in Yobe State

Table 9a: Summary of the model of housing facilities and teachers' job performance

Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.707 ^a	.500	497	.75565

b. Predictors: (Constant), inservice allowance TJP

The result in Table 9 shows how the independent variable explains the variance in the dependent variable. The result shows that housing facilities and teachers' job performance were found to have a moderate positive significant relationship which is indicated by r value = 0.707

Table 9b: Summary of ANOVA of housing facilities and teachers' job performance

Model	Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	83.363	1	145.992	000 ^b
	Residual	83.367	146		
	Total	166.730	147		

a. Dependent Variable: incentive

b. Predictors: (Constant),

The results show that there is statistically strong positive relationship between incentive and teachers' job performance The results show that there is a statistically strong positive significant relationship between incentive and teachers' job performance $F(1, 146) = 145.992$, $p > 0.005$ since the p -value (0.001) is less than 0.05 levels of significance, the null hypothesis was rejected. Therefore, there is statistically significant relationship between housing facility and teachers' job performance in senior secondary schools in Yobe State, Nigeria

Discussion

This study investigated the relationship between teachers' job satisfaction and job performance in senior secondary schools in Yobe State, Nigeria. Finding from table 1 revealed that salary

package in senior secondary schools in Yobe state is high with the grand mean of 4.03. This finding is in line with the opinion of Owen (2003) who noted that performance-based rewards improve the governance of schools by increasing the efficiency of resource allocation. This finding also agreed with the opinion Dessler (2005) who believes that satisfaction is another very important thing in terms of motivation so when employees are satisfied with their job, organization environment, salaries, rewards, then automatically get motivated and show performance. The finding is also related to the opinion of Lewis and Michael, (2001) whose state that absence of performance-based compensation, and * the presence of tenure, is one reason why many "school-wide" collaborative education reforms fail. Teachers in a particular school have little incentive to join a school reform team or advance the goals of the team by changing their teaching practice or collaborating in the implementation of reforms.

Finding from tablet revealed that promotion in senior secondary school in Yobe State, Nigeria with the grand mean 4.12 which indicates high promotion in senior secondary schools. This finding is in line with the opinion of Fadeyi, Abayomi, and Rotimi (2015), whose believe that attention should be given, to teachers' welfare, this will bring about positive development in the educational system. It was recommended that teachers . should be placed on meaningful salary scale and given opportunities to further receive training in their various disciplines for better performance to be achieved. The study is also relevant to the opinion of Adeyemo, Oladipupo and Omisore (2013), whose observed that the condition of service of teachers, teachers' Fringe benefit payment, and teachers' promotion of in-service training have a direct influence on the student's performance. Ombuya (2015), also observe that motivation strategies such as frequent in-service training, regular promotion and the general improvement of the working conditions that formed the major study variables, were critical in enhancing teachers' commitment to their tasks performance.

Finding from table 3 shows that in-service allowance in senior secondary schools in Yobe State .A grand mean of 3.74 indicates that in-service allowance is moderately high. This finding is in line with the opinion of Kulkarni (2013) who revealed that in this competitive world, training plays an important role in the competent and challenging format of business. Thus, employee training and development programs are important aspects which are needed to be studied and focused on. Alam, and Farid, (201 1) found that mostly teachers experienced that they were paid less salary according to their knowledge, skills and capabilities for doing their job. Thus, respect should be given to teachers, provide them training to exceed their performance level and salaries should be designed according to their capabilities, experience and skills regarding job.-

Finding from table 4 shows the mean and standard deviation of respondents' opinion on housing facilities in senior secondary schools in Yobe State. A grand mean of 3.76 indicates that housing facilities is also high. This finding is relevant to the finding from Ikenyiri and Ihua-maduenyi (2011) examined teachers' assessment of needs effectiveness in Omoku-ivers

State, Nigeria. They found out that enhancement of rent allowance (Housing) was a strong predictor of teacher effectiveness in Rivers State primary schools. The study is also in line with finding from Adelabu (2005) who found out that various state governments had instituted a policy of granting a revolving loan for teachers in order to assist them build their own houses. The study further discovered that the majority of the teachers did not receive the housing loans. The researcher recommended that this policy should be implemented to motivate the teachers to enhance their job performance. This is also in the opinion of Kadzamira (2006) revealed acute shortage of affordable housing within reasonable commuting distance from most schools and this had escalated transport costs for teachers.

The result in Table 6 shows how the independent variable explains the variance in the dependent variable. The result shows that salary package and teachers' job performance were found to have a strong positive significant relationship which is indicated by r value = 0.737. Dessler (2005) examined that from the perspective of teachers in schools, job performance and motivation are different. Motivation is an input to work, and job performance is an output from this motivation. From a teacher's perspective motivation and job performance may be difficult to distinguish and motivation is often inferred from the output produced, the possibility of high motivation and low output or low motivation and high output is often not considered.

The result in Table 7 shows how the independent variable explains the variance in the dependent variable. The result shows that promotion and teachers' job performance were found to have a strong positive significant relationship which is indicated by r value = 0.707. A study conducted by Fadeyi, Abayomi, and Rotimi (2015), was carried out to examine the relationship between teachers' welfare scheme and job performance in selected Secondary Schools in Isin Local Government Area of Kwara State, Nigeria. The paper concludes that if necessary attention is given to teachers' welfare, this will bring about positive development in the educational system. It was recommended that teachers should be placed on meaningful salary scale and given opportunities to further receive training in their various disciplines for better performance to be achieved.

The result in Table 8 shows how the independent variable explains the variance in the dependent variable. The result shows that in-service allowance and teachers' job performance were found to have a positive significant relationship which is indicated by r -value 0.798. Matoke, Okibo and Nyamongo (2015), carried out a study to determine the effect of teacher motivation in public secondary schools in Masaba South Sub-County in Kisii County, Kenya. The study established that development factors had a significant effect on teacher motivation. The study recommended that school managers to sponsor teachers to workshops and seminars in order to motivate them. Schools management should work towards improving the teaching and learning environment. Study findings will assist school managers in formulating

competitive -teacher motivational strategies to improve student examination performance and to curb the mass loss of teachers from public secondary schools to more lucrative jobs. The result in Table 9 shows how the independent variable explains the variance in the dependent variable. The result shows that housing facilities and teachers' job performance were found to have a moderate positive significant relationship which is indicated by r value = 0.707. Akinmoladun and Oluwoye (2007) carried out an assessment in Lagos metropolis, Nigeria, of why the problems of housing shortages persist in developing countries. The study revealed that housing delivery in Nigeria was beset by several problems. The study concluded that the elitist orientation of the existing housing policy be discouraged and recommended that the people for which the houses are meant should be involved in policy formulation, implementation and review.

Conclusion

Based on the findings of this study, it revealed that salary package, promotion, incentive and housing facility are high in Senior Secondary Schools in Yobe State, Nigeria,

Recommendations

Based on the findings of this study, the following recommendations are made

1. This study recommended that salary packages should be maintained in senior secondary schools in Yobe State, Nigeria.
2. This study also recommend that promotion should be maintained in senior secondary schools in Yobe State, Nigeria.
3. This study again recommend that in-service allowance should be maintained in senior secondary schools in Yobe State, Nigeria.
4. The study finally recommend that housing facilities should also be maintained in senior secondary schools in Yobe State, Nigeria

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ASSESSMENT OF SECURITY MEASURES IN THE DESIGN OF A PUBLIC SCHOOL IN KASTINA STATE, NIGERIA.

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ABSTRACT

Over the years there have been a global increase in terrorist attacks, the last few years, Nigeria as a country has had its own fair share of terrorism attacks, ranging from kidnapping to terrorist attacks and most of these attacks are carried out by terrorists forcing their way through unsecured public buildings, we conclude that the effect of these attacks especially bomb blast attacks on buildings affects the overall safety of building occupants and other important structures. It is therefore become a matter to take seriously. This recent wave of abductions follows other notorious incidents of mass abduction and murder of students, most prominently the cases of the Chibok and Dapchi girls. We should take all aspects and consideration to increase the architectural and structural resistance by advanced methods of designing, advanced materials and different security procedure of implication. It is mainly because of these are manmade disasters that's why it's an exceptional case. Furthermore it is discovered that most public buildings mostly in the northern part of the country are not designed with some innovative security measures as to be adopted in such structures to safeguard it. Hence the need for proper security measure in public buildings through the use of crime prevention through environment control (CPTED) cannot be overemphasized, therefore this research is embarked upon exploring different measures through crime prevention can be actualized in public buildings through the use of crime prevention through environmental control, so as to reduce or counter terrorists' attacks in public schools in northern part of the country, we will be adopting qualitative research approach, which entails participating, observing and also conducting interviews, the results of the findings will be incorporated as a serious measure in public schools to enhance security against terrorism in public structures.

Keywords: Innovative, Environmental, Terrorist, Kidnapping, Terrorism.

INTRODUCTION

The concept of security is an all-encompassing condition in which people and communities live in freedom, safety and peace, and generally participate fully in the administration of their nation, enjoy the protection of fundamental rights, have access to resources and basic necessities of life, and inhabit an environment which is not detrimental to their health and well-being. This description revealed that security embraces all aspect of societal prospects and human endeavors geared towards promoting freedom and safety of people and their properties. In this sense, the focus on people, their values and properties are aspects of security that specifically deal with the issues of personal and physical security. Kidnapping in secondary schools has increased in recent times, School as a social organization is singled out for attacks by terrorists worldwide, we have examples like in 1874 around 17th century as child abduction in Britain when the kids of the rich families were been abducted for “ransom while asleep (nap)” Tzanelli et al., (2019), and also Nigeria in recent times especially in the north-west region of the country there are over five hundred reported cases of students adoption by bandits, most times attacks are indicative of “targeted violence” aimed at educational institutions, most times by rebel or terrorist groups with a view to sending strong messages to the state authorities (Mohammed et al., 2016). According to Applebury (2018), providing proper school security and keeping schools safe allows children to look forward to being in an encouraging environment that promotes social and creative learning. When their basic safety needs aren't met, children are at risk for not feeling comfortable at school and may stop showing up, or they may remain on edge throughout the day. Promoting school safety creates an open space for kids to explore, learn and grow. The case of the Chibok girls, the abducted Dapchi girls, the 300 students from the Government Girls Science Secondary School in Jangebe, Zamfara state and the more recent on case of the abduction of school children in the kagara district of Niger by an armed gang who stormed the government secondary school this is an indicator that points to the fact that other states are also encountering the same security challenges.

LITERATURE REVIEW

Nunes-Vaz, *et al.* (2011) describe security measures or controls as a physical, psychological, procedural, electronic, or other structure that executes or contributes to one or more security functions by dividing physical space into zones. Most safety and detection measures, according to the entire building design guide (WBDG), have to do with a balance of organizational, mechanical, and physical safety approaches. A primarily operational approach, for example, would emphasize the round-the-clock deployment of guards; a primarily electronic approach would emphasize video monitoring and warning sirens; and a primarily physical approach would emphasize closed doors and vehicle barriers to secure a given facility from unwelcome intruders. It is critical to implement certain specific security measures

outside and inside the facility in order to minimize danger. Trees, thick plantings, heavy structures such as huge sculptural objects, giant boulders, and concrete shapes could be used as defence precautions.

Passive measures for a working protection infrastructure, according to the National Capital Planning Commission (2002), are a permanent protective function provided by both the location and the structure that necessitates the effective application of architecture and engineering to increase protection by removing potential threats. According to Randall (2003), protective precautions can be addressed using words like perimeter and exterior security, entrance security, interior security, security preparation, and crime reduction by urban design (CPTED).

ZONING FOR SECURITY

An application of zoning concept simply entails a proper control of human movement in terms of security. The main idea behind zoning is to allow for visitors, vendors, and others to reach their respective destinations or points without any hindrance and simultaneously prevent them from entering areas where they have no business (Randall, 2003). This can go long way in reducing congestion and also helping in spotting unauthorized persons. According to Nunes-Vaz, *et al.*, (2011) Security layers around a sphere may be used to zone for defence, and these layers lead to the installation of a series of controls that can theoretically avoid or completely prevent the dangerous occurrence of a given incident. According to Droge *et al.*, (2004), a comprehensive site management scheme considers fundamental principles that determine the security requirement and protect against a range of threat scenarios. Zoning for security is achieved by site security (usage of certain vital elements and factors that helps to restrict space). This can be achieved through setbacks, physical barriers and perforation, and landscaping.

SETBACKS AS A SECURITY MEASURE

Terrorism attacks focus on explosive devices concealed in vehicles near target buildings in around 80% of cases. This is why many site security designs emphasize maintaining a minimal gap between the target building and possible bomb sites, such as a vehicle or a static feature on the premises. This is referred to as a "standoff" or "setback" gap. Setbacks, also called "standoff" zones, are specified distances between a "target" object, such as a house, and the nearest point of attack (Droge & Hopper, 2004).

ACCESS CONTROL FOR SECURITY

It is basically the various procedures for blocking, identifying, and/or searching individuals trying to obtain access to a building are known as access controls (Droge & Hopper, 2004). Designing for protection, according to Bulla (2004), is similar to peeling an onion: it is done layer by layer. Mechanical and electronic structures, operating protocols, and natural and

architectural features are used to create a sequence of overlapping layers of security defences. They provide the basic foundation of any effective defence infrastructure: deterrent, detection, and delay, as all of these functions together. At any of these layers, access control is a factor in ensuring security and safety. You will reduce the likelihood of crime by limiting entry. True barriers, such as fences, or symbolic barriers, such as low-growing landscaping trees, height changes, or even changing the texture of the sidewalk, can all be used. People entering or exiting a room are driven by the location of doors, exits, walls, landscaping, and lighting. The attractiveness of a low Hawthorn hedge does not compensate for the debilitating punctures caused by its thorns. As a result, it's a perfect alternative to unsightly barbed wire fencing. Stop trees and shrubs that could serve as scaling aids for the deck or higher story windows (Bulla, 2004).

CRIME PREVENTION THROUGH ENVIRONMENTAL CONTROL (CPTED)

Crime prevention through environmental control (CPTED) can be described as a multidisciplinary approach towards designing for security (Randall, 2013). It involves designing the built environment in such a way that it reduces the fear of, and opportunity for, disorder and crime. Natural surveillance, natural access control, territorial reinforcement, and maintenance are the four components of CPTED. According to Cozens, (2015) a critical look into CPTED can bring into focus the realization of seven key concepts; territoriality, surveillance, image management, activity support, access control, target hardening, and geographical juxtaposition. Droge and Hopper (2004) According to the author, nonviolent crimes like burglary can be deterred by providing adequate illumination, monitoring, and visual access to the location, The CPTED principles are a great collection of tools for preventing antisocial behavior and encouraging community ownership of public spaces. It also gives the impression that outdoor space planners and architects have some control over the final group of potential risks and violent crime. Many of these risks occur outside the building, where site protection architecture principles will prevent and/or mitigate harm while also allowing for the creation of high-quality public spaces.

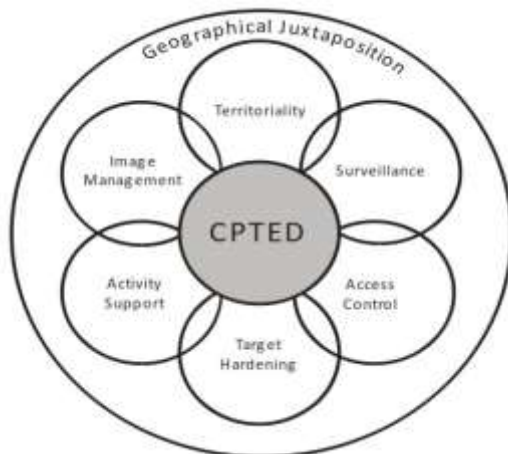


Figure 1: Showing the different f (CPTED) Techniques

Source: Zahner, (2017)

PASSIVE SECURITY MEASURES.

This involves space planning, landscaping, lighting to achieve a functional and safe environment and the use of all such design related components not needing mechanical operations. This is a design feature that deters threats and still remains largely invisible to its users.

These can be achieved by the use of high fences, barb wires, and bollards, directing traffic using curbs, multiple layers of protection, distant parking and buffer creation.

This type of security measure is economical, most effective and permanent of all protective security measures of building structures, content and its occupants through adequate planning from conceptualization of the design. Passive security measure also integrates functionality into the environment components and furniture without conflict as the architect thinks along with such plans in his preliminary sketch design aside securing the intended properties, its components and furniture.

METHODOLOGY

Research Method

To meet the objectives as stated in the chapter one of this research, this work adopts a descriptive research method. A descriptive research method simply involves observing and describing the nature and behavior of a subject mostly accompanied with an observation or survey tool. Sufficient data was collected and analyzed to serve as guidelines throughout the research, for better understanding of this project. Different research methods were employed to gain important and more information about the whole design. Descriptive Survey method was employed for compiling data for this research work. This implies examining and recording a situation as it is.

Table 1. Checklist for observation and assessing sampled market

Source: Author's field work

S/No	Variables
1	Zoning for Security
2	Defined site boundary
3	Well established Drop off procedure
4	Use of Long stem trees, bollards, and barricade
5	Use of watch Towers
6	Designing of residential apartments in units to further enhance the defensible space theory
7	Gates and checkpoints

A non-random sampling techniques was adopted in this study, which involves intentional selection of specific samples relevant to the subject of judgment. These samples were

selected to be subjected under observation by the researcher in line with the drafted observation schedule, in order to extract information relevant to the study. The following are listed samples (public secondary schools) selected to be observed as shown in table 2

Table 2: List of Sample Libraries.

Source: Author's field work

S/No	Sample / Location
1	Emma Willard School, Newyork, USA.
2	Federal Government College, Kabba, Kogi State.
3	Federal Girls Government college, Batori, Kastina State.
4	Command Secondary School, Kaduna State.
5	Sabon Gar Modern Secondary School, Funtua Kastina state.
6	Zee Alpha International School, Funtua Kastina State.
7	Nigerian Tulip International School, Kaduna State.

DATA ANALYSIS

In this research, data gotten have been examined using qualitative data evaluation principles. The data acquired by the researcher using the observation guide was examined using the Microsoft office excel software, and the outcomes were presented using plates and figures.

ZONING TO SECURITY

The public schools observed showed that only (1) out of all the schools had and overall excellent security zoning, which took only 10% of the particular analysis, the private schools examined also had a fairly good security zoning and most public schools used had poor general security zoning.

Table 4: Zoning to security

Source: Author's field work

SECONDARY SCHOOLS	Poor	Good	Excellent
Emma Willard School, Newyork, USA.			?
Federal Government College, Kabba, Kogi State.	?		
Federal Girls Government college, Batori, Kastina State	?		
Command Secondary School, Kaduna State.		?	
Sabon Gari Modern Secondary School, Funtua Kastina state.	?		

Zee Alpha International School, Funtua Kastina State.		?	
Nigerian Tulip International School, Kaduna State.		?	

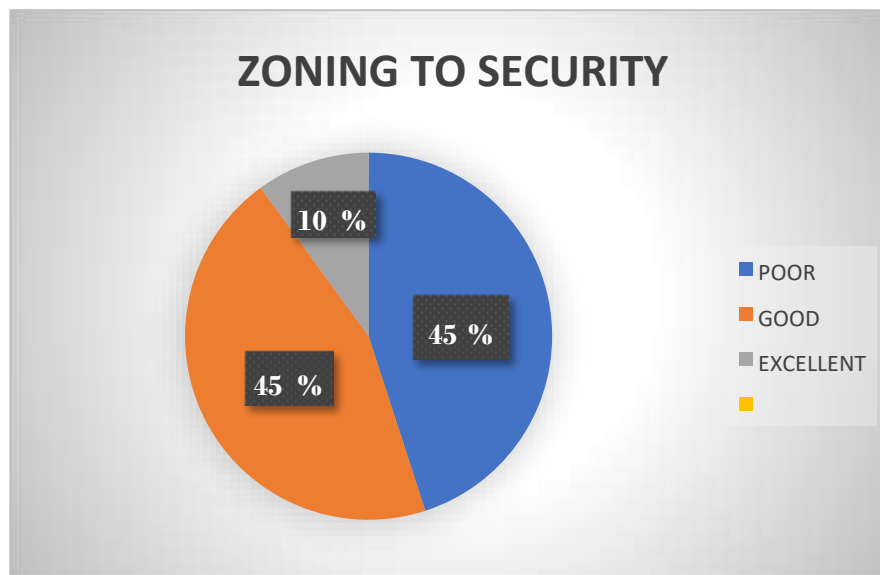


Fig 2: Percentage Distribution on Zoning to Security

Source: Author’s field work

DEFINED SITE BOUNDARIES

Site boundaries are the defined landmass area covered or owned by the school that is properly fenced and marked for the school, the percentage distribution showed that most public school in the north had poor site boundaries demarcations only private case studies used had fairly good defined site boundaries.

Table 4: Defined site boundaries

Source: Author’s field work

SECONDARY SCHOOLS	Poor	Good	Excellent
Emma Willard School, Newyork, USA.		?	
Federal Government College, Kabba, Kogi State.	?		
Federal Girls Government college, Batori, Kastina State	?		
Command Secondary School, Kaduna State.		?	
Sabon Gari Modern Secondary School, Funtua Kastina state.	?		

Zee Alpha International School, Funtua Kastina State.		?	
Nigerian Tulip International School, Kaduna State.		?	

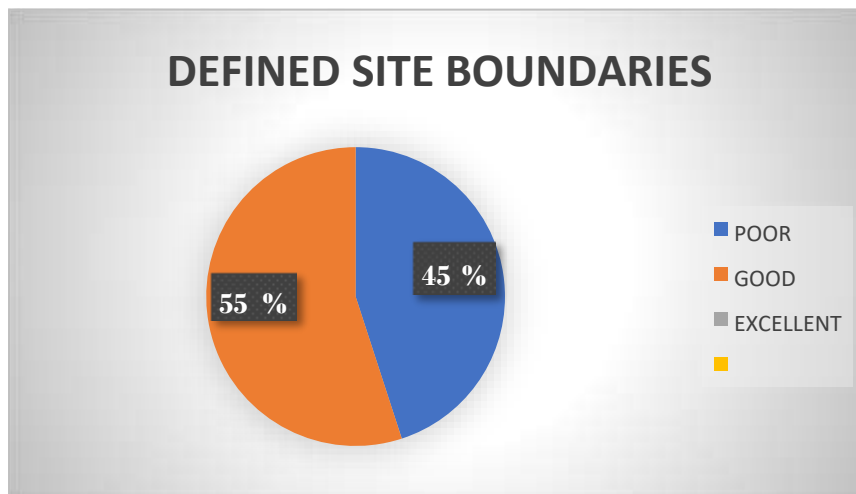


Fig 3: Percentage Distribution on Defined Site Boundaries
Source: Author’s field work

WELL ESTABLISHED DROP OFF ZONE

Drop off zones refers to the defined zones for vehicular movements, car parks stations how defined they are in terms of security. The chart shows that most vehicular movements in and out of most of the schools are not closely monitored.

Table 5: Well established drop off zone
Source: Author’s field work

SECONDARY SCHOOLS	Poor	Good	Excellent
Emma Willard School, Newyork, USA.			?
Federal Government College, Kabba, Kogi State.	?		
Federal Girls Government college, Batori, Kastina State	?		
Command Secondary School, Kaduna State.		?	

Sabon Gari Modern Secondary School, Funtua Kastina state.	?		
Zee Alpha International School, Funtua Kastina State.	?		
Nigerian Tulip International School, Kaduna State.	?		

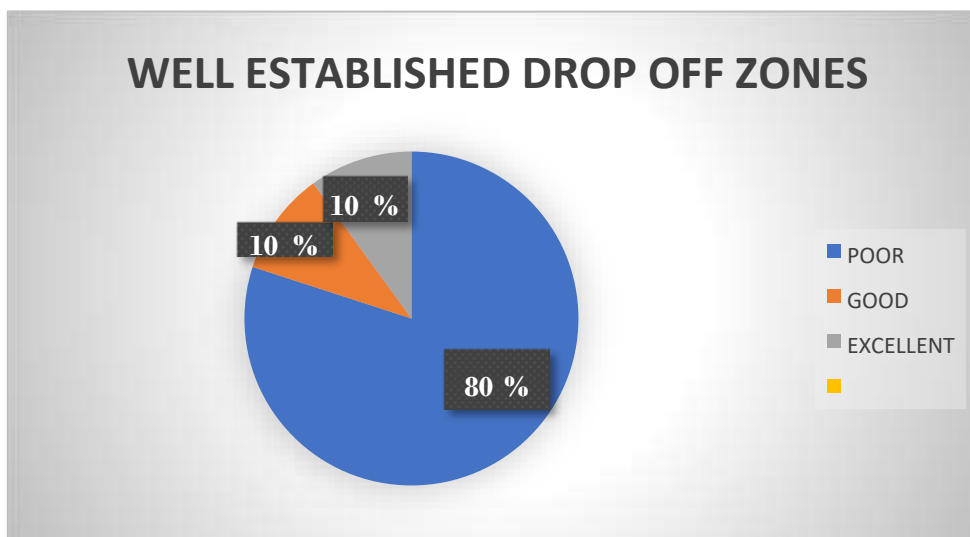


Fig 4: Percentage Distribution on Well-established Drop off Zones
Source: Author’s field work

USE OF LONG TERM TREES, BOLLARDS AND BARRICADES

This involves the use of barricades which can either plants, bollards or any other devices as security guide in the various public schools. This chart shows the percentage of barricades distribution in the schools.

Table 6: use of long stem trees, bollards and barricades
Source: Author’s field work

SECONDARY SCHOOLS	Poor	Good	Excellent
Emma Willard School, Newyork, USA.			?

Federal Government College, Kabba, Kogi State.	?		
Federal Girls Government college, Batori, Kastina State	?		
Command Secondary School, Kaduna State.			?
Sabon Gari Modern Secondary School, Funtua Kastina state.	?		
Zee Alpha International School, Funtua Kastina State.		?	
Nigerian Tulip International School, Kaduna State.		?	

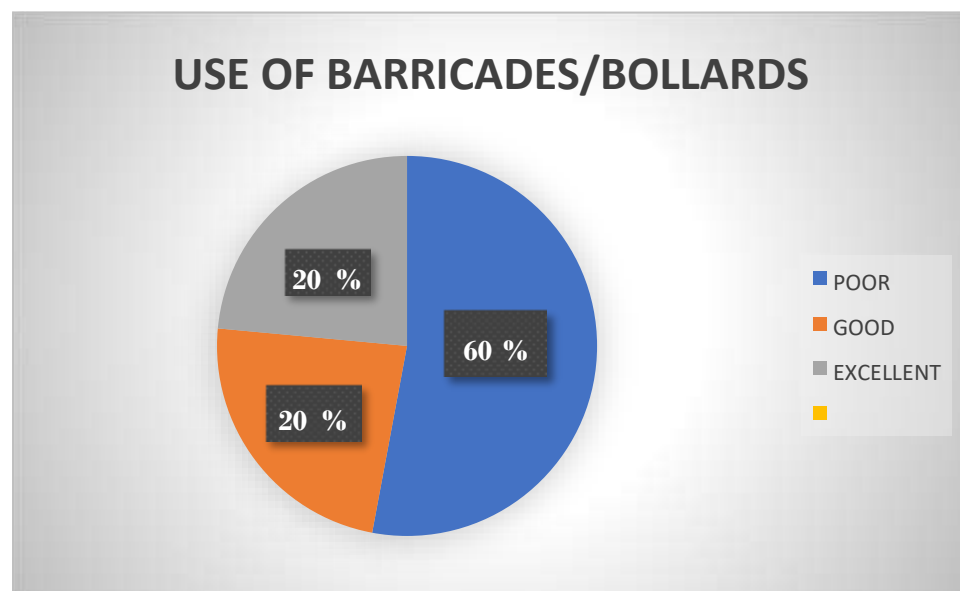


Fig 5: Percentage Distribution on use of barricades / Bollards
 Source: Author’s field work

PRESENCE OF WATCH TOWERS.

The percentage of schools employing the use of watch tower is very poor. The chart shows the percentage of schools employing the use of watch towers.

Table 7: Presence of watch towers.

Source: Author’s field work

SECONDARY SCHOOLS	YES	NO
Emma Willard School, Newyork, USA.	?	
Federal Government College, Kabba, Kogi State.		?
Federal Girls Government college, Batori, Kastina State		?
Command Secondary School, Kaduna State.	?	
Sabon Gari Modern Secondary School, Funtua Kastina state.		?
Zee Alpha International School, Funtua Kastina State.		?
Nigerian Tulip International School, Kaduna State.		?

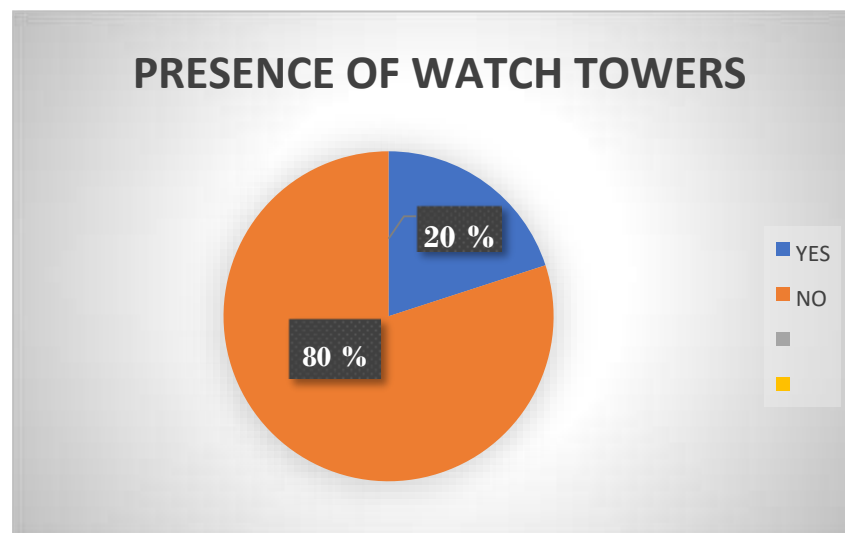


Fig 6: Percentage Distribution on use of Watch Towards.

Source: Author’s field work

GATES AND CHECKPOINTS

This charts shows how the various checkpoints and gates in the school are ranked in terms of security of the various schools.

Table 9: Gates and Checkpoints

Source: Author’s field work

SECONDARY SCHOOLS	Poor	Good	Excellent
Emma Willard School, Newyork, USA.			?
Federal Government College, Kabba, Kogi State.	?		
Federal Girls Government college, Batori, Kastina State	?		
Command Secondary School, Kaduna State.		?	
Sabon Gari Modern Secondary School, Funtua Kastina state.	?		
Zee Alpha International School, Funtua Kastina State.		?	
Nigerian Tulip International School, Kaduna State.		?	

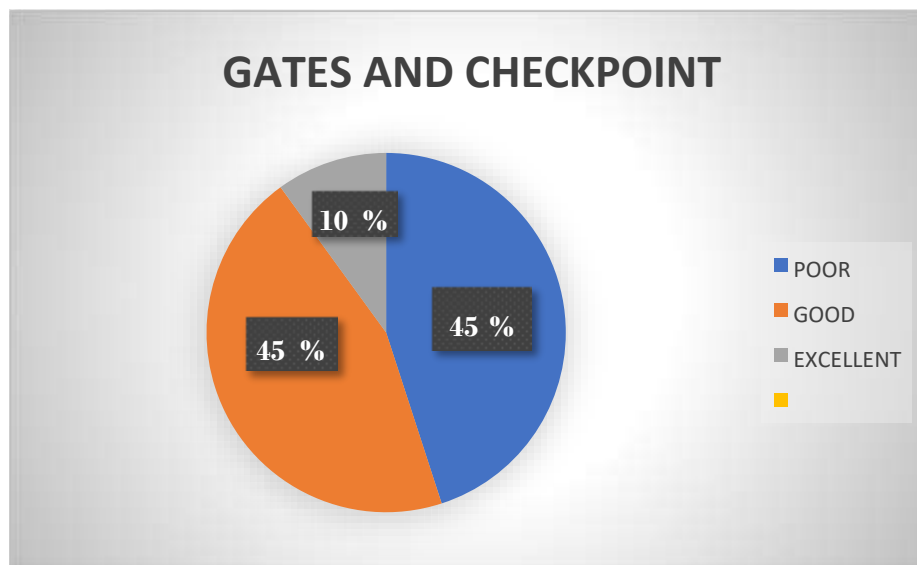


Fig 7: Percentage Distribution on Residential Zoning

Source: Author’s field work

Summary of Analysis and Findings

From the evaluation and analysis carried out it is seen that most of the schools especially northern public schools in Nigeria lacks the necessarily security features to protect its occupants, and most of the school are not designed with security of the place in view thereby causing the school to be lacking in proper security managements of its environments.

CONCLUSION AND RECOMMENDATION

The study showed that most of the schools are plagued with security problem, as result of negligence in considering various vital factors of security that needs to be put in place to facilitate a well functional and secured public schooling environment.

Therefore this research recommends market designers and planner to consider without negligence various factors that facilitates proper and vital security managements in public schools in Nigeria.

Like proper defining of public school boundaries, siting the school in locations that are close to the main city, defined entry points, use of bollards, use of landscaping elements and also security checkpoints should be adopted to help fast track security in the schools

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THE IMPACT OF INTERACTIVE SPACES ON LEARNING: A MINI REVIEW

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Abstract

The built spaces are essential for facilitating learning, and encouraging learners to reach their goal. However, some spaces outside the designated classrooms serve as extensions for learning to continue which are often ignored. This mini review assessed the evidence on the impact such spaces may have on learning for students. The review focused on the existing research on interactive spaces in schools, and highlighted their importance, design, and as support tools to promote learning process.

Keywords interactive spaces, learning, outdoor spaces.

Introduction

A vital answer to education demands in the twenty-first century has necessitated Student-oriented teaching and learning environments (Keppell & Riddle, 2013; Scholl & Gulwadi, 2015). Meanwhile, the immediate surrounding has consistently been subjected to transformation and the notion which was once held that, our environment is "that which surrounds us" can no longer hold because, many a factor has pull down the immediate walls that defines physical boundaries with the internet taking the lead (Sergio & Juan, 2008). As a result, there is an emergence of a new environment thriving on what humans can build, create or innovate making possible a dual existence in another realm called "the internet".

Meanwhile, Herczeg et al., (2021) asserted that learning should be structured in such a way that learners can discover and learn modicums of knowledge on their own especially in this era of sophisticated digital and virtual environments while the physical world serves as platform for ground work and evaluation thereby, successfully bridging the physical and virtual learning platforms. This virtual learning platform is perceived as a means of easing the apprehension of arbitrated events by technology, farther from using audio-visual aid, social

networks, among others; which is leading to the imminent change of the traditional education (Morales-Salas & Montes-Ponce, 2019).

Interactive spaces

Interactive space are provisions made for humans to interact with a computer in a physical space through digital input/output devices such as cameras, microphones, video screens, and speakers, merging digital technologies & virtual spaces with tangible and physical spatial experiences (Pinhanez, 1999; Carlos, 2009). These are characterised by responsiveness, space, tools (computer system), and time-saving factors in relation to physical world time (Boychenko, 2017; Pinhanez, 1999). There are provisions made in the built environment for interactive applications, aiding entertainment ranging from simply providing pleasure to social commitment to educational benefits alongside the possibility of integrating communal, commercial, institutional, and residential needs directed at attracting the audience (Boychenko, 2017). The unearthing of spaces which are interactive in nature is enclosed within the wider themes of computational thinking and creativity, learning by design, and technology awareness (Mandanici et al., 2021).

Moreover, the concept of interactive spaces lies beyond learning through virtual spaces but refers to spaces which aid learning without the designated classroom walls. Sıramkaya and Aydın, (2014) rightly affirmed to the aforementioned while asserting that, “education environments are social environments where educational communication and interaction take place, students interact and education activities occur. This environment with psychological, social and physical dimensions should be arranged accordingly for teaching-learning activities.” Examples of these spaces are circulation areas/lobbies, courtyards which can serve any of the following functions: waiting, chatting, studying, Debating and eating.

Informal Learning Spaces

Extensive investment has been made in knowledge-based structures across the globe. However, there is a continual paradigm shift from learning in built space, to an emphatic move towards teaching and learning in built informal learning environments by employing the following tools, online, flexible, or mobile learning. Primarily, the development of formal teaching spaces and informal learning environments is driven by ideologies agreed to be foundational to a student- centric and meaningful involvement (Finkelstein et al., 2016). Harrop and Turpin (2013) defines informal learning spaces as: “Informal learning spaces are defined as non-discipline specific spaces frequented by both staff and students for self-directed learning activities and can be within and outside library spaces.”

The learning environment comprises of several informal spaces such as circulation lobbies, gardens, courtyards which serves as connectors and means for interaction between formal and informal spaces. Craig and Scott, (2017) pointed out from the research works of McAuley et

al., (2010) that, “the recontextualizing of campus learning environments includes a transition to more unstructured and informal settings. This built-informality assumes that both the educator and learner are able to modify and adopt teaching and learning behaviours appropriate to these spatial modes.”

Solvberg and Rismark (2012), emphasised the possibility of merging routine teaching that is, student-oriented, which allows mobile technology, personalized, learner-centred, and concerted with learning environments that fast-track the possibilities of where, how and when learning occurs. While, Thomas (2010) opines that, the bulk of learning takes place in spaces not projected as learning spaces. All these and more does informal learning environments provides when all the requisite resources meet (Craig & Scott, 2017).

Factors influencing Interactive spaces

The advanced interactive modalities and devices for such environments need to be both motivating and intuitive for users (Pons & Jaen, 2020). Harrop and Turpin (2013), constructed an unranked typology consisting of nine attributes for the purpose of outlining the choice process activities engaged in as it concerns informal learning space design. These are: destination, identity, conversations, community, retreat, timely, human factors, resources and refreshment.

- Destination – Where learners go to study
- Identity – The ethos of the space and how it should be used
- Conversations – Collaboration and interpersonal communication
- Community – Social interactions, support and sense of common purpose
- Retreat – Privacy & quiet study
- Timely – Just in-time and on demand access to spaces and their resources
- Human factors – Ergonomics of work spaces & physical attributes
- Resources – Access to technology
- Refreshment – Access to food & drink

Furthermore, Jetter, et al., (2014), talks about “blended interaction”, a new conceptual framework that helps to explain when users perceive user interfaces (such as multi-touch walls, tabletops, and tablets) as “natural” or not while mentioning that individual and social interaction, workflow, and physical environment are design framework consideration for these interactive spaces.

Impacts of Interactive spaces on learning

Vercellotti, (2018) stated that research on interactive learning space classrooms reports that instructors and students affirms that the integration of technology in the learning process leads to greater effectiveness and efficiency from the students and the teachers.

Knowledge application: interactive spaces beyond physical contact prompts situations where student need to apply knowledge, experiences and new components which ultimately necessitate processes of analysis, reflection, and understanding. Furthermore, it becomes more significant where distance is a major consideration and this serves as a major tool as lack of physical presence is not a threat to the learning procedure (Morales-Salas & Montes-Ponce, 2019). The virtual platforms serve as a rewarding strategy in education, in collaborative effort with technology, which avail students the autonomy, in the sense of meaningful learning, and tends to elicit maximum attention during virtual communication with their teacher, triggering stimuli and responses.

Flexibility in the learning curve: the platforms are workable to the features and prerequisites of the user since a wide range of roles, teachers, tutors, administrators and students are engaged in the learning procedures, thus enabling communication, contribution and interaction between student, teacher and tutor using flexible teaching strategies as applicable to differing fields (Valencia et al., 2013). It uplifts great interactivity and fluid communication which help facilitates concerted effort, where partakers interact in multidirectional and acquire knowledge from others involved.

Socialisation: socialization is a term referring to the holistic developmental process of becoming a member of the society he was born and lived in. this is influenced by the following factors; family, immediate surrounding, peers, school and teachers, society and mass communication tools which ultimately results in the personality development of the individual. Educational structures serve multidimensional purposes and, social spaces within these structures enables the fulfilment of students' needs such as inspiration for creativity and idea generation. This might sound incongruent with education and administrative goals but it increases the quality of the education in institutions of learning (Siramkaya & Aydın, 2014).

Interactive and responsive learning: Interactive spaces for education are evolving as a tool for promoting natural ways of learning by means of play and exploration in physical spaces. Robots is a renowned research topic in the framework of educational tools due to their attractiveness for children. motivating and promising scenarios for collaborative or remote learning activities leading to, improved learning, metacognitive and self-regulation skills development and also provides platforms for students to be taught individually and learn at their own pace (Pons & Jaen, 2020; Greene et al., 2011; Acevedo 2005).

Information pollution: information pollution as stated by Nielsen (2003), refers to the provision of misleading, irrelevant, unwanted and low-quality information. Carlos, (2009) observed that little considerations might be given to filtering of information as a result of emergent need of information and much interactivity provided by internet protocols and administrations. This suggests that, the student might fall prey to information pollution suggestive of an overloading with ambient information.

Hacks: A subtler privacy problem for interactive systems was also pointed by Cuff et al., (2008): self-surveillance. Carefully consideration should be given to the use of self-surveillance techniques. As pointed by Cuff, self-surveillance and the sharing of data that comes with it, positions significant technical and moral challenges such as computer security breach mostly third-party hacks alongside uncontrolled access to personal data.

Restriction on Information: The collection of data in human related environments often conflicts with privacy concerns. Specifically, in this section we are concerned with information privacy. That is, “an individual’s claim to control how personal data is collected, distributed, and processed” (Cuff et al., 2008). Different country specific regulatory frameworks determine the relationship between what private property is and what is accessible to the public. This means obvious limitations on video and audio in an urban sensing context. These and similar questions should be poised when attempting to integrate an interactive system into an inhabited place (Carlos, 2009). This calls for great concern, particularly on the sides of institutions adopting or adapting full virtual learning environment as access to learning or teaching materials might be restraining and limiting the amount of information garnered through teaching or learning.

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RE-INVENTING THE CONCEPT OF FLEXIBLE SPACES FOR SHOPPING MALLS IN KUGBO, ABUJA, NIGERIA

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ABSTRACT

The process of reinventing spaces within the mall would deliver a product, be it an office space or social space that would provide tenants with spaces which are valuable, needed and useful. This shows an appreciation of prevailing trends and the need for shopping mall spaces to be transformed to alternative uses that can breathe life into it. As a result of changes in human behaviour and technological advancement, the need for flexible space creation is on the increase. This change is most evident in commercial facilities where rigid and solid wall construction is the norm and poses a limitation for expansion as a result of the growth of commercial establishments. The aim of this paper is to make spaces within the mall flexible so that the spaces can be transformed to serve various purposes as the need arise. The methodology used in this research is the descriptive research method. This study involved literature review and case study of selected shopping malls in Abuja, Nigeria. Content analysis was utilized in analysing and reporting data collected from the literature review and case studies. The result from this show that some of the shopping malls visited are not flexible enough to be used for other purposes. It therefore concludes that the study will promote flexibility of mall spaces for multiple uses thereby making it easily marketable. It therefore recommends that Architects and designers should improve on their design to encourage flexibility of spaces for multiple use.

Keywords: Commercial, Design, Flexible, Shopping Mall, Trends, Re-invent

INTRODUCTION

The concept of shopping centre was conceived to meet the basic need of the suburban shopper in one place, that is, conveniently accessible, amply stocked shopping area with plentiful and free parking available. Shopping malls are basically known to be indoor shopping centers,

though some have outdoor areas with the shops having their own indoor space. (Ihfasuziella, *et al.*, 2018). Shopping mall is also described as an urban shopping area limited to pedestrians, with stores and businesses facing a system of enclosed walkways exclusively constructed for pedestrians (American Heritage Dictionary, 2011) Shopping as one of the driving pillars of any nation's economic growth has evolved over time in the manner in which it is conducted and Nigeria's economy has not been excluded from some of the benefits of the emergence of new shopping centres.

With the more dynamic styled shopping malls which are being developed around the world, it can be said that the rigid design adopted for shopping malls in the country needs to be re-evaluated and reinvented to meet up with the new trends in shopping mall design which is a result of changes in human behaviour and technological advancement. Therefore, the need for flexible space creation is on the increase.

Kugbo, Abuja was considered for the study area because of the increase in the region's population as well as the fact that there is no 21st century shopping mall in the said study area. This study has found a gap that exists in the design and construction of malls to achieve flexibility to meet evolving needs of all users. In order to find a standard that can adapt to time, function and still embody aesthetic that encourages the ultimate shopper experience, this study had to identify answers to the following questions:

- How can flexibility be achieved in a shopping mall
- How can spaces be designed to adapt to evolving needs

LITERATURE REVIEW

HISTORY AND DEVELOPMENT OF SHOPPING MALLS

The Agora in ancient Greece was an open "place of assembly" which the Romans improved on and came up with the Forum a more defined open area. It was the Romans that developed the magnificent Trajan's Market, which was the first defined shop collection in a shared-use building. This is how shopping was transferred into the interior of a building. Then, the Medieval Market Hall, the Eastern Bazaar, the Exchange, the Market Building and the Fair were all developed as shopping environments before the 19th century. Afterward, the Arcade was born with the influence of Roman and Greek arcaded streets, the Eastern Bazaar and the Exchange from the 16th century.

A catalyst in the evolution of shopping malls was the development of transportation. The increasing car ownership made it easy to reach far settlements for the urbanites. The supermarkets and later the chain stores, the strip malls and lastly the suburban malls were all rapidly developed by the opportunities of easy access (Ergun,2010). By the start of urbanization, Trade had started in ancient civilizations in Asia, Africa and Far East, and European cities began the introduction of many different formats of shopping places in medieval times to the 19th century.

After all, the pioneer of the contemporary shopping malls today was an American invention by an European architect who got inspired by the arcades concept. Eventually, the shopping place became a fully enclosed and environmentally controlled space with the suburban mall, which was initiated as an urban centre but remained detached in application in many examples before its developed contemporary followers (Ergun,2010).

CONCEPT OF FLEXIBLE SPACE CONSTRUCTION

The basic concept of flexible design was defined by researchers in housing support systems, the open building movement, and adaptive architecture as the adaptability of buildings' features to the needs of its users (Sadafi, *et al.*, 2014)

There are three major type of change which are: function, capacity and flow and the interactions among these systems provide a framework in which to analyse the capacity of the facility to meet the performance requirements with respect to the value-added activities performed within or through the facility. A function refers to intended uses and activities or components to achieve a specific objective (Omrania,2018). Functions can be performed by the facility itself or with respect to human activities. Capacity is defined as the ability of the facility to meet certain performance requirements, in either loads/conditions or volume. Flows are defined as the movements within and round a building relating to surroundings environment and its usage population. The systems within a building can interact through various mechanisms, and the nature of these interactions and the systems themselves influence the flexibility of the building to respond to the different type of changes. The system interactions can be grouped into three categories: physical, functional and spatial (Arto & Pekka, 2008).

Flexibility can be affected most effectively by controlling design and construction. When the building is finished, the possibility to have an impact on its flexibility is much more constrained since it is implemented through frame solutions, floor heights, building services ductwork, etc. which are expensive to change afterward

Flexibility in the Design of Buildings

Flexibility in the design of buildings is a concept where buildings can adapt to current and future needs ranging from economic concerns, to sustainability and the possibility of change and also allows the division of the space according to the needs of the user. Flexibility in buildings is designing for changing requirements and arrangements (Schneider & Till 2005). In order for a building design to be flexible, the following must be considered: Adaptability, Mobility and Transformability.

a. Adaptability

Every building should be designed to have the ability to be changed to fit current circumstances. In architecture, change is inevitable therefore having a building with elements that allow for change to happen is the major concern so that while a building has a distinct

purpose, it can operate as multipurpose (Acharya, 2013). A space capable of meeting different requirements by simply changing of furniture, without any further modification can be seen as an adaptable space. The open building approach is considered the most formalized approach for adaptable architecture. The flexibility of the building design allows for users and occupants to choose their own pattern and have the freedom to create their own desired space.

b. Mobility

Mobility of buildings represent the physical movement of a building that changes places within a time range. Relocation according to specific needs is the basic idea behind mobile structures all over the world. This was practiced by the nomadic communities who take their dwellings with them (Acharya, 2013). Mobile structures are usually demountable buildings that promote movement and flexibility of space, widely used in a number of fields such as in commerce, industry, military, education, health care, housing, where they fulfil their individual roles (Andrei, 2002). Flexibility in the design of buildings, using mobile design is related with the possibility of designing temporary accommodations in critical and emergency situations such as in war and conflict areas or in relation to natural disasters. Mobility of buildings gives rise to efficient use of materials and resources making it important for flexibility.

c. Transformability

Transformability in buildings enables a building to change its shape, space and appearance by the physical modification to its basic components, outer shell or internal surfaces. Transformable buildings also have the ability to interact with external environment removing the barrier between inside and outside and respond to climatic situations thereby contributing to sustainability. Components can be opened or closed depending on the purpose and desire of the user. This transformation enables a building to open, close, contract or expand, making it a critical aspect of flexibility in buildings (Kronenburg, 2007). The transformation operation can be done manually by disassembling and assembling of different building components, or mechanically using a button to control the movement of parts and change of form of a building (Acharya, 2013).

Flexibility of Design Features

The flexibility of the design components that form a structure is the basic factor that determines how flexible a structure can be. These design features can easily be identified and assembled to enable one realize, create or modify the change requirement. The breaking down of these components that can be disassembled non-destructively from the product as a unit is referred to as modules and each module can be attached, detached, modified, relocated, and replaced easily for upgrading, repair, recycling, or reuse. Demountable structures include modular design which serves as basis for adaptable, mobile and transformable design. The

function-based modular design offers flexibility and allows maximum space utilization and functions to satisfy the needs of different groups of users.

Application of Flexible Walling in Shopping Malls

The application of flexible walling in shopping malls is achieved by three (3) methods namely:

- a. Division of Commercial Spaces:** 21st century shopping malls across Europe, North America and Asia have adopted a concept and ideology where large open spaces are provided for commercial functions and provided to retailers and entrepreneurs as they request. Plate I, shows foldable glass partition used in the division of commercial spaces. This eliminates the use of solid walls within the building structure and allows the flexibility of space creation which could be aesthetically pleasing depending on its execution within the building.



Plate I : Foldable Glass Partition

Source: www.indiamart.com (2021)

b. Billing of Rentable Spaces per Meters-Square

The heterogeneous division of interior spaces in 21st century shopping centers resulted in the leasing of rental spaces on a square meter basis. Hence the retail spaces can take several shapes and still be billable to the owners of shopping facilities without difficulty. This is achieved by calculating the total area provided to the retailer and relating it to the cost of each square meter of space. Plate II, shows the use of foldable wood partition in the demarcation of spaces which means that spaces can be reused without the necessity of breaking down walls but demounting the partition neatly and reusing them when the need arises.



Plate II: Foldable Wood Partition

Source: www.indiamart.com (2021)

c. Flexible Space Modification

Saari and Heikkila (2008) stated that space flexibility management is governed by three principles:

i. Service Flexibility

Service flexibility refers to the ability of space to adapt to recurrent quick changes in loading. Changes in loading are the result of, for instance, changes in the number of people in a space, changes in the activity conducted in a space, etc. Service flexibility affects strongly the productivity of the activity in the space. Thus, it is especially important for users. It can be improved by, for instance, movable partitions and adjustable ventilation. SOURCE?

ii. Modifiability

Modifiability of a building refers to its capacity to meet the changing needs of its users. Needs of a space changes as the users change or the business and activities carried out in that space changes. This type of flexibility is especially important feature for the property owner. It can

be improved by "loose" dimensioning of building services and system walls. Plate III shows modification of a spaces using laser cut partition which further beautifies the space.



Plate III: Foldable Laser cut Partition

Source: www.lasercutscreens.co.uk (2021)

iii. Long Term Adaptability

Long-term adaptability of space refers to its adaptability to unknown activities and uses. Adaptability is an important feature for the property owner when buying or selling a building. It is also a major factor especially from the viewpoint of urban structure and the environment. The adaptability of such structures ensures that flexible walls will continue to be put to use for this structure until the point when the owner decides to eliminate the flexibility feature of the structure hence the introduction of solid walls.



Plate IV: Foldable Wood Partition

Source: www.indiamart.com (2021)

RESEARCH METHODOLOGY

Observation method of research was employed and it involves directly observing and studying a population sample. The survey was conducted on 5 shopping malls in Abuja which includes, Jabi lakefront Mall (Jabi), Grand Tower Mall (Apo), Capital Hub (Mabushi), Ceddi Plaza (Central Area) and Silver Bird Gallery (Central Area) and attention was paid on the types of flexible partition materials and design approach used in these malls. The observation schedule was designed to reveal types of mall structures and spaces available, availability of flexible design elements, types of flexible design features and approach used. The 5 malls were selected purposefully based on their status as regional shopping centres. Data analysis took the form of simple descriptive statistics and content analysis represented in the form of percentages. Data collated was computed manually and tabulated in Microsoft Excel Spread Sheet Program.

RESULTS AND DISCUSSION

Availability of Outdoor and Indoor Recreational Spaces

Table 1 shows results obtained from the observation schedule of malls with outdoor recreational spaces and those without it. It was observed that all the malls visited had a single building for the mall, while only 60% made provisions for outdoor activities. Malls without spaces provided for outdoor activities are limited in activities that could be carried out in such malls and this is a minus economically. Therefore, malls should provide more outdoor relaxation and interaction spaces.

Table 1: Availability of Indoor and Outdoor Spaces			
S/No	Mall	Indoor	Outdoor
1	Ceddi Plaza	<input type="checkbox"/>	X
2	Silverbird Entertainment	<input type="checkbox"/>	<input type="checkbox"/>
3	Capital Hub	<input type="checkbox"/>	<input type="checkbox"/>
4	Jabi Lakefront Mall	<input type="checkbox"/>	<input type="checkbox"/>
5	Grand Tower Mall	<input type="checkbox"/>	X
	Total Available	5	3
	Percentage	100%	60%

Source: Author's Fieldwork (2022)

4.2 Assessment of Design features for flexibility

From Table 2 showing the 5 malls visited and their locations, it was observed that all of them utilized frame structure construction approach in the construction of the mall. The walls are constructed externally mainly with concrete, blocks and glass. The interior wall demarcation was constructed mainly with gypsum board, glass and wood.

Table 2: Mall and Location

S/No	Name Of Mall	Location
1	Ceddi Plaza	CBD
2	Silverbird Entertainment	CBD
3	Capital Hub	Mabushi
4	Jabi Lakefront Mall	Jabi
5	Grand Tower Mall	Apo

Source: Author's Fieldwork (2022)

Availability of Flexible Design Elements

Table 3 shows the presence of flexible design elements in the malls visited. 80% of the malls visited have flexible partitions available but these partitions would be partially damaged if they were to be removed because of the method of installation. The remaining 20% of the malls don't have the presence of flexible partition as the partitions are mainly solid blocks.

Table 3: Availability of Flexible Design Elements

S/No	Name Of Mall	Available	Unavailable
1	Ceddi Plaza	✓	X
2	Silverbird Entertainment	✓	X
3	Capital Hub	X	✓
4	Jabi Lakefront Mall	✓	X
5	Grand Tower Mall	✓	X
Total Available		4	1

Percentage

80%

20%

Source: Author's Fieldwork (2022)

Design Approach Adopted

Table 4 shows the design approach adopted in the malls visited. All the malls visited adopted the adaptable design approach in the design of the mall while only 20% of the interior of the malls can be transformed to an extent.

Table 4: Type Of Design Approach Adopted

s/no	Name of Mall	Adaptability	Mobility	Transformability
1	Ceddi Plaza	✓	X	X
2	Silverbird Entertainment	✓	X	X
3	Capital Hub	✓	X	X
4	Jabi Lakefront Mall	✓	X	✓
5	Grand Tower Mall	✓	X	X
Total Available		5	0	1
Percentage		100%	0%	20%

Source: Author's Fieldwork (2022)

Flexible Materials Used

Table 5 shows the types of flexible materials used in the malls visited. 100% of the malls visited used glass as their major partitioning material while 80% used gypsum board in addition to glass. 40% of the malls used wood in addition to glass and gypsum board as their partitioning material. None of the malls used polystyrene, metal and strawboard as their partitioning material.

Table 5: Types Of Flexible Materials Used

S/No	Name Of Mall	Glass	Wood	Polystyrene	Gypsum Board	Metal	Strawboard
1	Ceddi Plaza	✓	X	X	✓	X	X
2	Silverbird Entertainment	✓	✓	X	✓	X	X
3	Capital Hub	✓	X	X	X	X	X
4	Jabi Lakefront Mall	✓	✓	X	✓	X	X
5	Grand Tower Mall	✓	X	X	✓	X	X
Total Available		5	2	0	5	0	0
Percentage		100%	40%	0%	80%	0%	0%

Design Approach Adopted

Table 6 shows the presence of reusable flexible partition materials in the malls visited. All the malls visited have the presence of both reusable and non-reusable partition materials. The reusable partition material is Glass while the non-reusable material is gypsum board and wood.

Table 6: Presence Of Reuseable Flexible Partition Materials

S/No	Name Of Mall	Reuseable	Non-Reuseable
1	Ceddi Plaza	✓	✓
2	Silverbird Entertainment	✓	✓
3	Capital Hub	✓	✓
4	Jabi Lakefront Mall	✓	✓
5	Grand Tower Mall	✓	✓
Total Available		5	0
Percentage		100%	100%

Source: Author's Fieldwork (2022)

CONCLUSION AND RECOMMENDATION**Conclusion**

The study has clearly shown that the interior spaces of malls should be flexible enough to accommodate the needs of different users as the need arises. In Abuja, the study shows that

malls should not restrict flexible materials used for interior demarcation to glass, wood and gypsum board alone, other materials can be adopted for interior demarcation purposes. The study also revealed that glass is the only reusable material present in all the malls visited. All other demarcation materials used in the malls are non-reusable and this is an economic waste that can be avoided using the right approach. 60% of the malls visited have both indoor and outdoor recreation spaces provided, 80% have the presence of flexible design elements and only 20% of the mall interiors can be transformed. Related literatures studied were able to proffer solutions to the flexibility of design features.

Recommendation

In the design of malls, designers need to recognise the fact that malls are public places occupied by people with varying spatial needs, therefore it is important to use design features to achieve an effective flexible design. Malls attract an unpredictable population so space flexibility should be considered at all times and adopting all the flexible design approach so that as the users' needs change, the building also changes to meet their needs.

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EFFECT OF FINANCIAL FRAUD ON NATIONAL DEVELOPMENT: NIGERIA PROJECT

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Abstract

The financial scandals which have appeared in recent times have placed fraud at the heart of economic and financial issues. Fraud by executives has disastrous consequences as it results in huge losses for investors and creditors, and especially for the company itself. Most of these frauds were often in the form of accounting and financial manipulation, and they have evolved to change forms. Fraud is a hidden crime and businesses cannot assume that all frauds have been detected. It is extremely unlikely that the detected fraud within an organization will represent the total financial impact of fraud on that organization, or the total loss from fraud they have experienced. It is a fact that some individuals will look to make gains where there is opportunity, and organizations need robust processes in place to prevent, detect and respond to fraud. Fraud impacts on people, industries, public bodies, services, economy, and the

environment and all of these can be irreversibly harmed. The research therefore recommends that Auditors and Accountants in organizations and financial institutions should be trained on how to carry out forensic investigation since the fraudsters are now sophisticated in their operation. Also, internal control systems should be strengthened to block opportunities that attract fraud perpetrators and oversight function of the National Assembly be strengthened to make public office holders accountable.

Keywords: Fraud, deterrence and prevention, Return on Assets, Financial institutions, National Development

Introduction

Fraud is a serious, underestimated and unchecked problem. Every public body is an active target for fraudsters. Unfortunately, public bodies do not always consider fraud when conducting their activities. Even when fraud is considered, public bodies can find it difficult to define, measure and articulate the problem without guidance. In addition, the focus can be too centered on financial loss (Trumpeter, Carpenter, Jones, and Riley, 2014). In reality, the impact of fraud goes well beyond this. Fraud impacts on people, industries, public bodies, services and the environment and all of these can be irreversibly harmed. Understanding the total impact of fraud and not just the financial loss allows public bodies to make better informed decisions. Serious impacts can arise from any type of fraud, whether it is perpetrated by opportunistic individuals or serious and organized crime groups. However, serious and organized crime can often amplify the scale and impacts of fraud, and professional facilitators make their activities more difficult to detect and uproot. Fraud can be committed by individuals within an organization, irrespective of their positions or status (Trumpeter, Carpenter, Jones, and Riley, 2013). Finally, fraud can be minimized if the factors encouraging fraud can also be minimized (Mohamed, 2020).

Financial fraud committed by managers and individuals have multiplied in recent years; however, they constitute a highly delicate phenomenon in the world of finance. Each year, fraud causes significant losses to the shareholders and creditors of the targeted companies, which hinders the proper functioning of the capital markets. Fraud is generally committed by executives who are very often involved and are subject to legal action by financial market regulators (Del Giudice, Carayannis 2018). Fraud can undermine national defense and security. It can also damage international standing and affect the ability of nations to get international support. The proceeds of fraud can also fund organized crime groups and terrorism, potentially leading to further crime and terrorist attacks. The revelation of a fraud tarnishes the reputation of several participants in the financial markets, thereby affecting investor confidence in the market and penalizing all businesses. In fact, any fraud announcement leads investors to question the competence and vigilance of financial market

regulators, and even auditors, financial analysts, boards of directors, and credit rating agencies, all these actors have their share of responsibility (Debellis, and De Massis.2020). In addition to the financial losses suffered by investors, other losses are added, such as the socio-economic costs related to job losses, and can even go as far as the disappearance of the whole entity.

Fraud against public bodies is not a victimless crime. Fraud can be a traumatic experience that often causes real and irreversible impacts for victims, their families, cares, communities and nations (Managing Fraud for Public Bodies, 2019). Those who rely on government services, such as the elderly, the vulnerable, the sick and the disadvantaged, are often the ones most harmed directly or indirectly by fraud. Fraud can have a devastating and compounding effect on these victims; amplifying the disadvantage, vulnerability and inequality they suffer. Fraud can also cause lasting mental and physical trauma for victims, and in some cases, take people's lives. Fraud against public bodies can compromise national defense and security, putting service men and women, and citizens at risk. It can also damage international standing and affect the ability of nations to get international support. Fraud against government programs can be used to fund organized crime groups and terrorism, potentially leading to further crime and terrorist attacks. Based on international estimates, public bodies generally lose between 0.5% and 5% of their spending to fraud and related loss. The majority of fraud is hidden and undetected and can be difficult to categorize. Calculating the financial impact can assist agencies understand their potential losses and how to mitigate them.

When fraud against a public body occurs, it diverts finite resources and compromises the government's ability to deliver services and achieve intended outcomes. This can happen in the following ways:

- **Services not delivered:** finite money and resources are diverted away from the intended target, or services are not delivered to the standard required.
- **Program objectives not met:** the vision, objectives, and goal of the policy or program are compromised.
- **Program/service shut down:** in some circumstances the entire program is shut down, which can negatively impact those relying on that service.
- **Customer/client experience:** the customer experience is compromised.
- **Opportunity cost:** fraud can result in lost opportunities to a program or service.

Programs or services lose the opportunity to improve if shut down as a result of fraud, or if they are constrained by fraud financial losses and the business costs of responding to fraud thereby causing adverse effect on the development of an organization or country. The occurrence of fraud can result in costs and capacity drain in a wide range of government systems and services. Finite resources are diverted to deal with the fraud responses and outcomes. This reduces governments' abilities to deal with other issues (International Public Sector Fraud Forum 2019).

Financial fraud is viewed to have not only negative but damaging consequences on any nation's economy, security and social wellbeing of the general citizen. It is very necessary to note that as global and modern financial system encourages, facilitates both local and international commerce, antithetically, financial criminals are also evident through technology which enables transfer millions of dollars around the world instantly through available information communication infrastructures such as internet, electronic money transfer (wire transfer) and the rest which is referred to as "yahoo yahoo" in Nigeria ((Mohamed, 2020). There are numerous financial frauds like computer crime, identity theft, "yahoo yahoo", financial statement fraud, cash theft and money laundry and so on. A recent study has indicated that corporate corruption increases the profitability of privately held firms (Ferris et al. 2021). Moreover, several studies have provided empirical support for a positive bidirectional relation between economic growth and corruption in developing economies and a negative unidirectional relation between them in developed countries (Mohamed, 2020; Qureshi et al. 2021). Consequently, fraud can damage and sustain economic development. Fraud can affect any entity. However, when it is handled poorly, fraud can result in an erosion of trust in government and industries, and lead to a loss of international and economic reputation. This is particularly true when fraud is facilitated by corruption.

The economies in the developing countries like Nigeria were particularly vulnerable because of the dependence of many of them on western economic and financial systems. In Nigeria for example, the drop in the price of crude oil and its reduced production due to the conflict in the Niger Delta, had a telling effect on the country's revenues and budget. The demand for goods and services was generally depressed leading to factory closures and lay-offs. The financial crisis in Nigeria is more complex to decipher. It is however, well established now that the Nigeria banking system is both corrupt and inefficient (Jibo, 2008). The highly commendable work of the Central Bank of Nigeria (CBN) Governor Sanusi Lamido Sanusi has exposed the stench in the country's banking industry. Huge unsecured loans were given by the banks; their CEOs allegedly manipulated bank books and helped themselves to customer funds. Above all, bank shares were manipulated to deceive. Things were presented from a public relation (PR) perspective and many were led to purchase bank shares which were almost worthless. While this alleged scam was on, the banks presented a polished image by maintaining an elaborate scheme of deceit. Many Nigerians were ruined by a number of banks who loaned them money to purchase their worthless shares. Bank CEOs in a number of instances criminally used their customers' accounts to borrow money from banks under their charge (Mohammed, 2020).

The most prominent of frauds in banks and agencies of government detected in Nigeria in the recent times includes: Fraudulent transfer and withdrawals; Use of unauthorized overdraft;; Posting of fictitious credits; Presentation of forged cheques; Conversion of banks money into personal use; Granting of unauthorized loans; Abuse of medical scheme; Insider abuse; Illegal conversion of pension funds in various agencies and ministries; Ghost

workers fraud resulting into millions of naira paid into private pockets; Abuse of political office leading to contract over billings and over invoicing. In the broader financial institution context, the cause factors, consequences, deterrence as well as the ways for preventing corporate frauds are investigated (Bonsu, Dui, Muyun, Asare, & Amankwaa, 2018). They found that fraud is damaging for corporate financial performance and advocated the use of fool proof deterrence and prevention methods for curbing its occurrence. Hence, globally, employee fraud in the financial institutions is one of the most critical causes in the major banking crises. According to; Bonsu, Dui & Muyun (2018), fraud in financial institution is diversified, as it may range from employee fraud to consumer fraud; from corporate fraud to individual fraud; and from accounting fraud to transactional fraud.

In legal terms, there are five elements to a fraud: (i) "Scienter", or knowledge of facts, events, or circumstances by one party; (ii) Misrepresentations (including non-disclosure) of that knowledge of the party in dealings with another; (iii) Reliance on those misrepresentations by the second party; (iv) An agreement, contract, or transaction between the parties which a reasonable person would not have entered into if privy to the first party's knowledge; and (v) Harm or damage to the second party as a result. The casual factors that should be removed to deter fraud are best described as fraud triangle. The fraud triangle explains three factors that are present in every situation of fraud. (i) Motive (or pressure) – the need for committing fraud (need for money etc). (ii) Rationalization – the mindset of the fraudsters that justifies them to commit fraud; and (iii) Opportunity-the situation that enables fraud to occur (often when internal controls are weak or nonexistent). Breaking the fraud triangle is the key to fraud deterrence. Breaking the fraud triangle implies that an organization must remove one of the elements in the fraud triangle in order to reduce the likelihood of fraudulent activities. "Of the three elements, removal of opportunity is most directly affected by the system of internal controls and generally provides the most achievable route to deterrence of fraud".

Purpose of the Study

The aim of this paper therefore is to examine the effect of Financial Fraud on National Development in Nigeria.

Research Question

To what extent does financial fraud affect national development in Nigeria.?

Null Hypothesis

Financial fraud has no effect on national development in Nigeria.

Methodology

The study adopts the historical research method in an attempt to determine the effect of fraud and related crimes on the Nigerian's national development. The purpose of historical research is to obtain a better understanding of the present through the evaluation of the past and intelligent prediction of the future (Adefila, 2008). The study purely used secondary data for the analysis. The use of secondary data only is because; information relating to the study is

readily available from various publications. The analytical tool adopted by the researcher in analyzing the data collected for the study was the Regression Analysis.

Results

Regression Correlation between Financial Fraud and National Development in Nigeria

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.957E17	2	4.359E18	19.288	.022 ^a
Residual	7.372E16	4	2.191E17		
Total	6.711E17	5			

Predictors: (Constant), the gross domestic product

Dependent Variable: chances of Fraud

Adjusted $R^2 = 0.817$, t-cal = 3.898

$f(2,4) = 19.288$ t tab = 2.132

$f(\text{tab}) = 10.13$, 5% level of significance.

The result of automated data analysis (SPSS 20) reveals that Gross Domestic Product can be held responsible for 81.76% variation on fraud and related financial crime with reference to 2010 to 2019.

The F-statistics (ANOVA) indicates that the mean is statistically significant at 5% level of significance. The $F(2,4) = 19.288$ is greater than the $F(\text{tab}) = 10.13$, Therefore with respect to theoretical expectation, the coefficient Gross Domestic Product are assigned correctly. The estimated parameters are statistically significant at 5% level of significance. To test for the significance of the estimates, the student's t-test is employed. The t-cal = 3.898 is greater than t-tab = 2.132 for the parameter estimates, this means that the null hypothesis that fraud and related financial crime has no positive and significant effect on the Gross Domestic Product is rejected, while the alternate hypothesis is accepted. The implication here is that financial fraud has significant effect on the National development in Nigerian.

Discussions

The financial scandals which have appeared in recent years have placed fraud at the heart of economic and financial issues. The implication here is that financial fraud has significant effect on the National development in Nigerian.

It is in accordance with Bonsu, Dui, Muyun, Asare, & Amankwaa, (2018), They found that fraud is damaging for corporate financial performance and advocated the use of fool proof deterrence and prevention methods for curbing its occurrence. Hence, globally, employee fraud in the financial institutions is one of the most critical causes in the major banking crises.

Okoye and Gbegi, (2013) However, Nigerian government like many other governments of developing countries until recently has been very slow in putting in place strict

policy measures and legislative framework in combating the effects of economic and financial crimes. As a result, economic and financial crimes have eroded the integrity of Nigerian financial institutions since sizeable numbers of them were actively involved in money laundering and other financial crimes on the economy and socio-political development of Nigeria as a developing nation.

Conclusion

The effect of fraud and financial related crimes on the Nigerian economy are enormous when we consider the high rate of crimes and the amount involved especially on the area of advance fee fraud or 419 or Nigeria letter. Fraudulent practices and financial related crimes have portrayed Nigeria in bad light and as such foreign investors are skeptical in doing business in our country. The research therefore concludes as follows:

- (i) Fraud and related financial crime have significant effect on Gross Domestic Product thereby affecting the National Income and by extension, Nigerian Economy.
- (ii) Fraud and related financial crime have no significant effect on inflation. However, it has contributed in affecting the economy in a negative way.

Recommendations

Fraud Detection and Prevention Measures: It is recommended that Auditors and Accountants in organizations and financial institutions should be trained on how to carry out forensic investigation since the fraudsters are now sophisticated in their act. Also, internal control systems should be strengthened to block opportunities that attract fraud perpetrators. **Fight Against Corruption:** Corruption has become a way of life in Nigeria since authorities no longer frown at it because chief cronies are involved. Despite various agencies and commissions established to fight corruption and crimes in the country, the crime rate especially financial related crimes are on the increase hence the researcher suggested that government should be serious in the fight against corruption. Recently a chieftain of PDP that was jailed for corruption was released after completing his jail term, but surprise he was received by statesmen and government officials in a well celebrated reception. This type of attitude does not portray the government in good light before the international community; hence, anti-corruption agencies should improve on their strategies in fighting corruption and fraud so as to reduce the negative effect of fraud on the Nigeria economy.

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ENGINEERING AND ENVIRONMENTAL ADVANTAGES OF SLAG CEMENT CONCRETE: THE NEED FOR SLAG CEMENT IN NIGERIA

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Abstract

This study review relevant literatures concerning the engineering and Environmental advantages of Slag Cement Concrete over Portland Cement Concrete in the construction industry. Several works were reviewed on the subject matter to ascertain the appropriate mix

ratios, assess the setting time, compressive strength, flexural strength, permeability and its resistance to sulphates and chloride attacks. The review shows that concrete performs better at replacement ratios of 25 to 50%. It also reveals that Slag Cement Concrete has lower setting time than Portland cement. Concrete made with Slag Cement has considerably higher compressive and flexural strength than Portland cement concrete, permeability was observed to be less in Slag Cement than Portland cement, Slag Cement also offers better resistance to chemical attacks than Portland Cement. It was also observed that Slag Cement is more environmental friendly than Portland cement. Hence, Slag Cement should be given more consideration in the construction industry.

Introduction

A thorough literature assessment was undertaken to acquire and study the information concerning Slag Cement Concrete features. Concrete characteristics like setting time, compressive strength, flexural strength, permeability and chemical resistance ability of Slag Cement Concrete were assessed. Furthermore, replacement ratios were also reviewed to determine the most suitable replacement ratios.

Slag concrete use can be followed to the 1700's the point at which the material was joined with lime to make mortars. The original United States creation was in 1896. Until the 1950's, granulated slag was utilized in the assembling of mixed Portland concretes, or as crude feedstock to make concrete clinker. Nonetheless, in the 1950's, slag concrete opened up in different nations as a different item. The primary granulation office in the U.S. to make a different slag concrete item was Sparrows Point, Maryland, in the mid 1980's. Ongoing years have seen the inventory and acknowledgment of slag concrete develop drastically all through the U.S.

Slag concrete is a water powered concrete formed when granulated impact heater slag (GGBFS) is ground to appropriate fineness and is utilized to supplant a part of Portland concrete. It is a recuperated modern result of an iron impact heater. Liquid slag redirected from the iron impact heater is quickly chilled, creating lustrous granules that yield wanted responsive cementitious attributes when ground into concrete fineness

Finding proper application for slag offers a monetary benefit as well as a chance to discard this high weight troublesome - to - handle strong waste in accordance with the idea of steel creation and ecological best practice for economical turn of events (IISI, 2005). Concrete can be supplanted in part by 20% of EAF slag in block making without forfeiting the strength apparently. • The compressive strength of the squares (E. N. BASSEY et 2011). The compressive qualities of slag concrete commonly improved altogether as the relieving time frame expanded as long as 90 days (E. N. BASSEY et 2011).

Prior examinations (BSP, 1977; Matyas, 1978) have prompted the utilization of BF slag as bases in street development and for upkeep and surfacing of the streets. This training is broad

in Europe and India with huge scope BF creation. Report from Germany shows the appropriation of fundamental Oxygen Furnace (BOF) slags for street, track laying and development of channel (Rellermeyer, 1975). Besides BF slag has been effectively utilized in the assembling of concrete and glass (Lee, 1974). Dome slag was additionally answered to have halfway supplanted concrete in mortar blend readiness (Aderibigbe et al, 1982). As the innovation of creating steel by Electric Arc Furnace technique is itself moderately new, work nearby conceivable business utilization of EAF slag has not yet been broad. Anyway examination did so far has shown a decent guarantee for the utilization of EAF slag in the structure business. Contemplating the strength properties of EAF slag, Egoro (1986), found that utilizing coarse EAF slag total instead of stream rock in indistinguishable water/concrete cement blends a higher strength of up to 1.2-1.6 N/mm² was acquired for the slag totals. Pellingrino (2009), explored the mechanical and strength attributes of cement containing EAF slag total and found that they were acceptable. Concerning the usefulness of the solid blends from OPC and EAF slag, the aftereffects of prior examinations, (Okpala et al, 1987; Diagbonya, 1987), are appeared in Tables 2 and 3. There was an observable expansion in both the droop and compacting factor esteems. This was because of the presence of the granulated slag in OPC concrete. The expansion saw is as the consequence of the presence of genuinely high level of ferrous oxide (FeO) in the slag. This compound generally doesn't assimilate a lot of water, along these lines makes accessible more blending water than when concrete alone is utilized. The water non-spongy nature makes free blending water that licenses higher droop and compacting factor.

Slag concrete for the most part improves workability, finishability and pumpability of plastic cement. It might give a little lessening in water interest (see SCIC #5). Slag concrete will in general build season of beginning set, which is regularly an advantage in warm climate. In cooler climate, gas pedals, warmed materials or bringing down the level of slag concrete in a blend (as a part of cementitious material) can be utilized to diminish seasons of set (see SCIC #3). Early age qualities (through 7 to 14 days) of slag concrete will in general be lower while later age qualities will be higher (see SCIC #14). Creation of slag concrete makes a worth added item from a material—impact heater slag—that in any case may be bound for removal. Not exclusively does the creation of slag concrete decrease the weight on landfills, however it likewise lessens air discharges at steel plants through the granulation cycle (when contrasted with the conventional air cooling measure).

Engineering Advantages of Slag Cement Over Portland Cement

Workability

Slag concrete improves the workability of cement because of its fine crush and smooth design. Upgraded functionality benefits putting, compaction, and completing of the solid. The

subsequent solid components may have less surface voids and improved solidification. Slag concrete has additionally been utilized adequately in the plan of self-merging solid blends.

Setting Time

Setting time is where opposition arrives at determined qualities. To a solid project worker, starting setting time alludes to the time at which a solid surface can bear the heaviness of a person with least space. Initial and final setting time are significant on the grounds that, they give a sign of when the solid can be appropriately positioned, consolidated and wrapped up. The elements affecting the setting time are, cementitious material science, cementitious material fineness, cementitious material substance, water to cement proportion, concrete and encompassing temperatures, admixture type's and so on

How does slag cement affect the setting time?

At temperatures under 85 degrees Fahrenheit, concrete containing slag can have longer season of set, when contrast and 100% Portland Cement concrete. The lower the encompassing or potentially solid temperatures, the more slow the set occasions will be (Figure 1). The level of slag concrete utilized can likewise influence the time of set. Be that as it may, substitution paces of under 30% for the most part will not influence the time of set fundamentally. More slow occasions of set are gainful in sweltering climate in light of the fact that the contractor makes some more extended memories to convey, spot and finish concrete. In the event that seasons of set need to be diminished, gas pedals, warmed materials or decreased slag concrete content may be utilized.

Improved Compressive and Flexural Strength

Concrete made slag concrete gives higher compressive and flexural strength contrasted and Portland concrete. Improve strength makes it simpler to accomplish determined wellbeing variables of the solid combinations. It gives upgraded material properties permitting makers to streamline solid blend plans.

How does slag cement improve concrete strength?

Slag concrete increment the compressive and flexural strength of regular solid (Figure 4 and 5) and is frequently an imperative segment in creating high strength concrete. 28 days strength for the most part increment as the level of slag concrete increment, up to about half slag concrete as a level of the cementitious material. At the point when PC responds with water, it structures CSH and Ca(OH)_2 . CSH is the paste that gives strength and holds concrete together, Ca(OH)_2 is a bye result of PC hydration that doesn't add to strength. At the point when slag concrete is utilized, it responds with water and Ca(OH)_2 to shape more CSH. The extra CSH densifies the solid network, improving the strength.

Concrete made with slag concrete will have higher strength development over the lifetime of the solid component contrasted and PC solid combinations. Slag concrete has an especially critical impact on the flexural strength of cement. Flexural strength or Modulus of Rupture is one of the main elements in concrete pavement design. Expanded flexural strength is clear in figure 5, where 50% slag concrete accomplished a 20% strength improvement. Improved flexural strength are credited to the expanded thickness of the glue and improved glue totals bond.

Reduced Permeability

Permeability is the proportion of how simple it is for water, air and different substances, for example, chloride particles to enter concrete. A typical method to quantify permeability of cement is the Rapid Chloride Permeability test otherwise called Standard Test Method ASTM C1202 Electrical sign of solid capacity to oppose chloride particle entrance. Low porousness cement can help diminish the decreases hazard for the building up steel to erode when open to chlorides by restricting infiltration of those chlorides into concrete. At the point when the supporting steel interacts with the plastic concrete, a compound response happens between the steel and the solid that cause a defensive layer (an inactive layer) to create around the building up steel. This detached layer ensures against the erosion of the supporting steel. Over the long haul, concrete in de-icing salts can responds with the building up steel, separate the latent layer and making the steel consume and cause the solid to break. In the wake of breaking, the weakening speeds up as chlorides are permit simple entrance to the building up steel. The crumbling of both the concrete and the steel bargains the structural integrity.

How does slag cement reduces permeability

At the point when Portland Cement (PC) hydrates, it structures calcium silicates hydrates gel (CSH) and Calcium Hydroxide $\text{Ca}(\text{OH})_2$. CSH is the paste that give strength and holds the solid together. Porousness is identified with the extent of CSH to $\text{Ca}(\text{OH})_2$ in concrete glue. The higher the extent of CSH to $\text{Ca}(\text{OH})_2$, the lower the penetrability of the concrete. At the point when slag is utilized as a feature of the cementitious material in a concrete blend, it responds with $\text{Ca}(\text{OH})_2$ to shape extra CSH, which thus brings down the permeability of the concrete. By and large, the higher the level of slag in a concrete, the lower the permeability. Lower permeability cement can be accomplished by subbing between 25 to 50% slag for Portland Cement. Figure 3 shows the capacity of a particular slag cement to diminish the permeability of concrete as measures by quick infiltration test.

Mitigation of Sulfate Attack

Sulfate attacks happens in solidified concrete when sulfates, found in seawater, in certain dirt and in wastewater, respond with the tricalcium aluminate (C_3A) in Portland concrete glue.

The response causes a material called ettringite to form. Ettringite formation can bring about concrete expansion and untimely deterioration. The higher the C₃A of the concrete, the more noteworthy the potential for sulfate attack. Slag concrete doesn't contain C₃A so the higher the level of slag concrete utilized, the lower the C₃A of the combination and the lower the potential for malicious expansion. Moreover, slag concrete decreases the porosity of the concrete and limits the capacity of sulfates to infiltrate into the concrete.

Alkali silica reaction (ASR) Mitigation

Antacid silica response (ASR) happens when the soluble bases in Portland concrete respond with certain receptive totals and water to shape an extensive gel that makes concrete rashly weaken. Slag concrete mitigates ASR by consolidating with the salts in Portland concrete and making them inaccessible for the ASR response. It additionally brings down the porosity of the concrete, restricting the measure of water that is accessible to help the response. Now and again, it will bring down the complete antacid substance of the concrete glue.

Environmental Advantages of Slag Cement Concrete

1. Lessening ozone depleting substance emanations by dispensing with roughly one ton of carbon dioxide for every huge load of Portland concrete supplanted.
- Reducing energy utilization, since a huge load of slag concrete requires almost 90% less energy to create than a huge load of Portland concrete.
 - Reducing the measure of virgin material removed to make concrete.
 - Reducing the "metropolitan warmth island" impact by making concrete lighter in color in this manner mirroring all the more light and cooling constructions and asphalts with uncovered cement.

Applications of Slag Cement

Slag concrete is utilized in practically all solid applications:

- Concrete asphalts
- Structures and establishments
- Mass solid applications, like dams or holding)
- Precast and prestressed concrete (Pipe and Block)
- Concrete exposed to cruel conditions, like wastewater treatment and marine applications
- High-execution/high-strength concrete, for example, skyscraper constructions or 100-year administration life spans

Conclusion

From the review of relevant works on this subject matter, the following conclusions were made

1. Concrete replaced with 25 to 50% Slag was observed to enhance better Engineering properties and as such should be adopted in concrete mix
2. Slag cement lowers the setting time of concrete which is advantageous in hot weather conditions owing to the fact that it gives the engineer longer time to deliver, place and finish concrete.
3. The compressive strength of concrete made with Slag cement is observed to be higher than that of PC which lowers the shrinkage tendencies of the concrete and also lowers the cementitious factors but rather provide better structural integrity.
4. Slag cement provide considerably higher flexural strength than PC making it more suitable in high performance concrete.
5. Permeability of concrete was observed to be considerably less than Portland cement which minimizes the corrosive risk of the steel reinforcement by lowering the penetration effects of chlorides and sulphates into concrete. Hence, durability and service life is more guarantee.
6. Slag cement has higher resistance to chemical attacks and as such, it performs better in chemically aggressive areas such as seawater etc.
7. Slag cement as a bye product of steel which is a waste when converted to a usable material eliminates the tendencies of environmental pollution. It also reduces greenhouse effects in concrete construction, hence, it is more environmental friendly than Portland cement.

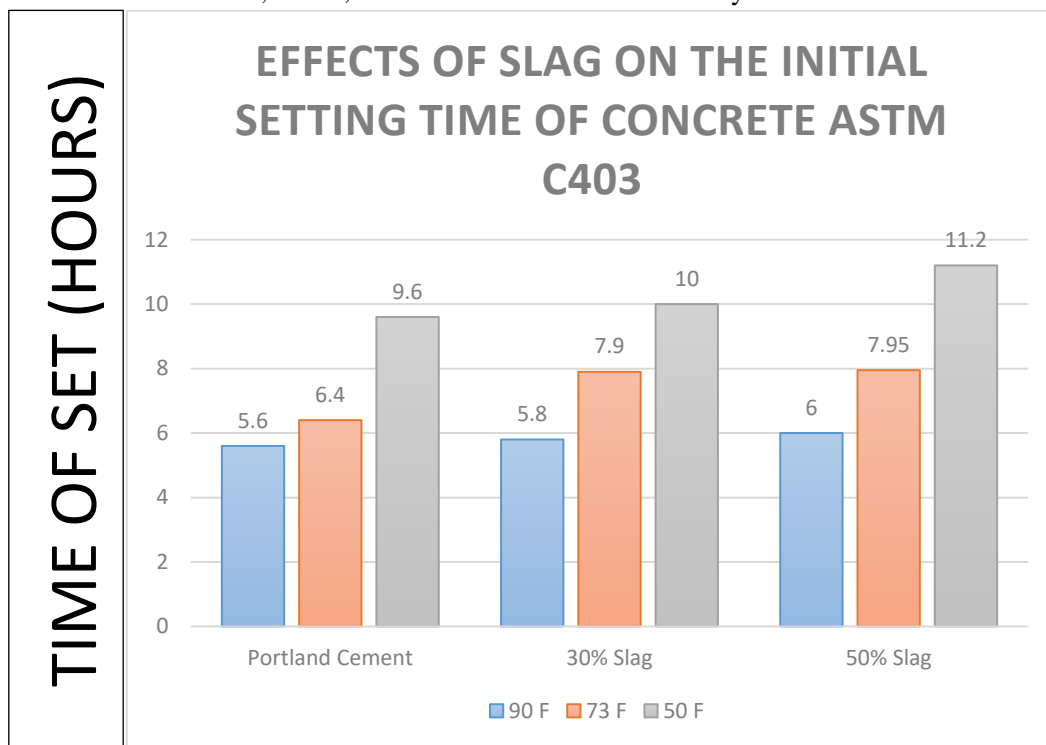


FIGURE 1

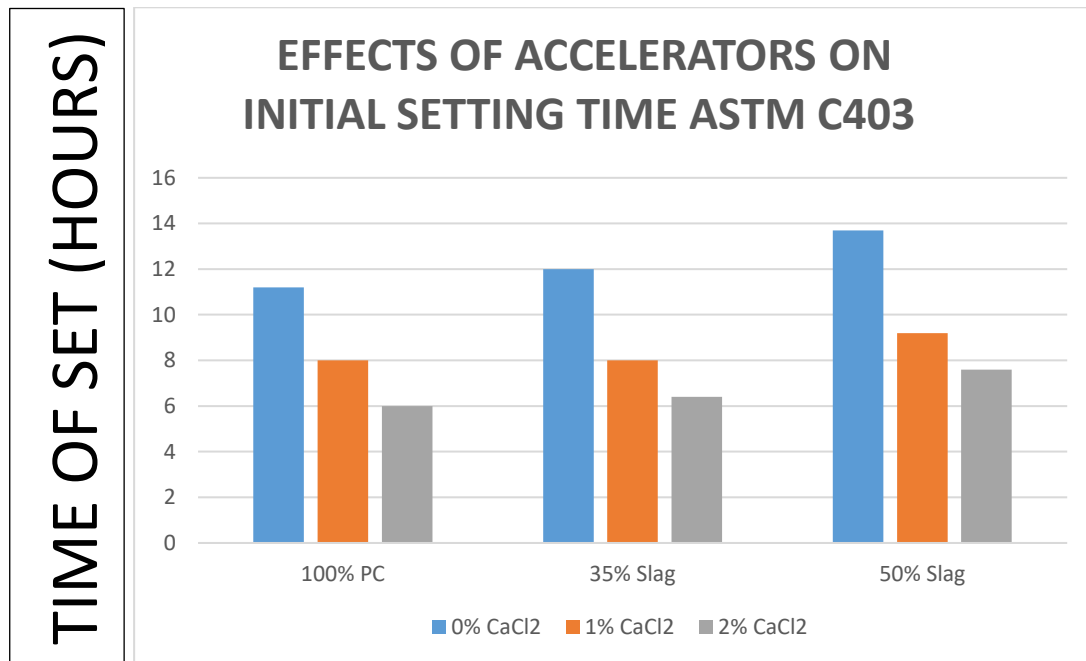


FIGURE 2

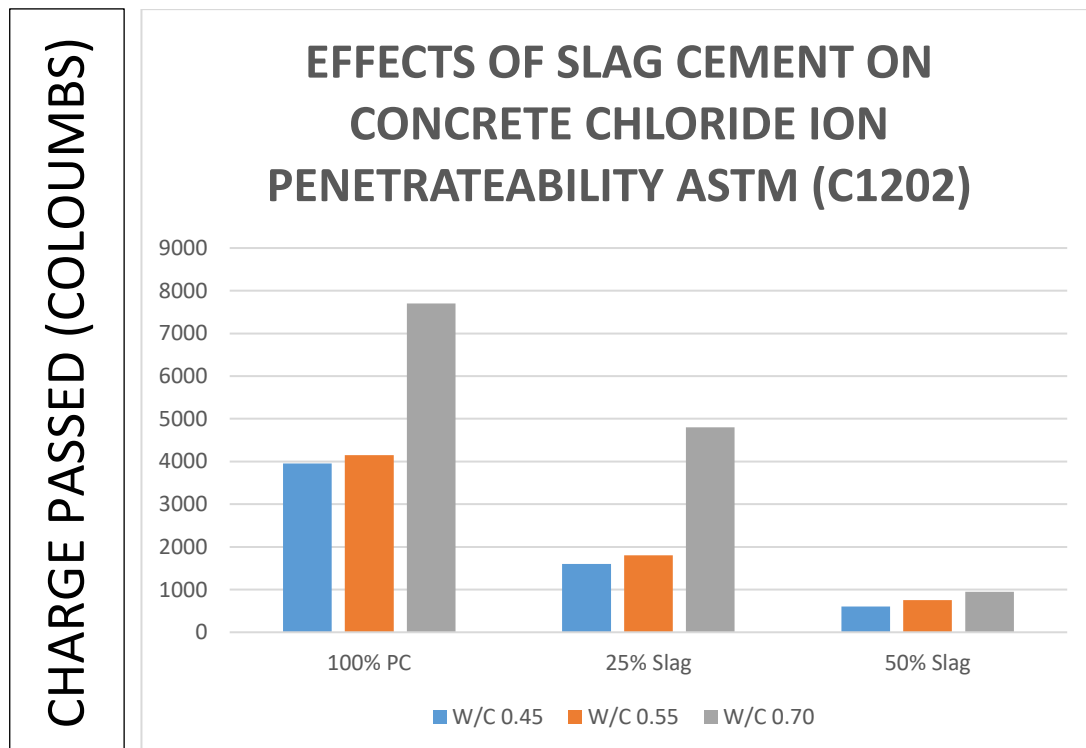


FIGURE 3

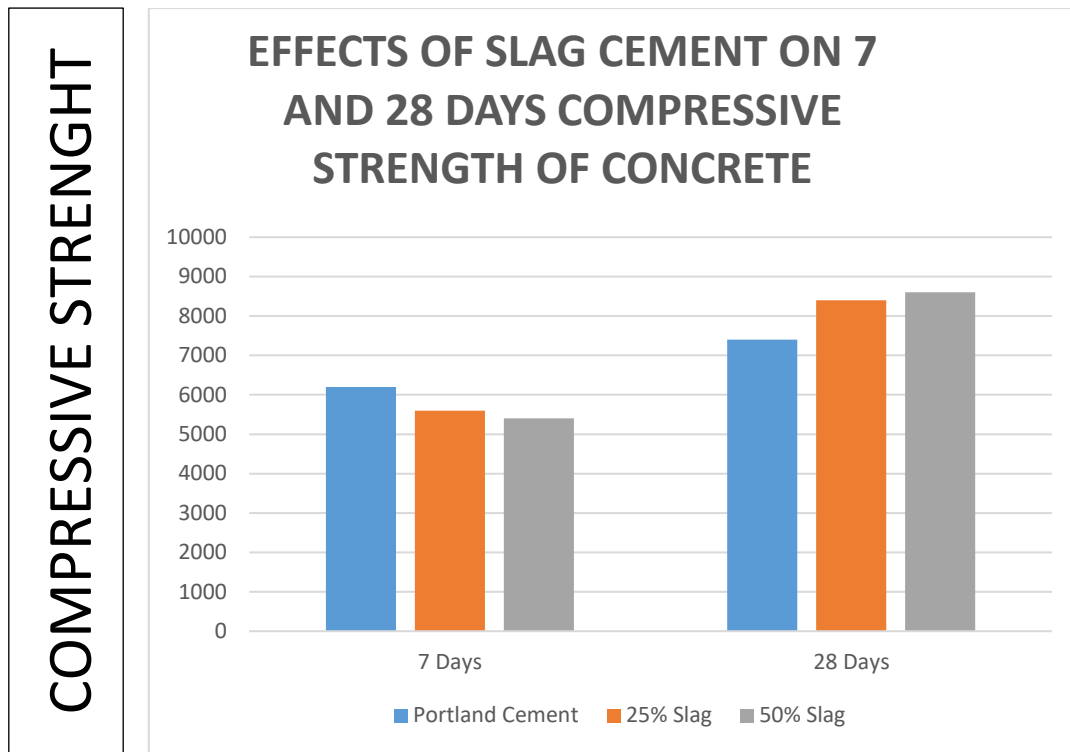


FIGURE 4

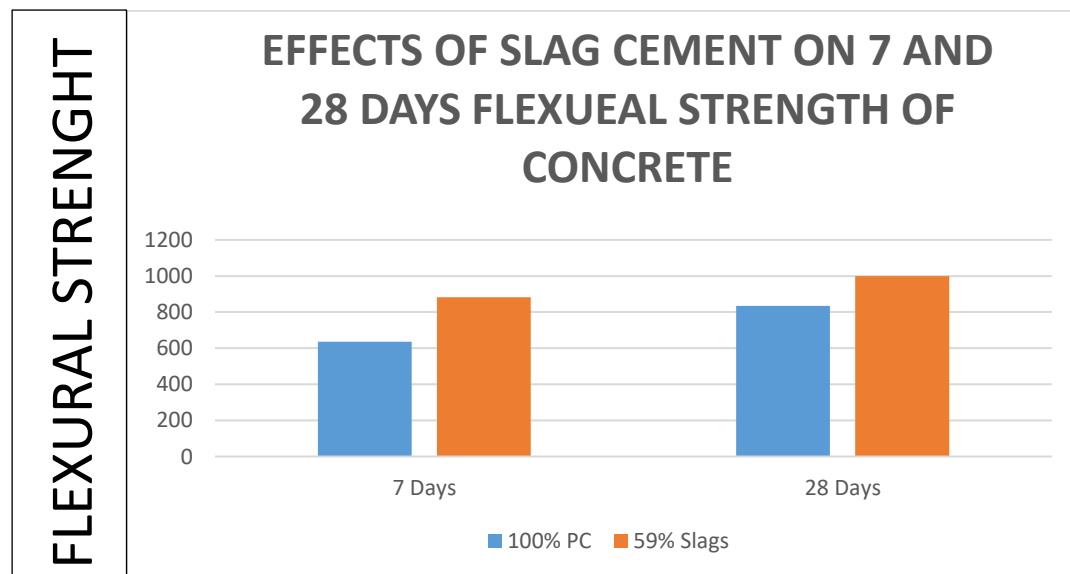
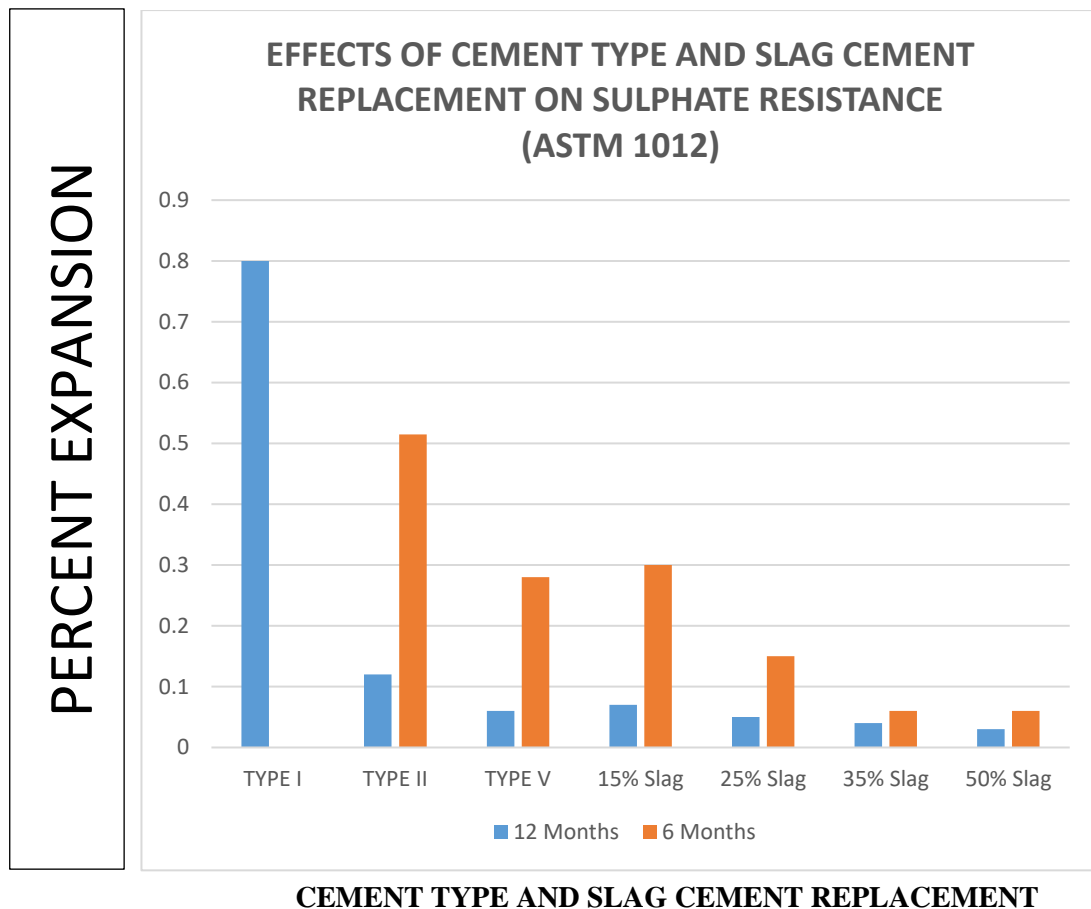


FIGURE 5

**FIGURE 6****References**

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ROUTE DESIGN: A GUIDE FOR ENGINEERING BILL OF QUANTITY

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ABSTRACT

Road is an assets of nations economy and the driving force of integration and development. Road network plays a vital role in the social economic and political development of any country. Nigeria is aggregation state where most of its produced is concentrated in the rural area that are mostly in accessible due to inadequate road network, it became imperative to explore the means of providing sufficient road network to link rural areas with it adjoining city centers, in view of the important role played by adequate road networks in the economy of this nation as well as availability of survey data in the construction of such road networks. It provide data for the heighting, alignment, as well as for the setting out curves, culverts, bridges where necessary along communication routes such as road networks, railroads, canals, transmission lines, and pipelines. The proposed route starts from Yelwan Duguri to Birim village in Alkaleri Local Government Area of Bauchi State, covering a distance of habitants of both villages are mainly farmers and are in daring need of good roads, specifically this particular project if utilized, could facilitate the conveyance of their farm produces to the city centre. Sokkia SET 600 Total Station instruments was used to carry out the route survey along the proposed road to provide data on the existing Position and heights as well as the topographic features within the corridor for the plotting of the longitudinal profile of the road and subsequent Engineering design of the Geometry of the road. Levelling was carried out along the proposed route at 20m interval to provide vertical controls for the alignment of the centre-line of the route and for the design of the longitudinal profile. Hydraulic structure such as culvert and concrete line drain were designed in this research for road construction.

Engineering bill of quantity was also produced for appropriate costing of engineering work. This research work is recommended for used by the Bauchi state Government as well as the Federal Government of Nigeria.

Keywords: Profile, Cross section, Engineering bill, Quantity, Costing and Road network,

Background of the Study

The role of a surveyor in all level of construction especially road construction cannot be undermined because its function is measured from the point of commencement of the work to the point of termination (Oguche Sunday 2009). Route surveying which fall under engineering surveying embraces all engineering works, before any work commences large scale topographical map of the plan is required as a basis for design. The position of any new construction must then be marked out on the ground. Route surveying in a summary involves traversing and levelling. Traversing is for horizontal control alignment of the route while levelling is used to determine the elevation of points along the route (vertical control alignment). It's also involves longitudinal, cross sectioning and geometric design of the road. The major problem that prompted this research work are; lack of design plan for the construction of most of the engineering project before resuming to the site. Inappropriate planning and design of engineering bill of quantity by the contractor instead of the client. The project is located in Alkaleri Local Government Area of Bauchi State, geographically located on Longitude 09057'33.98''E, latitude 10010'55.91''N, and Longitude 09059'33.47''E, latitude 10009'57.32''N. The proposed road starts from Yelwan Duguri to Birim village with a length of Km 0+000 to Km 3+700m.

Aim and Objectives

The aim of this research was to assess the increase in price of engineering project against the engineering bill of quantity (BEME). This was achieved through the following objectives:

- i. To produce data for the design of engineering project
- ii. To produce longitudinal and cross section for cost estimation
- iii. To design hydraulic structures for estimation of bill of quantity
- iv. To generate the summary of bill of quantity for engineering project

Project Planning

Before commencement of this project, all necessary data and logistics were prepared. Three GPS controls established by Federal Surveys were traced for connection purpose. The coordinates of such controls were gotten from ministry of works, Bauchi state. Data such as the topographic-sheet or base map of the study area was also used for depicting the nature of the terrain. Required instruments for the actualization of expected accuracy, survey team, time

stream and logistics were properly considered being a prerequisite to the success of any survey task. The preliminary inspection of the entire area was carried out. It involved going to the field to identify the existing controls used for connection as well as to enable me know the extent of the area to be surveyed and noting all areas that is likely going to cause difficulties thereby avoiding them. During this operation three sets of township controls were traced within the study area these are CNSB781, CNSB776 and CNSB789. The traversed points were carefully selected and permanently marked noting very well the inter visibility of these selected points as well as avoiding areas that such points cannot be easily removed. The main instruments employed for the execution of this project include a Sokkia SET600 Total station and its accessories such as reflector, tripod,

Data Acquisition

Instrument used were tested and were confirmed functioning optimally prior to field observations. To ascertain the functionality of the instrument used, observations were made on the existing control while angle and distance measurements was carried out on same set of control coordinates computed and compared. This multifaceted testing proves both the instrument and the control in-situ. Total station was used centre line, left, and right wing of the route.

GPS Control establishment

GNSS observation was carried out on the buried pillars at regular interval of 1km along the proposed road. This served as the control points to provide checks for the total station observations. In the other hand it serves as a guide to determine the horizontal alignment of the route as well as to provide controls in case of setting out. For corridor mapping total stations observations was carried out between the established controls to provide x,y,z data necessary for the determination of longitudinal as well as the cross section of the proposed road at 25meter chainages.

Data Processing and Analysis

GNSS data was later downloaded to a computer using Spectrum survey Software then processed and adjusted. The adjusted data was converted to UTM projected coordinated and exported in Microsoft excel format. Total station observed data for corridor mapping, Longitudinal and cross section was downloaded to a computer via USB cable using Sokkia link software and also exported in to Microsoft excel file format for plotting in AutoCAD. The data acquire was used for the production of longitudinal profile and cross section. The contractor of all the sample used in the research is Messrs Triacta Nigeria Limited. It shows summary of previous BEME and increment in the price of engineering work. Hydraulic structures was produced using the observed data. Figure 1 is the 2.45m by 2.00m double cell

culvert and the barrel reinforcement is shown in Figure 2 whereas Figure 3 showed the apron and wing wall reinforcement. Figure 4 showed 1.25 by 1.0 single cell box culvert. . Figure 5 showed single cell ring culvert of 90mm diameter. Figure 6 and Figure 7 showed a section of 80mmx100mm and 120mmx100mm concrete line drain respectively.

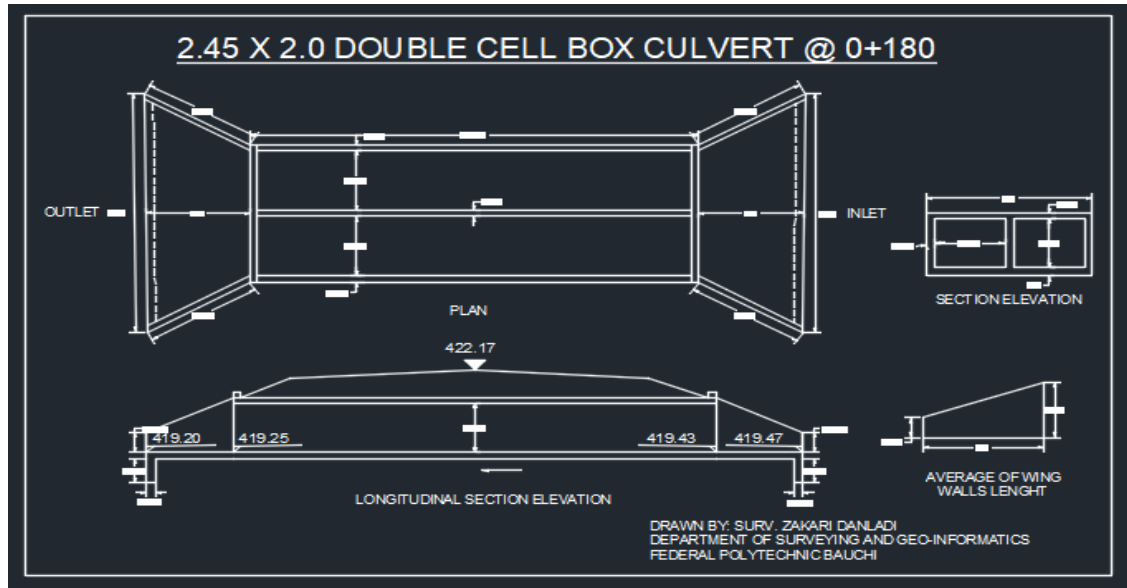


Figure 1: Double Cell Box Culvert

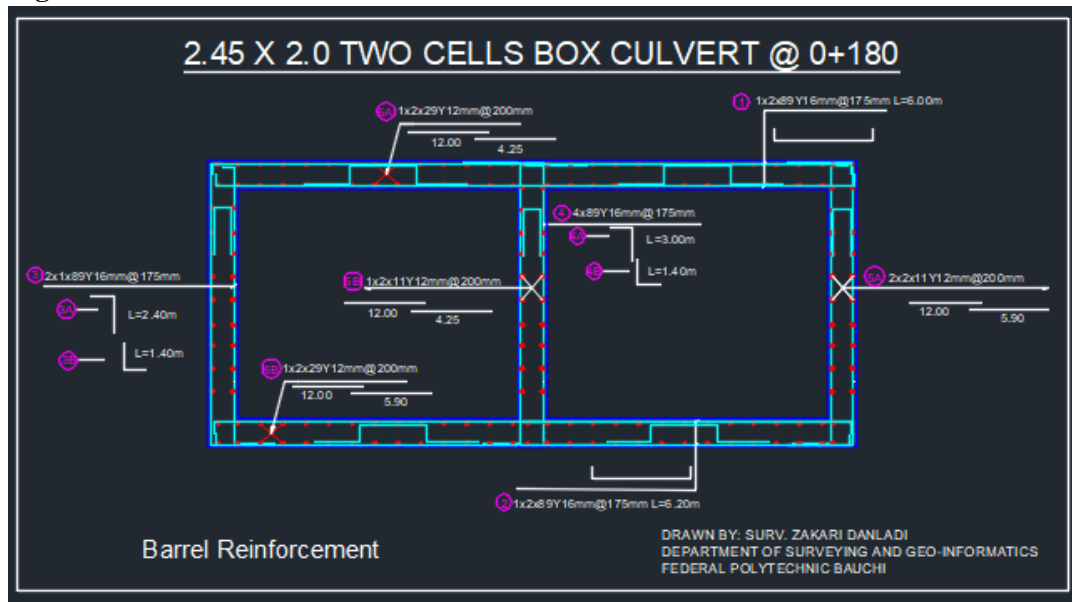


Figure 2: Barrel reinforcement

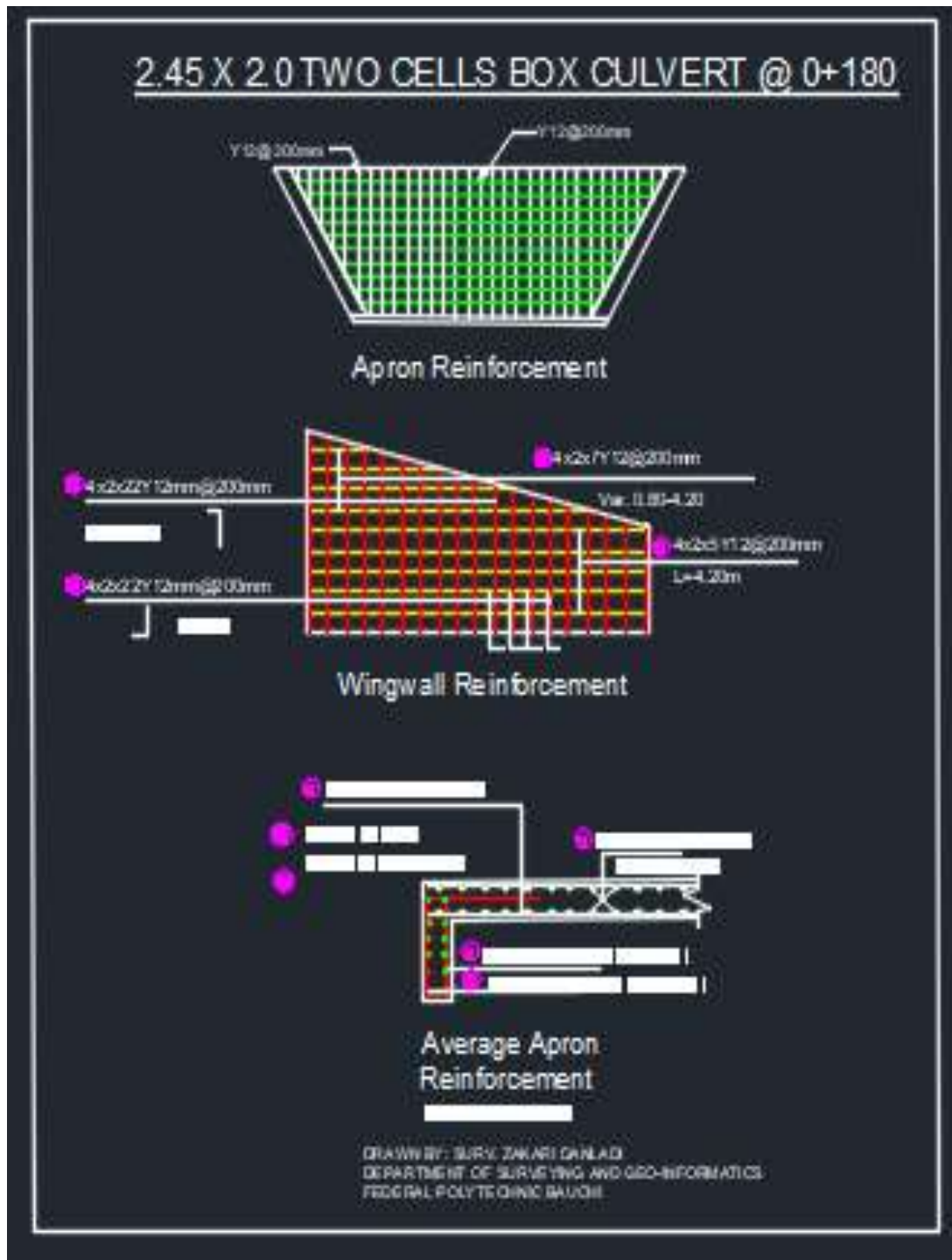


Figure 3: Apron and wing wall reinforcement

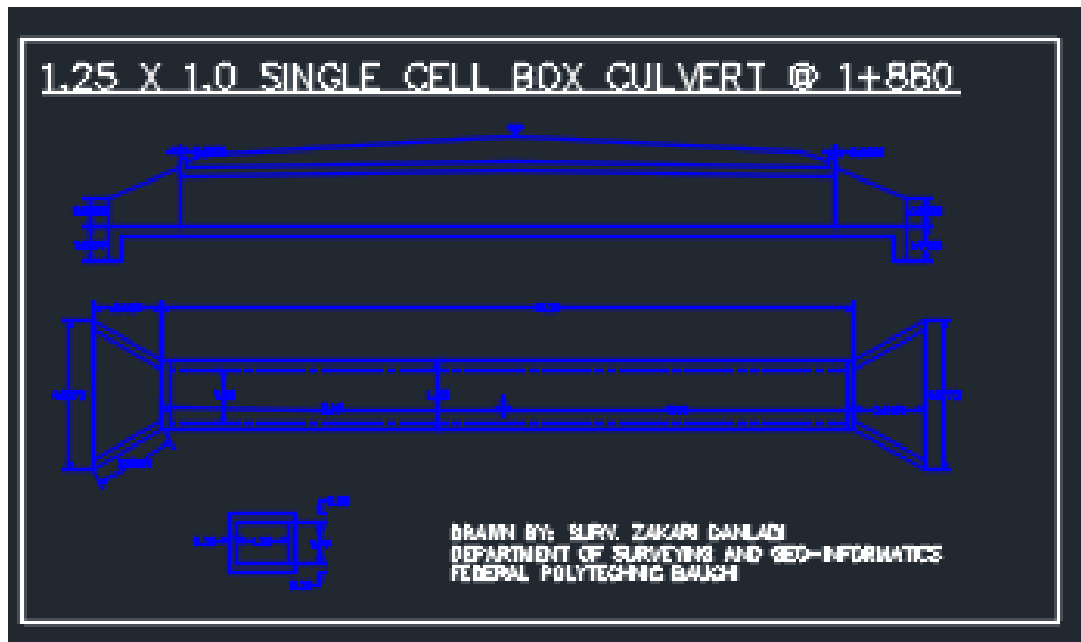


Figure 4: Single Cell Box Culvert

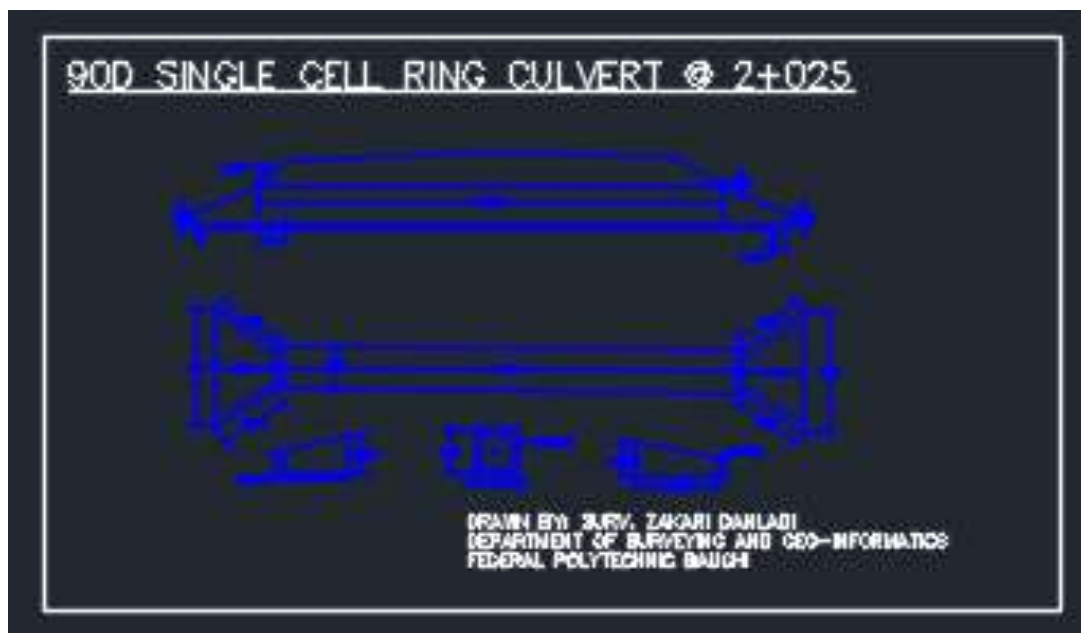


Figure 5: Single Cell Ring Culvert

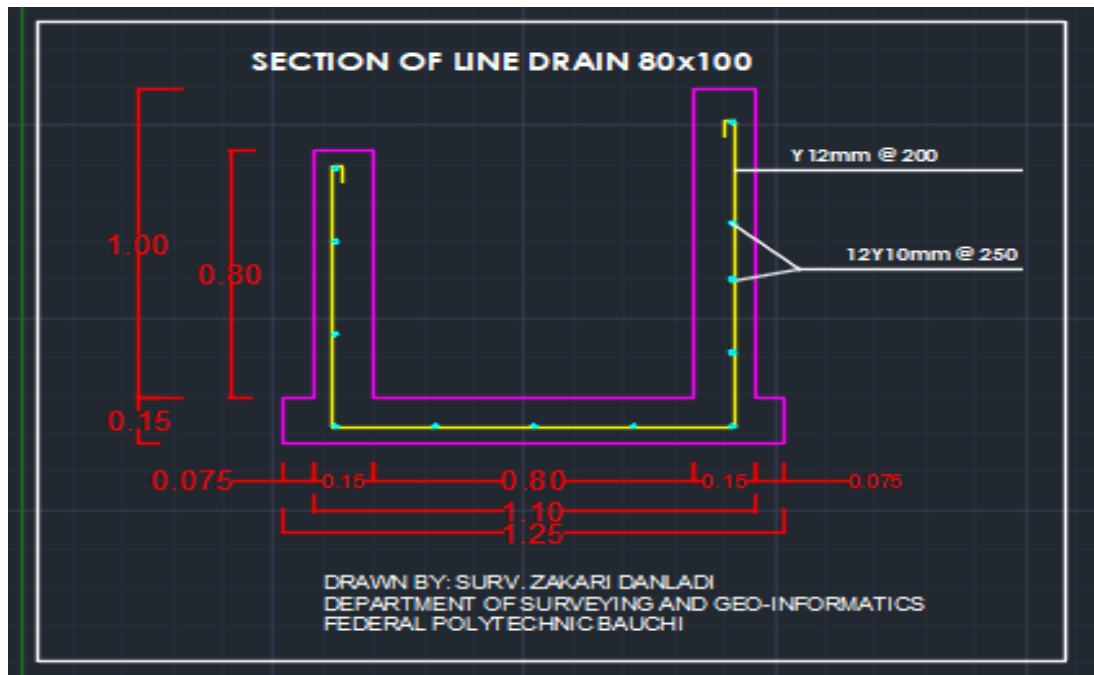


Figure 6: Section of Concrete line drain (80x100)

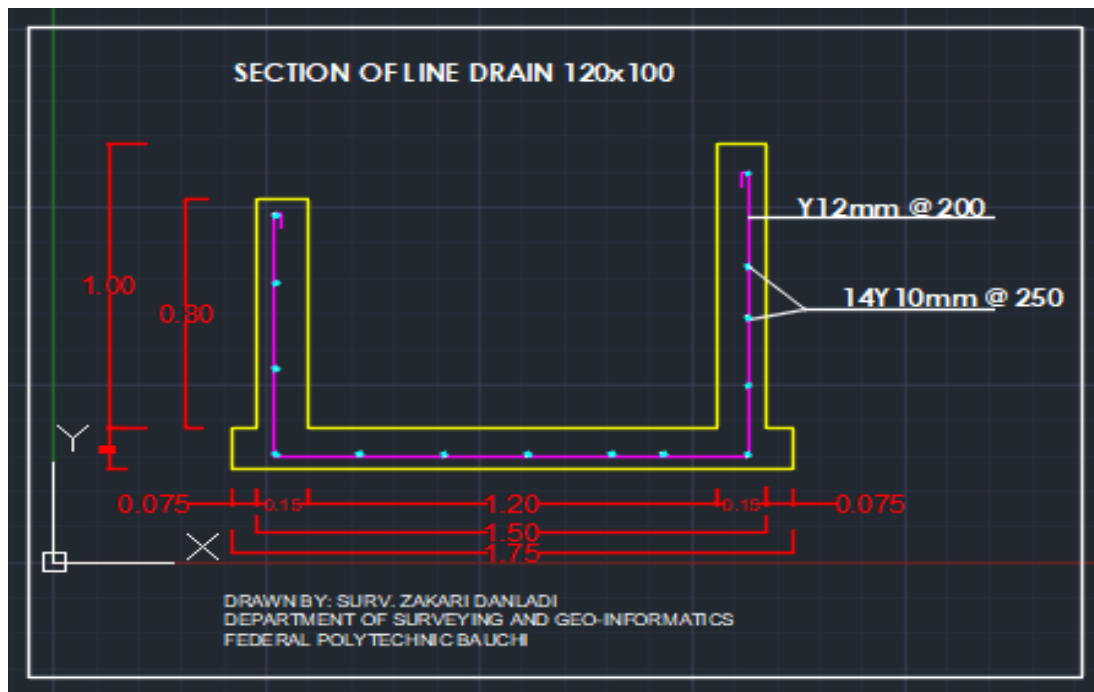


Figure 7: Section of Concrete line drain (120x100)

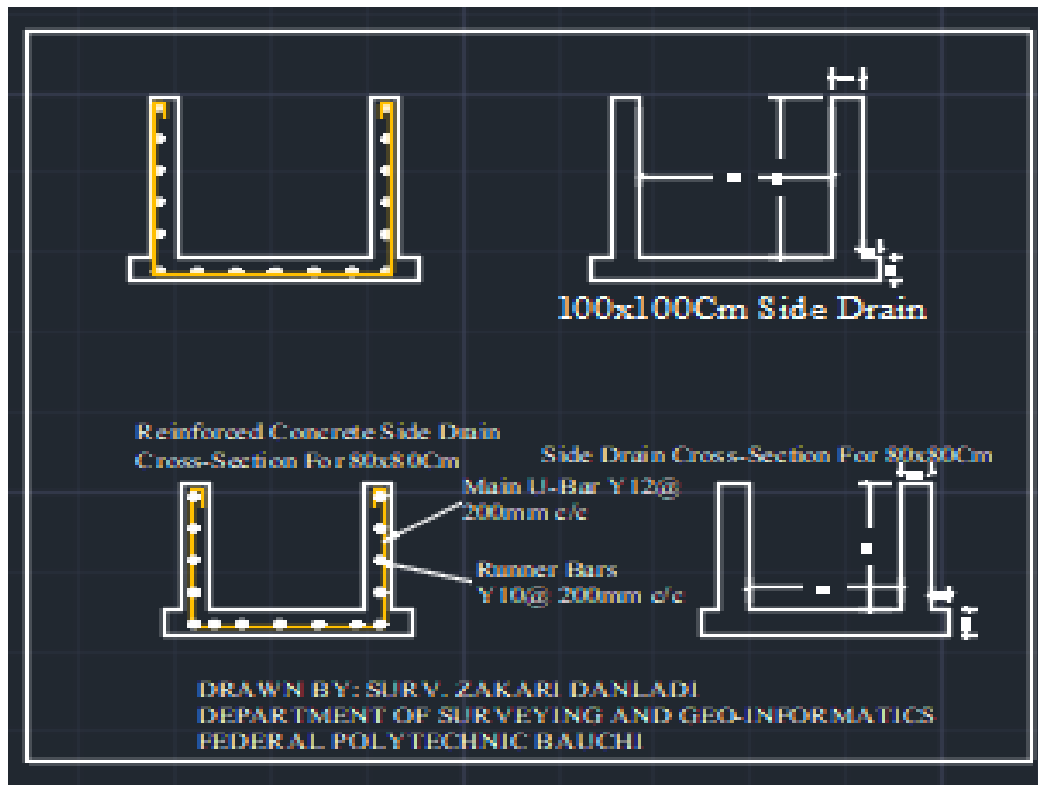


Figure 8: Section of Concrete line drain (100x100)

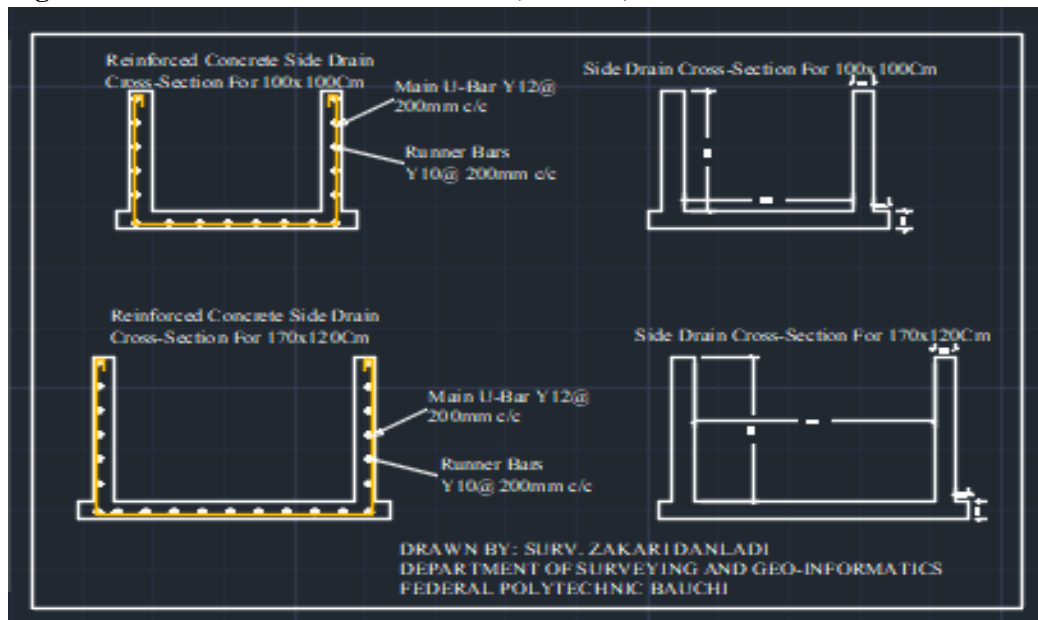


Figure 9: Section of Concrete line drain (100x100)

Plotting of the Longitudinal Profile and Cross section

Plotting of the longitudinal profile and cross sections was done in AutoCAD Civil 3D. The acquire data was imported as points using import/export command. After the display of points, it was used to model the terrain using terrain model program. The alignment of the road was then defined from the starting point of the road at chainages 0+000 to the end, including the curves along the route. The longitudinal profile generated from the surface as shown in Figure 10, Figure 11 and Figure 12. The cross section is shown in Figure 13 for computation of volume of earthwork.

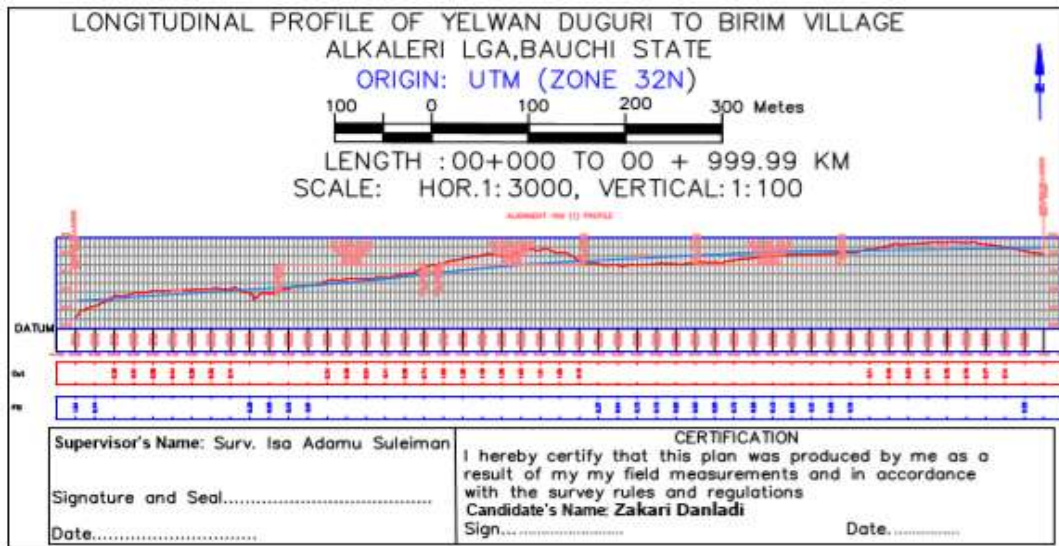


Figure 10: Longitudinal Profile from 0+000 to 0+999.99 km

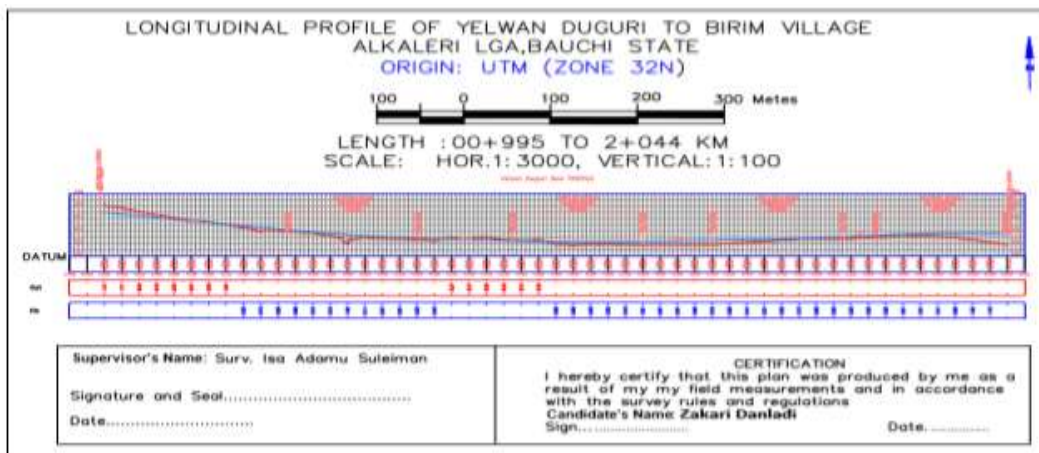


Figure 11: Longitudinal Profile from 0+995 to 2+044 km

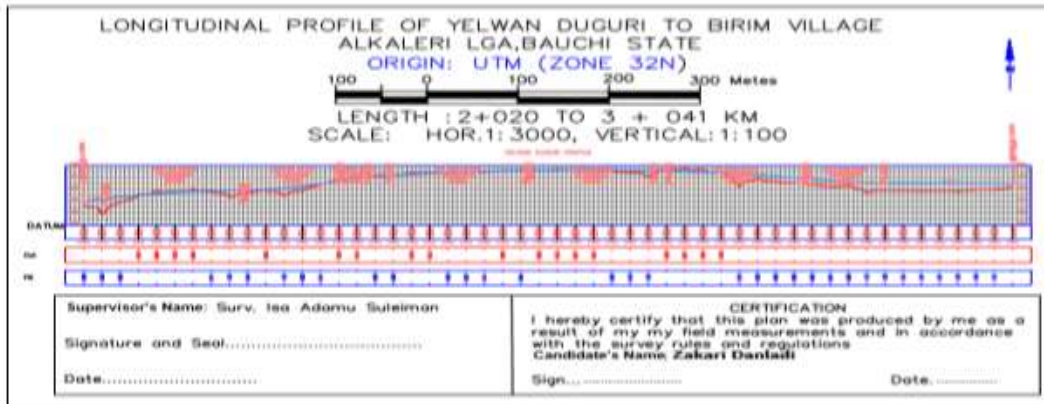


Figure 12: Longitudinal Profile from 2+020 to 3+041 km

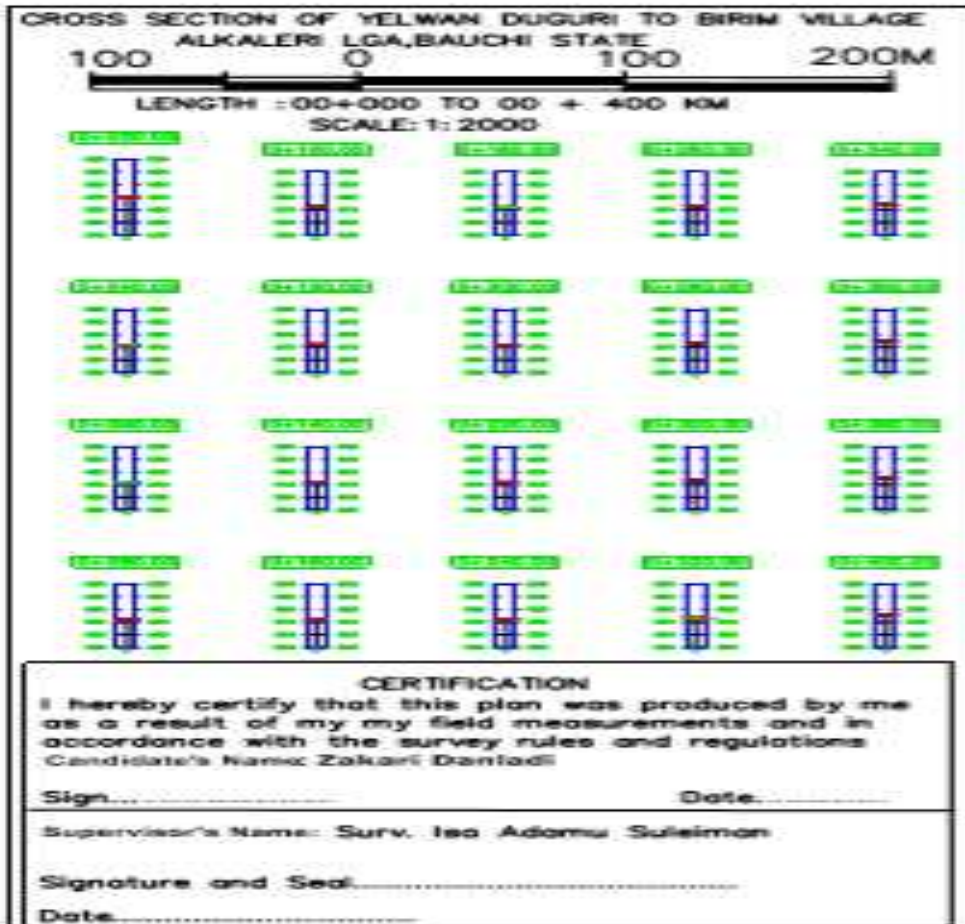


Figure 13: cross section

Table 1: Summary of Computed Bill of Quantity (BOQ)

GENERAL SUMMARY OF B.E.M.E		
S/NO.	DESCRIPTION	AMOUNT N:K
1	Project administration cost	15,000,000.00
2	Site clearance and earthwork	137,532,000.00
3	Culvert and drains	362,900,000.00
4	Pavement and surfacing	198,280,000.00
	Sub Total (1)	713,712,000.00
5	Add 5% Contingencies	35,685,600.00
6	Add 5% VOP	35,685,600.00
7	Add 0.25% Monitoring	178,428.00
	Sub Total (11)	785,261,628.00
8	Add 7.5% V.A.T	58,894,622.100
	Grant Total	844,156,250.100

Conclusion

The longitudinal profile and cross section were produced, and the volume of the earthwork was also computed as presented in the report. The general bill of quantity was generated from the designed culverts, concretes line drain, cross section and other component of the road. It is concluded that road deign, design of hydraulic structures and other component of road construction are necessary for production of engineering bill of quantity.

Recommendations

From the foregoing research, the following recommendations were drawn:

- i. The Federal, State, local Government and other parastatals should adopt appropriate road design before given out contract to any construction firm in order to minimize cost.
- ii. Engineering project should be design properly before embarking on the work in order to mitigate the overshooting in contract sum at the end of the project.

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ASSESSMENT OF THE EFFECTS AND REMEDIES OF CHANGE ORDER IN PUBLIC BUILDINGS: A CASE STUDY OF BAUCHI STATE, NIGERIA

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ABSTRACT

Change order is observed as one of the most frequently occurring issues in construction projects in Nigeria. These changes are known to impact various aspects of the projects. This study assessed the effect of change orders on public building projects in Bauchi State with a view to reducing them. The objectives of the study include: determining the causes of change

orders; identifying the effects of change orders; and then recommending strategies to minimize variation orders. A comprehensive review of relevant literature resulted in the identification of 8 common causes of variation orders, 7 effects of variation orders, and 10 recommended strategies to minimize the variation orders. A desk study and questionnaire survey were carried out to identify the causes of variation orders, and their impacts on public building projects and to seek recommendations to reduce them. The desk study was conducted on fifty-five samples size and the causes of change orders and their impacts on the projects were identified. The questionnaire responses were analyzed using SPSS descriptive statistics and the results were ranked using the average mean. The results indicated Risk factors, the complexity of design, Governmental financial problems, poor procurement process, and varying specifications by the consultant were the most causes of change orders. The results also showed that Productivity degradation, quality degradation, cost overrun, time overrun and delay in completion have the most effect on change. The findings also suggested the most recommended strategies to minimize change orders. These strategies include Value engineering, comprehensive design details, reduction of contingency, completeness of order documentation, and adequate payment from the client to lessen change on public building projects.

Keywords: Change, Change orders, Building projects, Public Institutions, Bauchi State

INTRODUCTION

Change is a variation that occurs in the master plan of the project different from the agreed or signed contract. It is common in all types of construction projects and plays an important role in determining the closing cost and time of projects (Akomah, Justice, Zakari, and Kottey, 2018). Adnan *et al.*, (2012) stated that change orders involved alteration, addition, omission, and substitution in terms of quality, quantity, and schedule of work. Bin-Ali (2012) defined change as any deviation i.e., alteration, addition, or omission from the contract concerning contract drawings specifications, and/or bills of quantities. Change order is also defined as the alteration or modification of the design, and quality of works, as agreed upon in the contract drawings, bill of quantities, and/or specifications.

Memon, Rahman, and Hasan (2014) explain that changes are caused by various factors, which often result in disputes and dissatisfactions among the parties involved in construction projects. Babatunde (2013) stated that the construction process is subject to many variables and unpredictable factors resulting from many sources. Furthermore, he stressed that one of these variables and unpredictable factors is changes in the scope of work by project participants, as these changes can lead to deviations from the sum stipulated in the contract. Great concern has been expressed in recent years regarding the adverse impacts of changes in construction projects (Memon, Rahman, and Hasan, 2014). Most building projects are liable

to changes that might be caused by the change of mind of the clients, consultants, or any unforeseen scope of the project raised by one of the project participants, but Keane, Sertyesilisik, and Ross (2010) argue that the causes of changes could originate from the client, consultant, contractor, and non-party-related causes.

Murdoch and Hughes (2008) insist that changes may originate from any of the following three ways:

- (i) clients may change their minds about what they asked for before the work is complete;
- (ii) designers may not have finished all of the design and specification work before awarding the contract; and
- (iii) changes in legislation and other external factors may force changes upon the project team.

Over a period of time, studies have observed that most public projects ranging from a bridge, road construction, and tertiary institution building in Nigeria and internationally usually rise above their estimated project cost. This is of great concern to clients, government, and building professionals as such. Subramani, Sruthi, and Kavitha (2014), surveyed the causes of this problem, and the results indicated that the major causes are slow decision-making at the planning stage of a project; poor project schedules and management; increases in the prices of materials and machines; poor contract management; poor design/delay in producing design; rework due to mistakes or wrong work; land-acquisition problems; poor estimation or estimation techniques, and the long time taken between the design and the time of bidding/tendering. In the context of Nigeria's construction sector, it was observed by Babatunde (2013), that instead of a project taking two years it may take more than three years with its cost possibly doubling. However, this unfavorable circumstance is a result of changes, which tends to raise a concern about public building and infrastructure facilities developed through meager public resources that fail to provide value for money. Memon, Rahman, and Hasan (2014) pointed out that the occurrence of change stands as the basis for why most construction works do not achieve quality, cost, and timely delivery.

Nowadays, change orders have become a common problem in public building projects in Nigeria. The major causes of delay, disputes, and sometimes generate significant cost and environmental impacts are change orders issued during the construction of projects. Yet, no unique method is available for minimizing change effectively. However, their impact can be curtailed with an appropriate study of the causes. Change orders on public building projects have the potential to impact public building projects, and the identification of their causes might lead to their reduction, possible elimination, and subsequent improvement in the overall performance of public building projects in Bauchi State.

The research aimed to evaluate the causes and control of change in public institution buildings in Bauchi State, Nigeria. The aim was achieved using the following research objectives:

- To identify root causes of change in building projects in Bauchi State
- To examine the effects of changes on public building projects in Bauchi State
- To proffer strategy and control measures for reducing the detrimental effects of changes in public building projects in Bauchi State.

THE CONCEPT OF CHANGE IN THE CONSTRUCTION INDUSTRY

Hayati (2006) in Yadeta, (2014) affirm that change could be taken to be any or a combination of any or all of the following:

- a. Change in building projects may mean ‘the alteration or modification of the design, quality or quantity of the works, as shown upon the contract drawings and described by or referred to in the contract bills, and includes the addition, omission or substitution of any work, the alteration of the kind or standard of any of the materials or goods to be used in the works, and the removal from the site of any work materials or goods executed or brought thereon by the contractor for the works other than work or material or goods which are not in accordance with the contract.
- b. Changes in building projects with instructions concerning the nature of the works are not specifically termed changes in the contract documents.
- c. Change of contract in law, i.e. if both parties alter a contract document by agreement after execution of the original contract this is a change of the contract terms or conditions.
- d. Change of price clause which enables the contract sum to be adjusted for rises and falls in the cost of labour or materials.

Sunday (2010) identified 53 causes of change orders for the formulation of the questionnaire. 58 questionnaires were distributed to the in-house construction professionals, consultants, and contractors involved in handling government projects. 30 in-house staff responded to the questionnaire and 18 responded by both the consultants and contractors who were involved in government construction projects. Through the analysis of the data, it was discovered that the projects handled by the consultants are more prone to change orders than projects handled by the in-house professionals. Aside, the study also discovered that the percentage difference in the initial contract sums and final sums was significant both the ones the contract has been concluded, its terms cannot be changed unless the contract itself contains some provisions for change, and then the only permitted changes are those that fall clearly within the contractual terms.

Ijaola and Iyagba (2012) indicated in their study that the “clients’ additional works and modification to design” were the most important causes of a change order in both Nigeria and

Oman, and the most important effects of change orders are “changes result in claims and disputes” in Nigeria while “delay in the completion date of the project and cost overruns” were the most important effects in Oman. He also identified the contractor as the most beneficial party in change. He determined certain points that are: Implementation of National Building code, Review of contractor’s/consultant’s registration should be carried out periodically to ascertain their professional competency, the Client should carry out proper feasibility study and survey before the design stage.

Change of project scope, political factors, wrong estimates, and faulty design may cause abandonment of construction projects, resulting in wastage of government resources (Olusegun and Michael (2011). Likewise, change strain the relationships of the owners, engineer, contractors, subcontractors, and others involved in the construction process as well as additional cost and schedule delay. Changes in one project can also affect other unrelated projects by tying up resources that are committed elsewhere. Negative relationships between the parties are another by-product of changes in a project. Not only is workflow disrupted, but also trying to get quick responses to quotes, shop drawings, and many other things required to get back to schedule causes a strain on working relationships (Rashid, Elmikawi, and Saleh, 2012). It is therefore clear that construction work processes might have many unpredictable changes such that their minimization is necessary. Thus, the project management team must have the knowledge, skills, and abilities to deal with the day-to-day management challenges of change (Zadeh *et al.*, 2016).

Classification of Change

The nature of a change can be determined by referring to both the reasons for its occurrence and subsequent effects. Arain and Pheng (2005), distinguished three types of change namely: beneficial, detrimental, and unpredictable change.

Beneficial Change

Ruben (2008) explains beneficial change as the one issued to improve the quality standard and reduce cost, schedule, or degree of difficulty in a project. It is a change order initiated for value analysis purposes to realise a balance between the cost, functionality, and durability aspects of a project to the satisfaction of clients. Beneficial changes are those that help to reduce cost, schedule, or degree of difficulty in the project (Arain and Pheng, 2005).

Beneficial change orders are initiated for value analysis purposes to achieve a balance between the cost, functionality, and durability aspects of the project to the satisfaction of the client by eliminating unnecessary costs from the project (Ndihokubwayo and Haupt, 2008).

Detrimental Change

According to Ndihokubwayo and Haupt (2008), Detrimental changes are those that reduce owner value or have a negative impact on a project, a detrimental change order compromises

the client's value system (Ndiokubwayo, 2008). However, detrimental changes were identified to be the major causes of conflict and dispute in the construction industry (Yates and Hardcastle, 2003). The client who is experiencing financial problems may require the substitution of quality standard expensive materials for substandard cheap materials. For example, on a construction project situated in a salty environment, steel window frames result in steel oxidation if selected instead of timber or aluminum frames.

Unpredictable Change

According to Mbatha (2006), Changes leading to cost overruns are caused by additions, fluctuations, adjustment of prime costs sums, provisional quantities, uncertain ground conditions, wrong design, claims due to delay from designers, etc. When weather conditions vary, the contractor will need to adjust his construction schedule accordingly and this may lead to adverse effects on the progress leading to overall project delay.

The predominance of Change in Public Construction Projects in Nigeria

Olowo-Okere, (1985). asserted that most countries put over 55% of their gross domestic investment into the creation of physical facilities, including infrastructure that is necessary for development. Wuyts and Kilama (2014), found that in 2010 the construction sector contributed 8 percent of the country's GDP. The contractors' Registration Board (CRB) of Nigeria (2011), affirms that the construction value of capital formation was 50 percent in the year 2010.

A significant portion of the government's development budget (about 60 percent) is spent on construction projects. National Bureau of Statistics (NBS) (2017), affirms that construction activities grew faster than other activities in the year 2015 at 16.8 percent. This growth is mainly attributed to continued Government investment in infrastructure development. The economic reforms carried out during the past decade have attracted a significant increase in the donor, private sector, and foreign direct investments in infrastructure developments. The amount of manpower employed by the construction sector is about 9 percent of the workforce in Nigeria.

Change orders in construction projects for instance in Kenya have been associated with cost and time overruns in the magnitude of 70 - 151% and 32 - 179% respectively. It was reported that the rampant occurrence of changes was considered an avenue through which unscrupulous contractors, engineers, and government officials conspire to escalate project costs resulting in the wastage of public funds (Dickson, Gerryshom, and Wanyona, 2015).

In Nigeria, change to works in public projects is administered by the Public Procurement and Disposal Act of 2005. Under this legal dispensation, the Public Procurement Oversight Authority (PPOA) was created to oversee the public procurement system with its principal function of ensuring that the public procurement law is complied with.

According to PPOA (2006), Changes to work shall be effectively provided; the quantity change for works does not collectively exceed 15% of the original contract quantity, and quantity change is to be executed within the period of the contract. Further, PPOA (2009), instructs that all changes must be approved by the tender committee within the procuring entity and instruction issued in change instruction or change order.

Attempts have been made to solve the problem of changes by restricting their magnitude. FIDIC (1999) allows for up to 10% while FIDIC (2006), stipulates 25% of the contract sum. Despite these attempts, building and civil engineering construction projects in Nigeria are still overwhelmed by change orders which are not only incessant but also excessive in magnitude, thus negatively impacting the performance of these projects. Moreover, Nigeria Anti-Corruption Commission (2007), cautioned that unwarranted changes present loopholes that could be exploited by unscrupulous personnel to embezzle public funds.

Nature of Change in the Construction Project

There are changes in all types of construction projects, but Ibbs, Wong, and Kwak (2001) affirm that various factors determine how the frequency and nature of changes vary from one project to the other. According to Kaming, Olomolaiye, Holt, and Harris (2007) in the event of changes in the construction project either total direct and indirect cost, adjustment to the contract duration, or both are experienced, in order to minimize adverse effects of changes on projects teams must possess the capability to efficiently react to changes. Changes are common in construction projects because of considerable changes to the cost and quality and project time. The task of change management is hard for most clients because of how diverse the causes of change orders tend to be. However, if a mechanism for handling change orders and making better informed decisions with the help of past projects can be built into project management then this unfavorable situation can be alleviated. Whether there are change orders should not be the litmus test for successful management, but rather, if change orders were resolved on time for the benefit of all the parties in the project.

Causes of Change in Public Building Projects.

Change arises from a variety of causes, of which some causes are foreseen and others are not. Literature reviews that change Orders require a comprehensive understanding of the root causes of Changes (Hester, Chang, and Kuprenas, 1991). Some of these are financial, design aesthetics, changes in drawings, weather, geological and geotechnical reasons. From the literature review, there are various causes of Changes identified and these Changes are mainly caused by the Employer, Consultants, and Contractors. These causes of Changes were grouped under four categories: Employer related Changes, Consultant related Changes, Contractor related Changes, and other Changes (Hester Chang, and Kuprenas 1991). These Causes of Changes have been identified by many researchers (CII, 2005; Thomas and Napolitan, 1995;

Mokhtar Bédard, and Fazio, 2000; Gray and Hughes, 2007; Arain and Pheng, 2004). Below are the perceived causes of change in public building projects in Nigeria.

Change in Project Schedule

According to Aftab (2014), almost every construction project in the world is facing the problem of a change of schedule during the executions. In the case of a change in schedule, the contractors have either to endow themselves with extra resources or also may cause keeping some of the resources inactive. In both cases, the additional cost is incurred. Thus, it affects severely the performance of the project. A change in schedule means that the Contractor will either provide additional resources or keep some resources idle at the construction site. In both cases, the additional cost is incurred (Fisk, 2007).

Client Financial Problems

According to Mohammad, Ani, Rakmat, and Yusof (2010) financial problems of the government bodies and stakeholders frequently affect the quality and progress of the project. This problem can lead to changes in work schedules and specifications, which then affect the quality of the construction. The Employer of the project may run into difficult financial situations that force him to make changes in an attempt to reduce the cost of the project. Employers' financial problems affect project progress and quality (Clough and Sears, 2002).

Varying Specification by the Client

Change to contract specification by the client is a rampant occurrence due to inefficient project goals (O'Brien, 2008). In the event of the execution of such changes, there is the possibility of the occurrence of change during the construction phase of the project. In a multi-player environment like any construction project, a change in specifications by the Employer during the construction phase may require major Changes and adjustments in project planning and procurement activities.

Complexity of Design

The complex nature of designs demands exclusive proficiency, attention, and technological advancement in construction (Arain, 2004). The flow of the construction sequence is affected by the complex nature of the designs while uncomplicated construction activities are comparatively tractable (Fisk, 2007). Hence, complexity may cause major Changes in construction projects.

Poor procurement process

Procurement delays have various negative effects on other processes in the construction cycle (Fisk, 2007). Occasionally, the procurement delay may cause an entire change or replacement

for originally specified materials or equipment for the project (Arain *et al.*, 2004). This may therefore cause a need for project activities to be reworked.

Change in specifications by consultant

Changes in specifications are frequent in construction projects with inadequate project objectives (O'Brien, 2008). As mentioned earlier concerning changes in specifications by the Employer, this is also a potential cause of Changes in a project, leading to reworks and delays in the project completion.

Sketchy working drawing details

Oluwaseun and Clinton (2018), in their research, pointed out that the use of inexperienced designers will result in wrong/inadequate descriptions in specifications, and omissions of details were the most implicated. Arain (2004), affirmed that scrappy detailing of construction working drawings can lead to a misconstruction of the prerequisite hence causing changes in the project.

Risk Factors:

According to Odeyinka, Lowe, and Kaka (2012), risks are the factors that can cause a project to fail in meeting its goals. For example, as they pointed out, positive changes between actual and forecasted cash flows are the impacts of risk factors that occur during construction. It should also be noted that wherever the word risk factor used in this study implies the factor that can cause changes on forecasted construction cash flows for a certain work part of the building project. Normally, the changes are caused by risk factors inherent in the construction cash flow forecast.

RESEARCH METHODOLOGY

This section presents the methodology adopted and identifies the tools and techniques employed in conducting this study. The methodology describes the practical way in which the whole research project has been organized (Oliver *et al.*, 2004). The methodology is a plan of action that shows how the problems will be investigated, what information will be collected using which methods, and how this information will be analysed to arrive at conclusions and develop recommendations. The research follows some steps and procedures when conducted. Once the problem statement has been formulated, it should become evident what kind of data will be required to study the problem, and also what kind of analysis would be most appropriate to analyse the data (Walliman, 2005). The problem investigated in this study is evaluating the causes and control of change in public institution building in Nigeria. It is anticipated that the identification of the causes of change orders may lead to their reduction, possible elimination, and improvement in the overall performance of public building projects.

Research Design

Research design is an action plan for getting here to there. Here' refers to the initial set of questions to be answered and 'there' is some set of conclusions about the questions. This study is designed to obtain views from architects, engineers, quantity surveyors, and procurement officers about the causes of changes in public building projects using a questionnaire survey.

Study Population

Population refers to the total set of observations that can be made. The population of the study comprises engineers, architects, quantity surveyors, procurement, and supply officers within Ilorin, Bauchi State, Nigeria. The population for this study was drawn from the sample size.

Sample Size and Sampling Techniques

Due to the nature of data to be collected from the desk study and the expected participants for the survey study, a non-probability sampling technique was preferred to be used. A purposive sampling method was adopted to select the population for the study therefore not every member of the population has a chance to participate in the study.

The study adopted a sample size of fifty-five (55) respondents derived from the sample size formula, population was the stakeholders in the Ilorin city government public building projects namely clients (project owners), contractors, and consultants to which the questionnaires were sent. These populations were selected depending on their direct exposure to the public building project activities in Ilorin from a total population of 65.

Method of Data Collection

It has been found that the data at hand is often not sufficient for dealing with any real life problem, thus, the need to collect appropriate data for a research study. Primary sources of data have been employed in this study. Primary data sources are those collected directly from the subjects of study either through experiments or surveys, whilst commonly used secondary data sources include journals, organisational reports, periodicals, books, etc. Primary data for this study were collected using questionnaires.

Research Instruments

Questionnaires were designed to primarily collect information that can be used as data for analysis. It consists of a series of questions asking respondents to directly provide the information requested in line with the objectives of the study. The questionnaire form was divided into two main sections. In section 1 of the questionnaire, the respondents were asked to fill in the space provided with the appropriate respondent's general information. However, in section 2 of the questionnaire, the respondents were required to rate causes, effects, and

strategies to reduce the effect of changes in public construction projects using a five-point Likert scale viz-a-viz: strongly disagree = 1; disagree = 2; neutral = 3; agree = 4 and strongly agree = 5. The Likert scale rating system has been used successfully by many researchers such their studies.

Validity of Research Instrument

To ensure that, the data collected through the research instrument would enable the researcher to address the aim and objectives of which the research was undertaken, the validity of the research instrument was conducted. In general, validity is an indication of how sound is research. More specifically, validity applies to both the design and the methods of the research. Validity in data collection means that the findings truly represent the phenomenon that is expected to be measured. The goal of conducting this test was to identify any mistakes in the questionnaire and also to make sure that questionnaire is easily comprehensible to the respondents, to get a valid response.

Method of Data Analysis

This involves the breaking down, extracting, implementing, and regrouping of data to interpret them, as they apply to the causes and control of change in a public building project in Ilorin, Nigeria. The results were analyzed in percentages and figures using descriptive statistics and presented in the form of charts and tables. In order to generate the result, mean, standard deviation, and ranking of the results, the researcher adopted the Statistical Package for Social Sciences (SPSS) version 21.0 for the analysis.

PRESENTATION OF RESULT AND DISCUSSION

This section presents the findings of the research titled evaluating the causes and control of change in public building projects with a focus on public institutional projects in Bauchi state. This research has been conducted on a sample size of 55 respondents spread among Clients, Builders, Quantity Surveyors, Design Consultants, Project Managers, and Contractors in construction projects out of which 42 respondents completed and returned the questionnaires duly filled in making a response rate of 76%. For analysis, frequencies (absolute and relative) on single response questions have been used and on multiple response questions, the Likert scale in collecting and analyzing the data whereby a scale of 5 points was used in computing the means and standard deviations. These were then presented in tables with appropriate explanations.

Analysis of Findings

The results from the data in the displayed tables are analyzed and interpreted to find answers to the research problems. The numbers are summarized and interpreted by using statistics. Statistics provide a means through which numerical data can be made more meaningful.

An analysis of the summarized research results was done to make meaningful conclusions and recommendations. Tables and descriptive explanations have been employed to illustrate data gathered from the field to make the research findings more meaningful. The following analysis shows the responses received from forty-two (42) professionals within Bauchi State, Nigeria.

Demographic Characteristics of the Respondents

This section is mainly designed to provide general information about the respondent in terms of their Profession, Educational Qualification, Experience of the respondents, and major organization type.

Table 1 Respondent's Organization Type

S/N	Organization	Frequency (No)	Percentage (%)
1	Contractors	22	52.4%
2	Consulting	15	35.7%
3	Government	5	11.9%
	Total	42	100

Field Survey, 2019

From Table 1, out of the 42 respondents, 52.4% of the respondents were contractors across different parts of Ilorin, while 35.7% of the respondents were consultants, and the rest respondents 11.1% were respondents under a government institution.

Table 2 Professional Distribution of Respondents

Organization	Frequency (No)	Percentage (%)
Quantity Surveyor	12	28.6%
Engineer	10	23.8%
Architect	9	21.4%
Builder	11	26.2%
Total	42	100%

Field Survey, 2019

From Table 2, it can be deduced that this research covers quantity surveyors (28.6%), Engineer 10 (23.8%), Architect 9 (21.4%), and the rest respondents were Builder 11 (26.2%).

Table 3 Years of Experience in Practice

Years of Experience	No frequency	Percentage (%)
0 - 5 years	8	19.05%
6 -10 years	11	26.2%

10 – 15 years	13	31%
16 – 20 years	10	23.8%
21 years	-	
Total	42	100%

Field Survey, 2019

The result illustrates that more than half of the professionals (Quantity Surveyors, Builders, Architects, and engineers) have an experience of more than five years. These results also provide a level of satisfaction that the obtained data will reflect what it was designed for. Those respondents have good positions in their organizations to provide accurate and precise information.

Table 4 Educational Qualification of Respondent

Organization	Frequency (No)	Percentage (%)
HND	7	16.7%
B –Tech/B.sc	11	26.2%
PGD	9	21.4%
Msc/M-Tech	9	21.4%
PHD	6	14.3
Total	42	100%

Field Survey, 2019

In Table 4, it can be deduced that most of the professionals are B.Tech/ BSc holders with (26.2%) while 7 of the respondents with (16.7%) were HND holders, others are as follows, PGD with (21.4%) and MSc/M.Tech with 21.4%

Table 5 Profession Qualification Respondents

Variables	Frequency	Percentage (%)
Nigeria Institute of Building (NIOB)	10	23.8%
Nigeria Institute of Quantity surveyor (NIQS)	12	28.6%
Nigeria Society of Engineers (NSE)	5	11.9%
Nigeria Institute of Architects (NIA)	8	19.0%
Not registered	7	16.7%
Total	42	100%

Field Survey, 2019

Table 5 shows the professional qualification of the respondents. It indicates that (23.8%) of the respondents were registered under the Nigeria Institute of Building, while the majority of

the respondents were registered under the Nigeria Institute of Quantity surveyors (28.6%). 12% of the respondents were registered under the Nigeria society of Engineers, 19.0% were registered under the Nigeria Institute of Architects, while the rest of the respondents were unregistered under any of the professional bodies.

Analysis of Research Objectives

Table 6 Root causes of change in a public building in Bauchi state

Root causes of change in a public building									
Rating	5	4	3	2	1	Total	Mean	STD	Rank
Risk factors	26	10	4	1	1	42	4.40	0.94	1st
Complexity of design	22	15	3	2	0	42	4.36	0.82	2nd
Governmental financial problems	21	14	5	2	0	42	4.29	0.86	3rd
Poor procurement process	21	15	3	1	2	42	4.24	1.03	4th
Varying specifications by consultant	20	14	6	1	1	42	4.21	0.95	5th
Sketchy working drawing	17	5	6	2	2	42	4.02	1.09	6th
Varying specifications by client	11	16	12	2	1	42	3.81	0.97	7th
Change in a project schedule	10	7	13	8	4	42	3.26	1.29	8th

Field Survey, 2019

In this section, the root causes of change in public building projects in Bauchi State were addressed. As it relates to the first objective of the research discussed. On a Likert score of 1 to 5, descriptive statistics were used to determine the standard deviations and the mean score of the variables, where, a scale “5” very high, “4” high, “3” neutral, “2” low and “1” very low. In order of agreement, “Risk factor” was ranked first based on the average mean of 4.40 while “complexity of design” with the average mean value of 4.35 was ranked second, “Governmental financial problem” was ranked 3rd with an average mean of 4.29 “poor procurement process” was ranked 4th with a mean 4.23, lastly “varying specification by the consultant” was ranked 5th with a mean of 4.21

Table 7 Detrimental effects of changes in public building projects in Bauchi state

Rating	5	4	3	2	1	Total	Mean	STD	Rank
Quality Degradation	30	11	1	0	0	42	4.69	0.51	2nd
Cost overrun	28	9	2	1	2	42	4.52	0.89	3rd
Delay in completion	26	12	2	1	1	42	4.36	1.03	5th
Conflict and disputes among construction parties	20	8	6	6	2	42	3.90	1.28	9th
Logistics delay	15	15	10	1	1	42	4.00	0.96	6th
Delay in payment	16	14	8	2	2	42	3.95	3.95	8th
Productivity degradation	10	20	5	5	2	42	4.69		1st
Re execution of work	20	10	5	5	2	42	3.97	1.24	7th
Time overrun	26	12	2	1	1	42	4.45	0.88	4th

Field Survey, 2019

The results in Table 7 show the detrimental effect of change of public building projects in Bauchi State. In order of agreement, “Productivity degradation” was ranked first based on the average mean of 4.70, while “Quality degradation” with an average mean value of 4.69 was ranked second, “Cost overrun” was ranked 3rd with an average mean of 4.52, “Time overrun” was ranked 4th with a mean 4.45 and lastly “Delay in completion” was ranked 5th with a mean of 4.36.

Table 8: Recommend strategy and control for reducing the detrimental effects of change in public building projects in Bauchi state

Recommend strategy and control for reducing the detrimental effects of change in public building projects in Bauchi state	Rating	5	4	3	2	1	Total	Mean	STD	Rank
Value engineering		34	6	2	0	0	42	4.74	0.063	1st
Comprehensive design details		30	10	2	0	0	42	4.67	0.57	2nd
Reduction of contingency		29	11	2	0	0	42	4.55	0.80	3rd
Completeness of order documentation		28	10	4	0	0	42	4.57	0.67	4th
Clarity of project requirement		24	16	2	0	0	42	4.52	0.59	5th
A thorough investigation of the site		22	18	2	0	0	42	4.48	0.59	6th

Use of project scheduling/management techniques	21	18	3	0	0	42	4.43	0.63	7 th
Freezing design	20	19	3	0	0	42	4.40	0.62	8 th

Field Survey, 2019

The results in Table 8 recommend a strategy that will control and reduce the detrimental effects of change in public building projects in Bauchi State. In order of agreement, “Value engineering” was ranked first based on the average mean of 4.73 while “Comprehensive design details” with an average mean value of 4.66 was ranked second, “Reduction of contingency” was ranked 3rd with an average mean of 4.54 “completeness of order documentation” was ranked 4th with a mean 4.57 and lastly “adequate payment from client” was ranked 5th with a mean of 4.31.

Discussion of findings

This section presents the discussion of the study findings from the questionnaires and the desk study. The cause of change orders, the effect of change orders, and recommendations to minimize change orders are discussed.

Causes of change

From the questionnaires, the common causes of change orders on public building projects were risk factors, the complexity of design, Governmental financial problems, poor procurement process, and varying specifications by the consultant were the most causes of change orders. The causes of change orders were ranked in descending order of mean and the most frequent were identified.

The first major cause of change orders was the risk factors. This could also be caused due to risk factors inherent in construction cash flow. This similarly confirms the literature by Odeyinka, Lowe, and Kaka (2012), that risks are the major factors that can cause change and a project to fail in meeting its goals. For example, as they pointed out, positive changes between actual and forecasted cash flows are the impacts of risk factors that occur during construction.

The complexity of design was the second major cause of change orders. This occurs due to the inadequate skill of the designer. Pheng and Teo (2004) explained that designs require unique skills and construction methods. Complexity affects the flow of construction activities, whereas simple and linear construction works are relatively easy to handle (Fisk, 2007). Hence, complexity may cause major changes in construction.

Governmental financial problem is the third according to the ranking of this finding. The government may run into a difficult financial situation that may prompt changes. This

similarly confirms the literature by Mohammad *et al.*, (2010), Financial problems of the government bodies and stakeholders frequently affect the quality and progress of the project. This problem can lead to changes in work schedules and specifications, which then affect the quality of the construction. The poor procurement process was ranked 4th indicating a major cause of change in public building projects. A literature review by Arain *et al.*, (2004) also pointed out that occasionally, the procurement delay may cause an entire change or replacement for originally specified materials or equipment for the project.

Varying specification by the consultant was ranked 5th in the result which explained how the consultant contribute to change and this could lead to rework. Changes in specifications are frequent in construction projects with inadequate project objectives (O'Brien, 2008). In a design stage, it could be a failure to change the specification due to a change of mind of the client or the consultant which results in change orders. Consequently, a change in specifications can be the major cause. Ndiokubwayo (2008), listed changes in specifications as among the major causes.

The detrimental effect of change

The results of this research also showed that Productivity degradation, quality degradation, cost overrun, time overrun, and delay in completion were the most effective change as ranked in Table 7. Productivity degradation was ranked first in this research based on responses from the questionnaire. However, construction works that are associated with changes have a negative impact on both plant and labour productivity. Alinaitwe, Mwakali, and Hansson (2007), also stressed that loss in productivity implies loss of time and subsequent delays, indicating that it has a major impact on a construction project

The second major detrimental effect of change according to this study is Quality degradation. Quality degradation is also the major impact as reviewed in the literature part.

Cost overrun was the third major impact of change orders as identified in this study. An increase in project cost is also the major impact as reviewed in the literature part. For example, Koushki, Al-Rashid, and Kartam (2005) found that change orders impacted both the completion time and costs of projects. These impacts were due to detrimental change orders since they negatively impacted the client's value. Any major additions or alterations in the design may eventually increase the project cost. It was not unexpected for the project cost to increase due to frequent changes in the project. This was because the change orders may impact the project's total direct and indirect costs. Therefore, any major addition or alteration in the design may eventually increase the project cost.

Time overrun and delay in completion were ranked 4th and 5th respectively According to the findings from the questionnaire investigation, the delay is the common impact on public building projects that increases the consistency of the response to a conclusion. Previously (Ibbs, 1997a) pointed out that completion schedule delay was a frequent result of changes in

construction projects. This confirmed that changes impact the project adversely, leading to delays in the project's completion. Likewise, many construction projects worldwide have suffered delays due to changes such that their value for money has been jeopardized. Thus, it can be concluded that changes result in the requirement of additional time to complete the job (Priyantha, Karunasena, and Rodrigo, 2011).

Recommend strategy and control for reducing the detrimental effects of change in public building projects

The findings also suggested the most recommended strategies to minimize change orders. These strategies were Value engineering, comprehensive design details, reduction of contingency, completeness of order documentation, and adequate payment from the client to minimize change on public building projects.

According to the findings from the questionnaires ranked previously in **Table 8**, the first most recommended strategy was Value engineering this would provide an opportunity for the consultant to review and finalize project goals at the preliminary phase. Literature also reviewed that, this is a cost minimization procedure in the design phase of a construction project. There will be no need for rework or demolition at the construction site when a change in design element at this stage occurs. Project goals are clearly defined when value engineering is exercised at the preliminary phase of a project to assist in minimizing change or disparities in project designs (Dell'Isola, 2002).

Comprehensive design detail was the second most recommended strategy to minimize change orders. Any change or modification made later will result in additional work which leads to changes. The design team should submit a complete design for tendering. This would assist in reducing the occurrence of changes during the construction phase where the impact of changes can be severe on the project. This confirms the contribution of Hao, Shen, Neelamkavil, and Thomas (2008), who proposed clear design specifications before bidding and curbing corruption in the Procurement process as the potential mitigation measures of detrimental changes in construction projects. An exhaustive design is very easy to understand and manageable to work with (O'Brien, 2008).

There were higher frequencies for claims for payment of work and extensions of time occasioned by the execution of the alleged varied work. In certain circumstances, loss of profit, loss, expense, and damages are also included within the claims. The major events that trigger the disputes were the terms of the contract (express or implied), the effects of instructions, and disputes over the rates. Although there were various points that counsel took when arguing for or against the claim, two bases and/or defense of claims are different from the rest: 1. The claim or relief sought is expressly provided for in the contract, and 2. The claim or relief sought is not within the meaning of the clause in question or outside the original agreement.

These findings suggest that there are areas over change clauses that need to be clarified. Presumably, some of the disputes could have been avoided if both parties had similar conclusive notions of the scope and limitations of the contract. The obvious differences in their interpretations suggest that it may be fruitful to improve the terms, especially on time and money-related issues.

CONCLUSIONS AND RECOMMENDATIONS

This section draws conclusions and recommendations. Conclusion constitutes the recapitulation of major findings from the exploratory study, interviews, and research instrument. The recommendation section highlights the practical implication of the study and suggests further research studies

Conclusion

The project has revealed that change is inevitable in building projects, thus having a great impact on the duration and completion of public residential building projects. It was revealed that not all changes are caused by architects and the project team alone but corruption has an impact on it to an extent. An exploratory study was done on some selected public residential building projects and data was collected, changes have impacts like an increase in contract sum and extension of time in the contract duration in some of the selected building projects. However, not all changes increased the final contract sum, some have value, while some have little or no impact on the final cost of the project.

In the same vein, not all changes resulted in the extension of contract periods as some had little or no impact on the duration and completion of building projects. Research also revealed that unfavorable site conditions, incomplete architectural design, insufficient time frame for planning, and changes in specification by the architect are the major factors that expose buildings to change. Since change is encountered on most public building projects, there are unforeseen threats that must be accommodated by making provisions and procedures in the contract and administration of the project, for which both the client and the contractor must be prepared to, negotiate.

Recommendations

Based on the findings of this study the following recommendations are proposed to minimize the occurrence of change in public building projects:

2. As part of preconstruction planning, the Government, client, and the Institution's management should acquire the right way for the entire corridor before the contractor moves in to commence works.
3. Contract Change issued should always be accompanied by time for carrying out the specific changes.

4. Project Managers must agree that delays or impacts which cause extension of time and/or increase in cost are a frequent occurrence in project construction and plan for their time
5. Contractors should regularly try to identify and bring to the attention of the client project risks such as an ill-defined scope in the early stages like at tender clarification meetings of a project.
6. A conclusive feasibility study that entails a thorough geotechnical investigation that brings to the fore all subsurface conditions necessary for the design.
7. The consultant should produce a concluding design and working drawings and contract drawings should be competing at the tender stage
8. Proper coordination between the overseas and local designers so that the local design standards and requirements are adhered to and the actual site conditions are taken into consideration during design.
9. Enhance communication and all parties should be proactive at all times.
10. The design team must patiently and carefully examine and interprets the client's brief and quality time should be spent providing several sketches, detailed cost control should be done at this stage to represent the client's intended project and financial capacity before preparing a detailed drawing.

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**IMPACT OF OPERATIONS MANAGEMENT STRATEGY ON
ORGANIZATIONAL PERFORMANCE OF NIGERIAN MANUFACTURING
INDUSTRY: MEDIATING EFFECT OF ORGANIZATIONAL COMPETENCE**

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Abstract

The Nigerian manufacturing sector has been plagued by a series of issues that have continued to impact productivity and profitability due to the unfavorable macroeconomic conditions coupled with the outbreak of the COVID-19 pandemic, which has become a global concern. This current study, therefore, examines the mediating effect of organizational competence on the relationship between management strategy and organizational performance in the manufacturing industry. A judgmental sampling approach was used to select the Procter & Gamble Company, but using a simple random sampling technique to select 252 respondents from a total population of 2,878 employees. Data were collected from respondents using a structured questionnaire. Data analysis was performed using structural equation modeling. The results show that supply chain strategy is positively and significantly associated with organizational competence, value proposition strategy, procurement strategy, facility management strategy, and organizational performance, whereas procurement strategy is associated with organizational performance but found not to be significantly related. Although

the study also confirms that organizational competence does not mediate between supply chain strategy, procurement strategy, and organizational performance. Organizational competence is partly mediates between value proposition strategy and organizational performance, and perfectly mediates between value facility management strategy and organizational performance. Therefore, manufacturing sector should focus on making their procurement strategies more strategic so that the sector can control costs through careful forecasting, planning, budgeting, reporting, and monitoring.

Keywords: Competence, Value Proposition, Supply chain, Facility management, Procurement

Introduction

The important role of manufacturing in a country's economic development in terms of creating jobs, alleviating poverty, and contributing to the Gross Domestic Product (GDP) has been recognized by researchers, economists, academics, and practitioners around the world. According to Sajuyigbe, Ayeni, and Inegbedion (2021), the sector employs over 3.7 million people worldwide and the sector is also a strong economic pillar for both developed nations and emerging economies. The United Nations (2020) confirms that the sector has turned many developed countries such as the US, UK, Japan, Germany, and France into wealthy nations and now China into the world's growing economy. In Nigeria, the sector is recognized as a major employer of the labor force and contributes significantly to the gross domestic product (GDP) (Adenikinju, & Ayorinde, 2011).

Paradoxically, the Nigerian manufacturing sector has been hit by a series of problems that have continually impacted productivity and profitability due to the adverse macroeconomic conditions coupled with the outbreak of the COVID-19 pandemic, which has become a global concern. Apparently, Sajuyigbe et al. (2021) say that the unfavorable macroeconomic conditions and the COVID-19 surge have killed many manufacturing firms and some are struggling to survive. The National Science and Technology Infrastructure Agency also recognizes that advanced manufacturing technologies, manufacturing processes, equipment, and systems around the world are rapidly changing to meet new customer needs, competitive challenges, and new technologies. For this reason, only finished products are imported into the country.

This unpleasant scenario has forced manufacturers to adopt operations management strategies (OMS) that ensure superior performance. Ngina (2019) argues that OMS creates the highest possible level of efficiency within an organization. According to Bosire and Owour (2018), an OMS takes over the entire production process and ensures that each step is carried out efficiently to ensure maximum productivity. The result is a quality product/service that meets consumer needs. Tanui (2015) also confirms that the OMS creates competencies that

companies can use as weapons to gain a competitive advantage. Similarly, Dao, Walker, and Strickler (2020) confirm that the implementation of OMS helps improve the competitiveness of companies, impacting corporate performance not only in high-end manufacturing companies but also in SMEs.

After OMS, organizational competence was recognized as a powerful factor influencing company performance. Organizational competencies have been viewed as simple employee skills required to achieve organizational goals that drive the implementation and alignment of integrated business strategies (Grant & Jordan, 2015). An organization's capabilities describe what it does best. These competencies and skills represent how your organization expects you to achieve what you need to achieve. Such competencies may include decision-making, risk-taking, problem-solving skills, attention to detail, innovation, customer service, strategic perspective, teamwork, and strategic leadership (Nowak, 2012). Previous studies have attempted to examine the impact of operational management strategies on organizational performance in manufacturing and service industries in both developed and emerging economies (Ngina, 2019; Bosire & Owour, 2018; Tanui, 2015; Dao, Walker, & Strickler, 2020).

However, none of these studies conceptualized operations management strategy as this study intends to measure the construct. In addition, none of the available empirical studies has established the mediating effect of organizational competence on the relationship between operations management strategy and organizational performance in the manufacturing sector. This study adopts operations management strategy measurement to be supply chain Strategy, value proposition strategy, facility strategy, and procurement strategy. This serves as a conceptual model gap that the study intends to establish in the strategic management literature.

Review of Related Literature and Hypotheses Development

Operations Management Strategy

Different authors give different insights into operations management. According to Pooja and Pallawi (2019), operations management is the management of all processes involving the transformation of resources to provide optimal value to customers. Operational management, as defined by Gowen, and Tallon (2012), involves planning, organizing, and managing all of an organization's workforce and product resources. This includes oversight of workers and various assets involved in product development. Anil and Suresh (2017) see it as a method and process for achieving the recorded goals of a working framework. Organizations have put a lot of effort into maintaining a high level of efficiency. These efforts typically include any process to reduce administrative and commodity costs (Rehema, Stephen & Gituro, 2020). Werunga (2016) clarifies that organizations typically focus on operational management to meet market demand and stay on top while working with limited resources. The development and application of good functional practices are entirely dependent on effective operational

management practices. However, for an organization to be efficient enough to achieve overall cost reductions through operational management, it needs supply chain management, value proposition management, facility management, procurement management, and organizational ability to meet objectives. Due attention should be paid to the area of business management. Azmi and Ika (2020) describe the supply chain strategy as a roadmap that helps companies get their products to their customers as smoothly as possible. This plan optimizes all stages of the supply chain, including material sourcing, manufacturing, delivery, and logistics. Qiao, Zhang, and Cheng (2016) use value proposition strategies to introduce a company's brand to consumers by telling them what the company stands for, how it operates, and why it is worthy of doing business. A facility management strategy is therefore a link between facility management and facility planning, with a focus on long-term outcomes and involving facility management in business initiatives (Chotipanich & Lertariyanun, 2011). According to Akubuko, Obodo, Musa, and Jimoh (2019), procurement strategy is a source of sustainable value for companies. Ensuring the overall performance of the company by setting purchase and spending targets for the company's goods and services.

Resource-based view theory reiterates that management practices are internal factors that contribute to competence development. As such, they can provide a competitive advantage to firms (Ngina, 2019). The operationalization of RBV theory is fundamental as it guides managers in executing resource-based strategies (Ngina, 2019; Kipnetich, 2016). This theory argues that operations management strategies such as supply chain strategy, value proposition strategy, facility strategy, and procurement strategy can be used as weapons by organizations to gain a competitive advantage. A study of manufacturing companies in Turkey by Akgul, Gozlu, and Tatoglu (2015) found that operational strategy was significantly correlated with organizational performance. In a similar study, Elisa, Andrea, and Massimiliano (2013) also confirmed that production and supply chain activities influence firm performance. Another study conducted in Kenya by Kipnetich (2016) reaffirms the significant impact of operational strategy execution on performance in terms of superior customer responsiveness and innovation.

Similarly, Chotipanich and Lertariyanun (2011) investigated the impact of facility management strategies on organizational performance in Thailand. They found that facility management strategy was positively correlated with business performance. Additionally, Mohammad and Elham (2014) conducted a study on supply chain strategy and organizational performance in Kuwait. Evidence shows that supply chain strategy is a strong predictor of business performance. A study by Pooja and Palawi (2019) argues that operational management activities influence job quality in service firms. Based on theoretical and empirical evidence, the following hypotheses are formulated:

H₁: Supply chain Strategy has a significant influence on organizational performance.

H₂: Value proposition strategy has a significant influence on organizational performance

H₃: Facility strategy has a significant influence on organizational performance

H₄: Procurement strategy has a significant influence on organizational performance

Organizational Competence

The concept of organizational competency has traditionally been narrowed to employee skills necessary to achieve organizational goals that drive the implementation and alignment of integrated business strategies (Grant & Jordan 2015). In this 21st century, organizational competencies go beyond employee skills to develop the necessary skills, the necessary information, and the right organizational culture necessary for an organization to fulfill its mission. Organizational competencies represent what an organization does best. These competencies and skills represent how your organization expects you to achieve what you need to achieve. These competencies may include decision-making, risk-taking, problem-solving skills, attention to detail, innovation, customer service, strategic perspective, teamwork, and strategic leadership (Nowak, 2012). Previous research has linked organizational competence to management practices and organizational performance (Pooja & Palawi, 2019; Rehema, Stephen & Gituro, 2020). According to Dragomirescu (2004), increasing the level of competence of an organization is primarily a matter of implementing operational management strategies and the need to pay due attention to supply chain management, value proposition management, facilities management, and procurement management. Nowak (2012) reiterates that organizational competencies have a lot to do with supply chain strategy; the ability to operate facilities efficiently, and organizational performance. Shi et al (2014) also advocate that organizational competencies representing various skills in the supply chain, value proposition, facilities management, and procurement validate organizational performance. This led to the following hypotheses:

H₅: organizational competence mediates between supply chain strategy and organizational performance.

H₆: organizational competence mediates between value proposition strategy and organizational performance

H₇: organizational competence mediates between facility management strategy and organizational performance

H₈: organizational competence mediates between procurement strategy and organizational performance

CONCEPTUAL FRAME WORK

After the careful study of literature review, the following conceptual model is formulated to illustrate the mediating effect of organizational competence on the relationship between operations management strategy and organizational performance. Figure 1 below shows the

hypothesized model with the dimensions of the independent variables separately linked to the mediator and dependent variable.

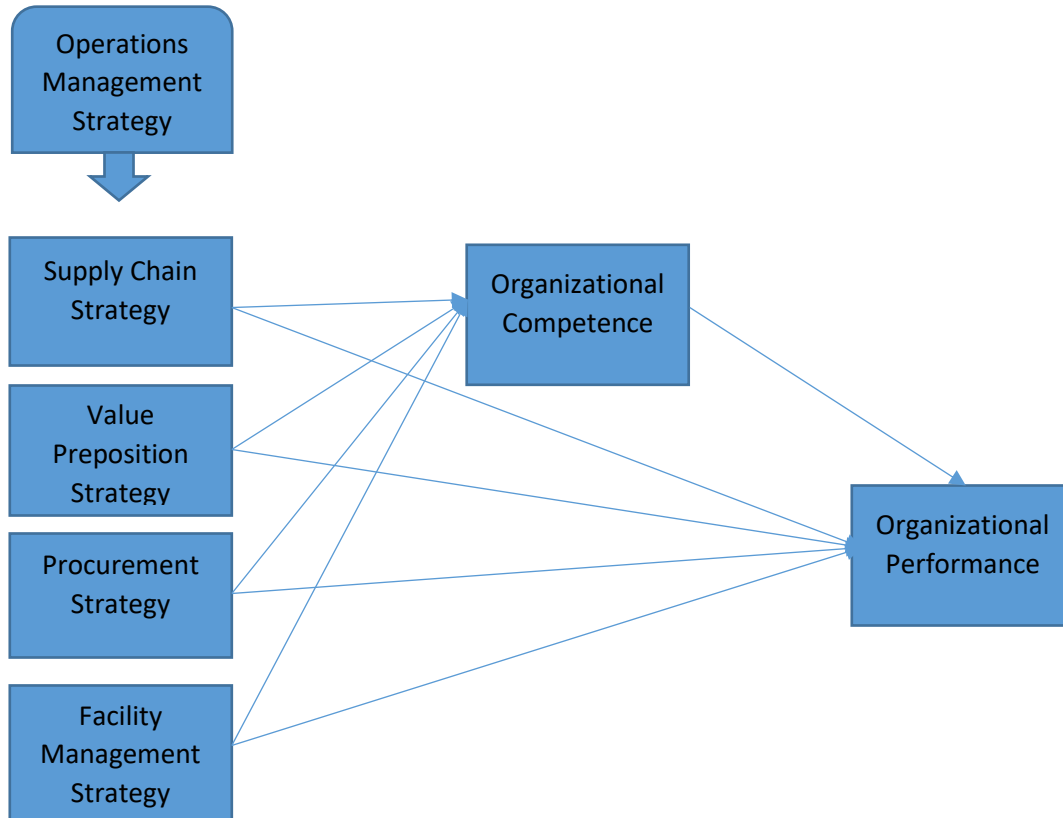


Figure 1: Conceptual Model

Methodology

This study used a survey study because it provides hard numbers on people's opinions and behaviors that can be used to make important decisions. Procter and Gamble Plc., was selected using a judgmental sampling procedure while simple random sampling techniques was used to select two hundred and fifty two (252) respondents from a total population of 2,878 staff members. The sample size is determined by the formula suggested by Mugenda and Mugenda (2003). The choice of Procter and Gamble Plc was based on the fact that the company is an American Multinational corporation that deals with consumer goods and operates in both developed and developing nations. Therefore, it is expected that the company has an effective operations management strategy for Achieving Competitive Advantage. A structured questionnaire was employed to collect data from the respondents. Structural Equation Modelling was used to perform Data analysis with the aid of STATA version 15.

Survey Instrument

The instruments used for the study consists of supply chain strategy scale, value proposition strategy scale, facility management strategy scale, procurement strategy scale, organizational competence scale, and organizational performance scale.

Supply Chain Strategy Scale: This scale was derived from the study of Azmi and Ika (2020)

The survey comprises 6 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.82

Value Proposition Strategy Scale: The scale was developed and validated by Qiao, Zhang, and Cheng (2016). The survey comprises 5 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.79.

Facility Management Strategy Scale: This scale was derived from the work of Ngina, (2019). The survey comprises 5 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.88.

Procurement Strategy Scale: This scale was derived from the work of Pooja and Pallawi (2019). The survey comprises 4 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.88.

Organizational Competence Scale: This scale was derived from the work of Ngina (2019). The survey comprises 4 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.88.

Organizational Performance Scale: This scale was derived from the work of Akgul, Gozlu, and Tatoglu (2015). The survey comprises 4 items. The scale was anchored on a five-point Likert scale (ranging from one = strongly disagree to five = strongly agree) for all the study instruments. The scale's internal consistency factor α was 0.88.

Table 1: **Summary of Results of the Measurement Instruments Validation**

variable		Cronbach's alpha
Supply Chain Strartegy Scale- – Cronbach Alpha –(FCS = 0.851)		
FCS1	We consider quality as our number one criterion in selection of Suppliers	0.795
FCS2	We frequently interact with customers to set reliability, responsiveness, and other standards for us	0.748

FCS3	Information exchange between our supply chain partners and us is timely	0.822
FCS4	Information exchanged between us and our supply chain partners is reliable.	0.764
FCS5	We facilitate customers' ability to seek assistance from us	0.798
FCS6	Development and access to new knowledge and resources of new products.	0.761
Value Proposition Strategy Scale - Cronbach Alpha – (VPS = 0.872)		
VPS1	We always delivers value to our customers through provision of quality services	0.789
VPS2	We make it our duty to ensure that the services offered to our customers are dependable	0.855
VPS3	Our firm always aims to differentiate its services from those of competitors to maximise value to our customers	0.797
VPS4	We increase the value delivered to our customers by offering extra benefits which are not available from our competitors	0.872
VPS5	Our firm seeks to determine the key benefits in services and provide them to customers as a key strategy in delivering value to our customers	0.696
Procurement Strategy Scale- Cronbach Alpha – (PS = 0.879)		
PS1	There is effective suppliers supervision	0.821
PS2	By keeping records, the organization avert the stress of duplicating recording efforts	0.766
PS3	Organization controls the cost through carefully forecasting, planning, budget preparation, reporting and monitoring.	0.817
PS4	Organization manages the cost to avoid unnecessary spending.	0.748
Facility Management Scale - Cronbach Alpha – (FM = 0.832)		
FM1	This firm critically evaluates several sites in search for the most appropriate location to set up the business.	0.789

FM2	In our firm, our processes are adequately considered in line with structures, customer involvement and resource flexibility	0.798
FM3	We adopt the office layout design that promotes transparency among our staff members.	0.818
FM4	The office layout arrangement enhances smooth flow of processes	0.809
FM5	Our firm seeks to adopt the most appropriate layout strategy in order to maximise resource utility.	0.787
Organizational Competence Scale- Cronbach Alpha – (OC = 0.885)		
OC1	The staff demonstrate excellence in the speed of service delivery to customers.	0.812
OC2	The staff demonstrate high capability of constantly designing new products to our customers.	0.803
OC3	The staff of this firm demonstrate high responsiveness to customer needs.	0.791
OC4	The staff demonstrate unique capabilities that are unmatched in the industry	0.788
OC5	In this firm, the staff members have acquired a vast wealth of theoretical and practical knowledge in the production processes	0.733
Organizational Performance – Cronbach Alpha – (OP = 0.841)		
OP1	We offer products/services that are highly reliable with reasonable price	0.760
OP2	We offer products that are very durable at low price	0.809
OP3	Managerial restructuring of production based on the introduction of foreign advanced technology and equipment.	0.799
OP4	There is high response and speed during production processes.	0.764
OP5	There is organizational high products reliability that meet up the standard.	0.785

OP6	The organization experiences wide range of production capacity.	0.805
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Table 1 above shows that the factor weights for all indicators are greater than 0.5, indicating that the question explains the variability of those variables. This makes the measurement model suitable for analysis.

Results of Data Analysis

Distribution of Respondents

The study reveals that 36% of the respondents are male while 64% of them are female. This implies that organization has more females and males, that the job is flexible, not labour-intensive and can be handled by females. In relation to the qualification, 18.5% of the respondents had SSCE, 26% of the majority respondents had NCE and ND, 53%, of the respondents had HND/BSc, and 2.5% of others had other qualifications. This implies that the majority of the employees have B.Sc. The result also shows that 61% representing the majority of the respondent are of lower level management, 35.5% are of middle level management and 3.5% are of top management. This result suggests that the majority of the staff are in lower management level, communication flows from top to middle to lower level management, also orders and specifications are done according to dictates of the management. It was also revealed that 16.0% of the respondents have 0-2 years of experience in the establishment, 13.5% had 3-5 years of experience, 4.5% of the respondents have 6-9 years of experience, and 66% representing majority of the respondents have 10years and above years of experience. This implies that the establishment has high employee retention which leads to expertise and performance.

Table 1: Correlation Analysis using Standardized Coefficient

Relationship between variables	R-value	P-value	95% Conf. Interval	
cov(SCS,VPS)	.671**	0.000	.5851227	.7575255
cov(SCS,PS)	.430**	0.000	.3026139	.5583052
cov(SCS,FMS)	.519**	0.000	.4048105	.6339881
cov(VPS,PS)	.320**	0.000	.1795223	.4611612
cov(VPS,FMS)	.451**	0.000	.3266144	.5764698
cov(PS,FMS)	.759**	0.000	.6930363	.8258663

Table 1 shows the link between the variables (supply chain strategy, value proposition strategy, facility management strategy, procurement strategy). The results show that supply

chain strategy also has a significant relationship with supply chain strategy, procurement strategy, and facility management strategy with the r-values of 0.671**, 430**, and .519** respectively. Evidence shows that value proposition strategy has a significant association with procurement strategy and facility management strategy with the r-values of .320** and .451** respectively. It was also discovered that procurement strategy has a direct link with facility management strategy ($r = .759^{**}$). This means that the operational management dimension has a lot to do with customer satisfaction and loyalty.

Table 2: Path Analysis (Direct Estimation)

Relationship between variables	Estimates	S.E	t-value	p-value
SCS → OC	.169	.763	2.21	0.027
SCS → VPS	.321	.064	4.96	0.000
SCS → PS	.194	.085	2.35	0.019
SCS → FMS	.592	0.854	6.93	0.000
OC → OP	.236	.073	3.22	0.001
SCS → OP	.192	.071	2.71	0.007
VPS → OP	.198	.064	3.09	0.002
PS → OP	.098	.077	1.27	0.203
FMS → OP	.212	.089	2.37	0.018

Table 2 shows path coefficient results. The result presented that supply chain strategy has a positive association with organizational competence ($\beta = 0.169$, $t = 2.21$), value proposition strategy ($\beta = 0.321$, $t = 4.96$), procurement strategy ($\beta = 0.194$, $t = 2.35$), facility management strategy ($\beta = 0.592$, $t = 6.93$), and organizational performance ($\beta = 0.192$, $t = 2.71$). The p-value of 0.000 further proves that the associated is highly significant. This study is consistent with previous studies that supply chain strategy, value proposition strategy, and facility management strategy are key determinants of firm performance (Pooja & Pallawa, 2019; Qiao, Zhang & Cheng, 2016; Ngina, 2019; Azmi & Ika, 2020). A t-value of 0.088 and a p-value of 0.203 prove that procurement strategy is not significantly associated with organizational performance. This result contrasts with previous studies that found procurement strategy to be an absolute condition for firm performance (Azmi & Ika, 2020; Pooja & Pallawi, 2019; Ngina, 2019). So **H₁**, **H₂**, and **H₃** are confirmed, but **H₄** is not supported. The implication of this insight is that operations management strategy places the manufacturing sector in the spotlight on global relevance by implementing supply chain strategy, value proposition strategy and

facilities management strategy to gain competitive advantage. Ngina (2019) also sees the operations management strategy as the cornerstone of a company's competitiveness.

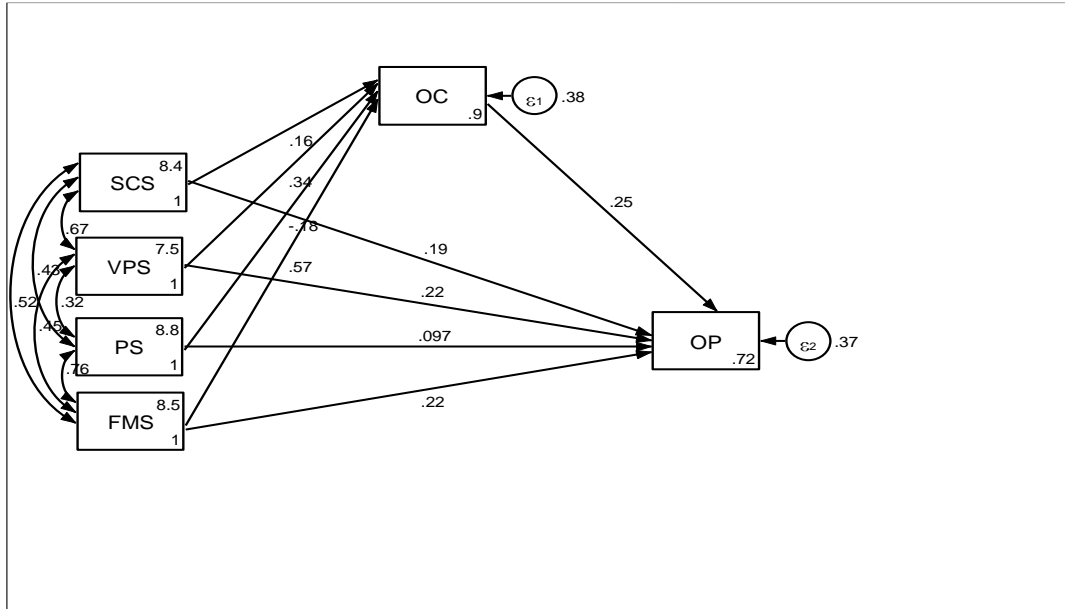


Figure: 2 Structural Equation Modeling

Table 3: Structure Equation Modelling with mediator (Indirect effects)

Relationship between variables	Estimates	S.E	t-value	p-value	95% Conf. Interval	
SCS → OC → OP	.0400	.021	1.82	0.068	-.0029639	.0830626
VPS → OC → OP	.076	.0628	2.70	0.007	.0209484	.1313879
PS → OC → OP	.046	.024	1.90	0.058	-.0936922	.0014943
FM → OC → OP	.140	0.480	2.92	0.003	.0462935	.2345599

Table 3 shows the mediating effect of organizational competence on the relationship between supply chain strategy, value proposition, facility management strategy, and procurement strategy. Using standardized coefficients, an indirect beta value of 0.0400 and a p-value of 0.068 indicate that organizational competence does not mediate between supply chain strategy and organizational performance. The p-value of 0.058 also indicates that organizational capabilities do not mediate procurement strategy and organizational performance. According to Kenny and Baron (2003), a p-value of >5% for a mediating variable implies no mediation. A p-value of 0.007 indicates that organizational competence partially mediates value proposition strategy and organizational performance. An indirect beta value of 0.14 and a p-value of 0.003 suggest that organizational competence perfectly mediates value facility

management strategy and organizational performance (see figure 2). This is proposed by Kenny and Barron (2003), when the independent variable and the mediator are both predictors of the dependent variable, partial mediation occurs, and when the independent variable is not a predictor but mediator is a predictor of dependent variable perfect mediation occurs. So H_5 and H_7 are unconfirmed, H_6 is partially confirmed, but H_8 is supported.

Conclusion

This current study establishes that supply chain strategy has a positive and significant association with organizational competence, value proposition strategy, procurement strategy, facility management strategy, and organizational performance. Furthermore, procurement strategy was found not be significantly associated with organizational performance. The implication of this insight is that operations management strategy places the manufacturing sector in the spotlight on global relevance by implementing supply chain strategy, value proposition strategy and facilities management strategy to gain competitive advantage. The study also confirms that organizational competence does not mediate between supply chain strategy, procurement strategy and organizational performance. Evidence also reveals that organizational competence partially mediates between value proposition strategy and organizational performance, while organizational competence perfectly mediates between value facility management strategy and organizational performance.

Recommendations

The following recommendations are made:

- i. That manufacturing sector must focus on making procurement strategies more strategic so that the organization can control costs through careful forecasting, planning, budgeting, reporting, and monitoring.
- ii. That manufacturing sector must ensure that its employees are highly responsive to customer needs and continue to be highly competent in continuously developing new products for their customers.
- iii. That manufacturing sector must continue to add value to its customers by offering additional benefits that its competitors do not offer.
- iv. That manufacturing sector must also implement effective and better strategies that enable the acquisition, dissemination and application of knowledge to improve the performance of the company.
- v. That manufacturing sector must focus on building skills such as assigned, managerial, transactional and technical skills to ensure sustained performance

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A REVIEW PAPER ON ALKALI SILICA REACTIONS IN CONCRETE

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ABSTRACT

Alkali-Silica Reactions (ASR) occurs over a long period of time. Reactions take place in concrete when the hydration product known to be highly alkaline cement paste and reactive non-crystalline silica which is found in many common aggregates, in the presence of moisture reacts. This results in the deterioration of concrete structures and can prove to be effective over time. The problem with this process is that it may not be noticeable during early stages with naked eyes but in the event of occurrence, it leads to considerable to severe damage of concrete structures. In areas with significant moisture during construction, Alkali Silica reactions are likely to be a problem in the long run.

Keywords: Alkali-Silica Reaction, Crystalline, Hydration, Moisture

INTRODUCTION

The sign of ASR is the occurrence of significantly large amounts of hydrous calcium aluminate sulphate $[\text{Ca}_6\text{Al}_2(\text{SO}_4)_3(\text{OH})_{12} \cdot 26\text{H}_2\text{O}]$ mineral (ettringite) in concrete. A typically colourless to pale yellow mineral crystallizing in the trigonal system, the prismatic crystals are typically colourless turning white on partial dehydration (see figure 1). The Calcium Hydroxide in the pore water is responsible for freeing the hydroxyl ions generated and also intensifies ASR. Signs of the alkali-aggregate reaction are observable in concrete after a period of about 15 to 30 years. To investigate early stages occurrence of ASR development, use of microscopy technique is required.

This research aims at simplifying the process of investigating the occurrence of alkali-silica reactions from concrete samples and developing a standard and simple procedure which does not require complicated machinery and lab conditions to carry out the work. It bridges the gap on economical aspect of laboratory work and on-site activities. Ordinarily, ASR is seen either by sulphate identifying means or by microscopy. Simple volumetric calculations and failure monitoring have not been employed. This is because normally it will take years to detect the occurrence of ASR.

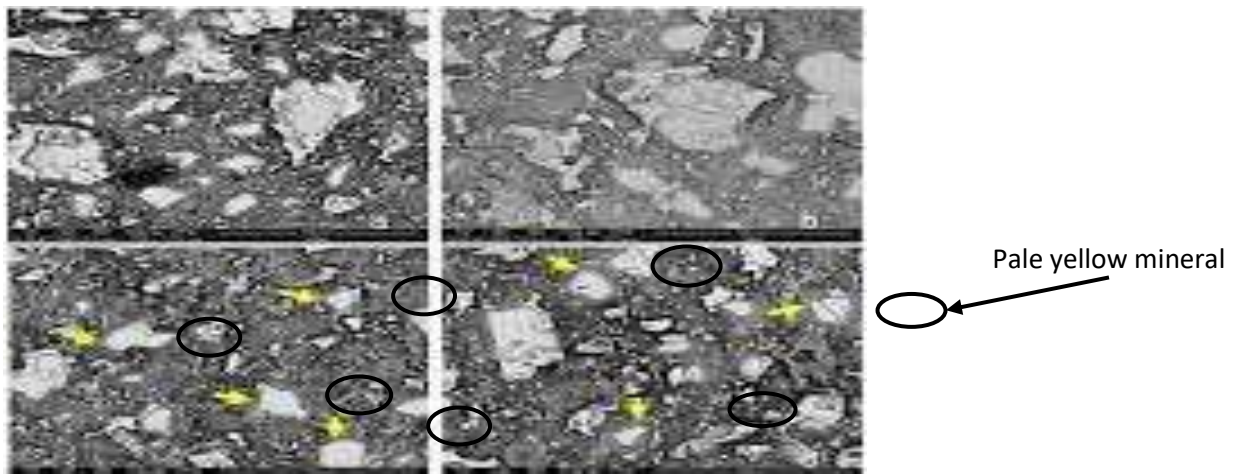


Figure 1: ASR Products with high alkali content (<https://www.understanding-cement.com/alkali-silica.html>)

FUNDAMENTALS OF THE OCCURRENCE OF ASR

Conventional Portland cement was measured and seen to have contributed around eight per cent of the whole anthropogenic CO₂ emission globally. Alkali Stimulated materials are looked upon as the probable material to be used as a replacement to Portland cement which can reduce the emission of CO₂. Alkali activated, material is what contribute to the occurrence of ASR (Luukkonen et al. 2018).

According to Richardson et al (2016), the products of hydration of the main silicate phases (Alite and Belite) in Portland cement are the same. These are calcium hydroxide and calcium silicate hydrate. A linear relationship was developed between Silica, Aluminium, and Calcium ratios in concrete mixes with cement blends that contain Alumino silicates as follows:

$$\frac{Si}{Ca} = 0.428 + 2.366 \left(\frac{Al}{Ca} \right) r^2 = 0.98 \quad (1)$$

Non crystalline silica is common in many aggregates and the reaction of that amorphous Silica and Alkaline cement paste causes the formation of Alkali Silica Reactions. The reactions occur in the presence of moisture.

Some of the cement replacement materials have relatively high quantities of reactive silica. Rice husk ashes which are residues found from processes done in productions and as a result of agricultural wastes combustion also can have a high amounts of silica which is reactive content and by percentage weight (greater than or equal to 90 by percentage weight). Amorphous silica is also said to originate in geothermal silica in the processes of geothermal power plants according to (Luukkonen et al. 2018).

It is imperative to determine the likelihood of the occurrence of alkali silica reactions during the early stages or during the construction stages of reinforced concrete structures. Zewdu et al (2013) states that the low service life of mended concrete structures has of late becomes of high concern.. The following diagrams give a summary of their findings on the repair of structures.

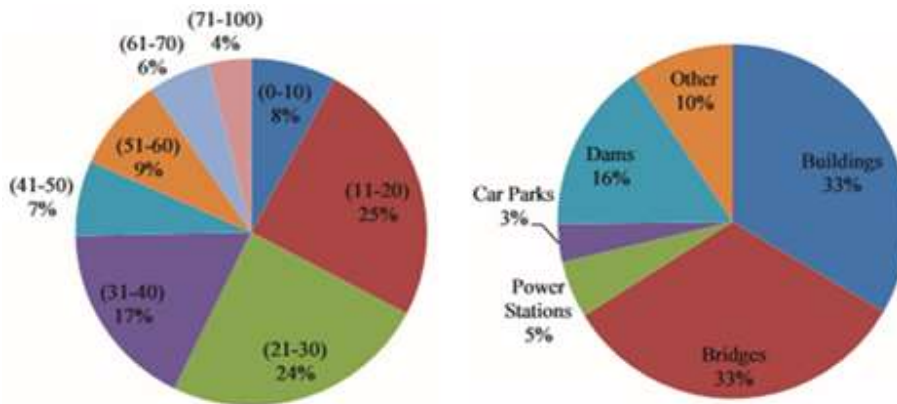


Figure 2: Distribution of the structure by type (<https://www.understanding-cement.com/alkali-silica.html>)

Structural failures that were as a result of Alkali activated reactions were stated as having caused 4% of the total damage of concrete structures in the whole of Europe, Zewdu et al (2013).

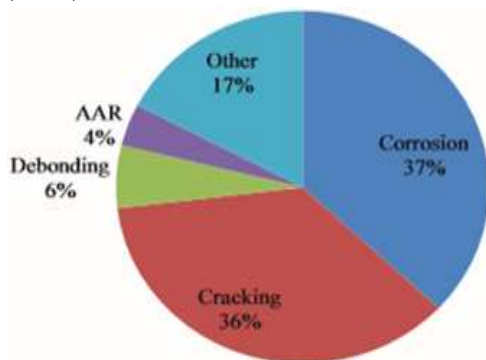


Figure 3: Failure mode of the concrete repairs (<https://www.understanding-cement.com/alkali-silica.html>)

Some Forms of active silica minerals are shown in the figure 4.



Figure 4: a, b, c forms of reactive silica (www.johnbetts-fineminerals.com)

Maddalena and Hamilton (2017) carried out an investigation in which they used injection of silica in concrete by use of Nano-silica material and after that did a comparison with diverse injection models. The figure beneath this paragraph shows their model of silica penetration depth after injection.

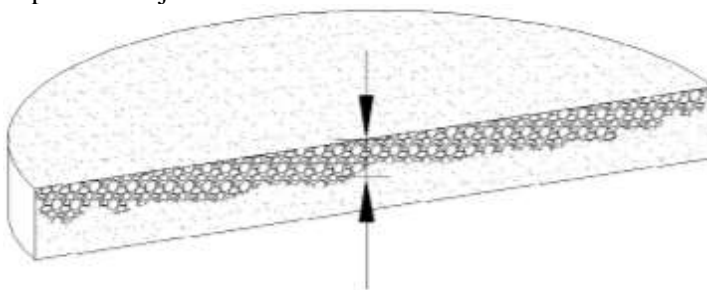
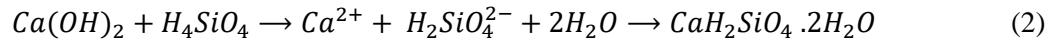


Figure 5: Model of Silica Penetration Depth (www.johnbetts-fineminerals.com)

Mechanism of ASR

The reactions between the amorphous or reactive silica and the active alkalis which forms the alkali-silicate gel occur initially at the aggregate/cement paste boundary



The founding principle to this research is Alkali silica reactions modelling. The model helps to develop volumetric analysis of reactions within a theoretical and hypothetical concrete sample. Conditions needed for ASR are shown below. Cubic cell of concrete of side s containing only one reactive particle of initial diameter D are used in this model reactions.

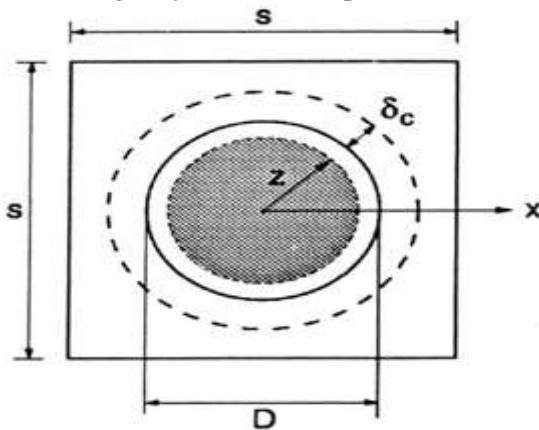


Figure 6: ASR Model (www.johnbetts-fineminerals.com)

For ASR to occur, the active silica and active alkalis must react with water. Reactive silica and the alkalis are needed to result in the formation of the alkali-silicate gel which occurs first at the aggregate and cement paste boundary. It was recommended that High Performance Concrete (HPC) is susceptible to ASR if especially when reactive aggregates are used, and that the reaction becomes complex depending on the admixture(s) used (Ferraris, 1995). They have known the gel to contain Sodium, Potassium and Calcium silicate. There are other factors that can be considered to be causing the Alkali aggregate reactions in concrete.

According to some reports, very small portion of the reactive material in the aggregate may be necessary to cause the distraction of the concrete (as low as about 0.5%). The gel is soft, but it takes in a large amount of water (by a process called osmosis). Due to this phenomenon, the gel attracts water and swells with the hydraulic pressure developed leading to an overall expansion of the concrete by exertion of stresses within. One reactive unit of initial diameter D and this means obviously $\rho_s E_s s^3 = \pi D^3 / 6$ Where E_s = silica concentration = mass of reactive silica per unit volume of concrete (kg/m^3), ρ_s = density of silica.

$$s^3 = \frac{\pi D^3 \rho_s}{6 E_s} \quad (3)$$

Overview of previously accomplished ASR work

According to Ronning et al (2013), the development of tests to determine the standard test of ASR has proved to be difficult. The reason they state is the difference in Alkali levels from

place to [place. There is there for a need to perform petrography tests to determine other significant parameters. Performance test to determine the following have been employed. Standard concrete test for aggregates combinations (fixed alkali level). Concrete test need to be conducted so as to detect the required reasonable alkali threshold level, i.e. at which the level of alkali is critical to a particular and very specific aggregate. Required Concrete test which are important for determining aggregate combinations incorporating various fractions at acceptable pessimism effect as given earlier Required Concrete test which are essential for developing cement or binder combination, with which specific Alkali Silica Reaction susceptible aggregate combination, and also grading will not at the end cause damages. Required Concrete test which is useful for developing a regional cement or binder combination to help mitigate structural damages when they combined with different aggregates for example a particular regional would be “worst case reference aggregate.” Concrete Required test for combination of the constituents intended for a precise job mix (but at a fixed, expectedly worst case w/b ratio).

The detection of alkali minimum levels for a particular area or country is doable. This exercise has indeed been done across Nigeria and in other areas as well. Due to the various minerals which are generally contained in aggregates, the severe disruption extent of the cement paste in concrete may come out different from place to place. This is dependent on several factors of cause. The idea of coming up with a standard test on this matter then until now has a number of challenges to face but still, focus can be put on developing the proposed standard. The test for aggregate which aims to obtain the possible combinations deemed reasonable and possible is also a way of determining pessimism intensities in the exercise. All these attributes of concrete material need to be established so that a standard experimental test is put forward to solve the problem. The steps to take will further be illustrated by the picture diagram figure 7.

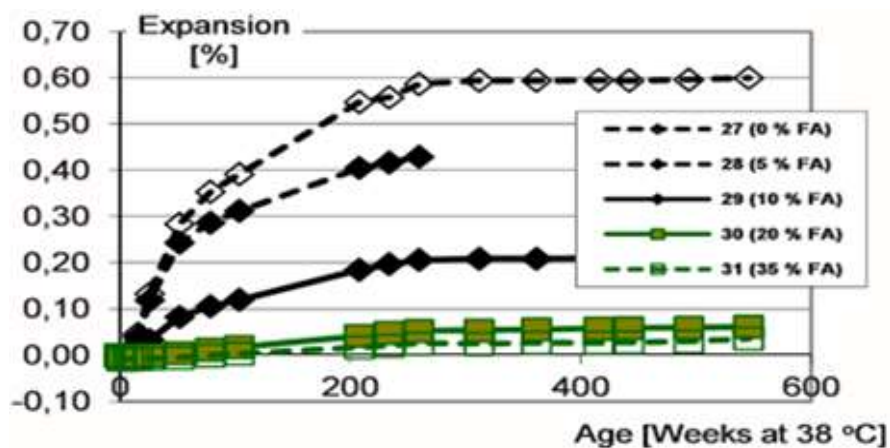
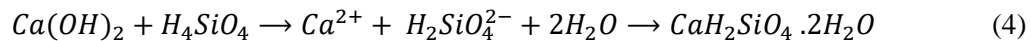


Figure 7: Concrete prism expansion with increasing fly ash replacement (www.johnbetts-fineminerals.com)

Performance tests refer to the process of obtaining the constituent materials for the concrete prism testing exercise. This has been adopted in countries like Norway. A very detailed and differentiated system of specification, which is based on numerous researches, was considered by the American Association of State Highways Transportation Officials (AASHTO) and accepted into their systems. Apart from Petrography, There was also the accelerated mortar bar testing .All of these target researches were done across Europe, mainly. Based on RILEM (International union of laboratories and experts in construction materials, systems and structures).What still remains difficult is to establish globally accepted expressions that can be used to calculate the rate, occurrence or predict the occurrence of Alkali silica reactions to help curb this problem which affects concrete structures and also affects the economy.

EXPERIMENTAL WORK

The guiding equation in the experimental work is given below:



The materials for the experiment includes; reactive pure silica, widely accessible alkaline material, 10 Graduated Cubes, Water and warm bath and Thermometer.

Background to ASR modelling experiment proposal

A theoretical relationship showing Alkali Silica reaction model equation (iii) is simulated by use of samples. Using the exact pure silica and known amount of alkalis made to react in solution to model 100% reactive samples of aggregate containing all silica and also 100 % of all alkaline cement paste. The sample is put in small quantities and small cubes are used as containers to measure the expansion or increase in volume due to formation of compounds modelling calcium- silicate hydrate. The idea of this approach is to allow determination of likelihood of problematic ASR on a concrete mix on site. The approach is meant to simplify the process of determining ASR reactions at a very early stage of the development of ASR. There is need to study carry out several of such tests in determining a general standard of the minimum amount of time that needs to at least be spent carrying out this experiment. Theoretically, it is known that ASR can be visible after about 15 years. It is also known that ASR cannot be visibly determined during early stages and hence there is need to develop a way to avoid damage to properties at later stages. The aim of this proposed experimental procedure is to solve the problem of having to use microscopy technique always to determine ASR. The steps laid out in the following sections are general steps but can be custom adjusted to suit particular site and particular circumstances.

Procedure

The procedures for this research are explained in details in this section. Firstly, measure the mass of the graduated 10cm x 10cm x 10 cm cube and record W_1 , make ready to mix equal volumes of Alkali and Silica, (V_S and V_A) is 150 cm^3 and Record the volumes, then add equal amounts of silica and alkaline paste in solution into graduated cube, and measure the weight,

$W_2 = W_S + W_A$ i.e. weight of Silica + weight of alkalis. After that then, start off timer watch. Measure the temperature of the contents in the cubes and after every 20 minute intervals, measure and record W , V_{Total} and temperature t . Hence, determine about 10 values of ASR (simulated) using the 10 cubes. And with coordinates of weight and or volume change, plot graphs of $(W_2 - W_1)$ against t .

On top of the contents in the graduated container cubes, add a known quantity of the mixed concrete to the cubes, in another graduated container, add mixed concrete from site to the same weight V , and allow to react. Record the initial volumes A and weights after adding concrete, measure and record final volume and the differences, plot graphs of the volumes with concrete added against time. Determine the graphs. After the graphs have been determined, a comparison of the two graphs can be done and the graphical values of Reinforced concrete volumes with time can be determined. Since ASR causes cracks in concrete through swelling, the volume change in the samples is representing the ASR swelling.

Interpolation

To determine the ASR values for any concrete sample, the concrete mix is tested and until there is considerable change on the volumes relative to the pure ASR mixes. The disadvantages of proposed method of ASR prediction include, obtaining the materials can be costly, Procedure needs to determine the volumes and then eventually not use them. While, the advantages of proposed method of ASR prediction, Easy to follow and can be done on site. It is also not causing delays.

RESULTS AND DISCUSSIONS

The graphs of Volume against time of concrete added to 100% reactive sample is used to determine the rate of change of volume.

$$\frac{dv}{dt} = x_i \quad (5)$$

Where x_i to x_n will be values determined by drawing tangents to graph.

Since there are many trial cubes for a start (10), the constant of equation (v) can be determined. This relationship is used to predict the rupture of concrete with time, as the plasticity of concrete is known. Further developments can be done and studied further. The more deviated the results are from those of pure Alkali and Silica, the better the concrete mix. The procedure can be used to determine relationship between ASR reactions and also to establish localized relationships between aggregates from different places. The results will need a practical approach to determine the minimum number of hours that must be spent to start seeing changes when the concrete is added to the 100% reactive silica and reactive alkaline substance. In some cases the occurrence of Delayed Ettringite formation happens simultaneously with ASR, so one needs to know how to differentiate the two. Proposed minimum time would be to start with over 48 to 72 hours and then adjust if this proves to be too much. If the formation of ASR reaction products happens earlier it may be wiser to do more trials and in shorter periods of

time to ensure minimum time. If there is no considerable change on the materials set up, it means there is need for more time in carrying out the experiment.

Temperature also needs to be monitored. The idea is to maintain the same standards and records well kept. Temperature can be used be contributing factor to the time taken for the concrete ASR to start and be seen, and one reactive particle of initial diameter D, obviously.

$$S^3 = \frac{\pi D^3 \rho_S}{6E_S} \quad \text{From equation (3)}$$

Where E_S = silica concentration = mass of reactive silica per unit volume of concrete (kg/m^3), ρ_S = density of silica. While, the size of the cubes was maintained at 1000 cm^3 to ensure uniformity, and also to allow a relationship to be developed from the results. The same exercise will involve a look on the change in mass and change in volume. The same experiment allows a comparison to be done on the two. A relation that will be governed by the 1000 cm^3 cubes maximum volume will be carried out. Two sets of graphs showing the relationship will be established from then practical and these will be compared to the graphs and findings of the pure reactive agents, silica and alkali. From the formula already given for the concentration of silica, $\rho_S E_S S^3 = \pi D^3 / 6$, volumetric calculations can be done also and a numerical relationship developed between the parameters.

Since all the finding are in reference to that formula given above, the equation can be used to then further develop a numerical expression and substituting into the equation means the missing parameters can be easily calculated. It may help to know what caused a concrete structure in particular to develop in deterioration until it totally fails.

CONCLUSIONS

ASR results from the reaction of alkalis and reactive silica. The alkali Silica reactions investigations have not been fully studied. A few comprehensive researches have been done on the subject. However, in Europe, Alkali Silica Reactions seem to have caused the minimal damage of about 4% according to 2016 report but the extent of damage is usually severe. In addition, since the damages are visible after a long period, it may be difficult to reinstate a reinforced concrete structure, which has considerably gone through a significant span of its intended life span. Alkali Silica Reactions are difficult to monitor as compared to other easily visible deteriorations of concrete structures. It may be helpful to the concrete research fraternity to invest more in developing early stage recognition of such problems more than the repair of the structures which is more of a reactive way to solving the problem when there are more active ways of curbing the occurrences.

The development of performance analysis actions is in development but resolution is expected to be restricted to “combinations of constituent’s concept” and for example not including enquiry into the effect of fluctuating the values of w/c-ratio. More or less of the nations that

have already adopted this performance tests for the drive of finding combined aggregate and cement and/or binder performance.

The addition of fly ash to the cement mill as a cement replacement material enables co-processing greatly in a way that seems to improve the alleviating effect, successfully increasing quality assurance together with overall performance. Alkali Silica Reactions can occur simultaneously with Delayed Ettringite formation and both processes can be detrimental to structures, it is therefore necessary to study the extent of damage of each process given that one may not identify the proximate cause of the structural damage.

RECOMMENDATIONS FOR FURTHER STUDY

It is imperative to further study the behaviour of Alkali Silica Reaction with a need to investigate if there are ways to accelerate the occurrence in concrete without changing the properties of the concrete that are required to fulfil the structural use of these reinforced concrete structures. There is need to investigate the possibility of Alkali Silica Reaction effects on all concrete materials and possible Alkali Silica Reactions alterations when cement replacement materials are totally used.

There is also need to investigate if it possible to add chemicals which will reverse the build-up of water which swells up inside the concrete mass and then exerts stresses on the concrete and thereby leading to crack formation. Another area of study is to investigate the possibility of incorporating drains, which will immediately provide passage of water out of the concrete mass, and thereby avoiding the swelling up of the concrete mass. This is because studies in the past done on the subject show that the cracks in the concrete mass are as a result of the internal stress build up that is as a result of volumetric changes as the water that bulges in the concrete forcibly tries to occupy space inside then concrete. Another area of study is the cost implications of the Alkali Silica Reactions. An understanding of the damage broken down to cost per cubic meter of concrete can be used to fully understand the cost implications of the structure.

An investigation, which can also be very important, is the formation of comparative expressions of different areas to determine the constants that will allow standard expressions of the calculations of these alkali silica reactions regardless of varying material constituencies. These expressions will make use of constants and allow the incorporation of research findings that have already been done and accepted by AASHTO. This will help to deal with the problem of varying compositions of alkali levels from one place to the next. There is need to investigate self-healing with mineral additives, self-healing by means of bacteria on these Alkali Silica Reactions. The concept of simultaneous DEF and ASR is not well understood. In some cases, the occurrence of Delayed Ettringite formation happens simultaneously with ASR, there is need to understand the relationship between

Recommendations for study on the rehabilitation of Alkali Silica damages may include; Demolition and building again, to use waterproof, to do nothing else but wait for swelling to grow. Lahdensivu and Aromaa. (2015), the occurrence of ASR problem will still persist if there is moisture still around the deteriorating structure. It may therefore be good practice to stop its occurrence by applying waterproofing.. All materials making up the concrete need to be analysed and contribution to deterioration of such structures monitored.

An area to study is the composition of sea water with respect to Alkali Silica reactions in which for places like lagos which are surrounded by water, structures could be exposed to a lot of Alkali Silica reacting material and hence this could result in a lot of damage on the structures. This would turn out to be costly.

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**EXPLORING PHOTOGRAPHY AS A TOOL FOR DEPICTING MESSAGES
ABOUT ENVIRONMENTAL DEGRADATION IN JEMA'A LOCAL
GOVERNMENT AREA (LGA), KADUNA NIGERIA**

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ABSTRACT

In Jema'a Local Government Area (LGA), the environment deteriorates daily due to natural and human factors with human activities being the key roots of environmental degradation which include open grazing, pollution, deforestation, and unlawful pasting of posters in public places. Photography is a vital tool for visual communication, and photographers have long used it to reveal issues that affect people and their environments. Therefore, this paper intends to identify the major causes of environmental degradation in Jema'a LGA. The paper aims at raising environmental consciousness through photographic images of degraded scenes of some environments in Jema'a LGA. This practice-based photography showed how impactful photographs are in conveying environmental messages in order to raise people's consciousness about the environment and shape their attitudes towards environmental conservation. Recommendations were made to help the government, NGOs and the general public to take necessary actions toward improving and protecting the environment. This paper will also provide motivation for further research in the field of photography.

Keywords: Photography, environment, Environmental degradation, Visual Communication

Introduction

Jema'a Local Government Area occupies an area of 1,384 km² and had a population of 278,202 at the 2006 census. Its headquarters is in Kafanchan, hosting members of different tribal affiliations. The widely spoken language in Jema'a LGA is the Hausa language while

the religions of Christianity and Islam are widely practised in the area. Jema'a LGA is part of the prestigious Jema'a Emirate with the Kafanchan General Hospital, College of Nursing and Yakowa market being important landmarks within the Local Government Area.

Photography has become an important tool for creating awareness about the environment and its conservation for decades. Photographic images greatly impact people's attitudes, behaviour and perception toward Nature (Owen, 2018). Therefore, knowing how people perceive conservation messages through images is significant to warrant that the right messages are efficiently conveyed to targeted viewers. Photography has become a fundamental tool in framing environmental issues and can show better the impact of global warming than words. Environmental photographers certainly depict the beauty in the natural world, but it turns into something much more. Several photographers reported starting with nature photography but, along the way, were awakened by how much a photo could reveal about the world in which we live and, for that reason, were inspired to do more (Seelig, 2015). The environment shapes us as a people and as a society. The conservation of the environment provides the essentials for a community to thrive, from clean water to barrier-free areas, from natural disasters like floods and droughts. Kaduna South loses acres of land daily to develop, making us lose touch with the natural world (Bulmer, 2022).

Previous studies show that there is little or no effort to encourage public participation in conservation and sustainable use. The nutritional and cultural value placed on some wildlife (bush meat) endangers the survival of species critical to other food chains. Wildlife and their habitats generally come under pressure during periods of drought or severe energy shortage. Aside from medicinal plants and animals domesticated for human needs, little or no effort is being made to regulate consumption, and exploitation of biodiversity, encourage conservation or promote sustainable use (Mande, 2020). Through practice-based research, photography was explored as a tool for depicting messages about environmental issues in Jema'a Local Government Area, Kaduna Nigeria

Photography

Photography is the method of recording the image of an object through the action of light, or related radiation, on a light-sensitive material (Andy, 2022). The word, derived from the Greek photo (light) and graphein (to draw), was first used in the 1830s. Photography has come a long way in its relatively short history. Masoner (2019) affirmed that the basic concept of photography has been around since about the 5th century BCE. It was not until an Iraqi scientist developed something called the camera obscura in the 11th century that art was born. Even then, the camera did not record images; it simply projected them onto another surface. The images were also upside down, though they could be traced to create accurate drawings of real objects such as buildings. Photo Making fosters artistry through the exploration of lens-

based, photographic media. Photography is a rich medium with a long history, a deep connection to the contemporary art world, and boundless potential for self-expression.

Photography is one of the most powerful means of communication that can overcome cultural and linguistic barriers to deliver messages that can lead to greater awareness of any number of topics, including the problems of poverty, civil rights, and, of course, environmental issues. Photography has greatly helped increase environmental consciousness by visually displaying both the beauty of nature and the consequences to that beauty of accidental and deliberate environmental degradation issues.

Environmental issues require wide-scale cooperation and collective action to resolve, and photographs can enormously impact the public debate. Photographers have a unique perspective on the world and excellent communication skills in visual mediums and often in other areas of life (Crane, 2021). Photographing, therefore, is a very complex relationship. It is a relationship between the subject and the photographer. It is a relationship between the subject and the audience, and it is a relationship between the photographer and his or herself. It is ultimately a relationship between the photographer and the audience and what he/she wants others to think of his/her work. These relationships, and the fact that they never occur arbitrarily, but with purpose through careful thought and reflection, are the very nature of symbolic interactionism. Joel (2022) supported this by stating that photography can expose environmental problems as nothing else can and can help get people to care. The element of danger could not be higher. It is ridiculous to think that we can destroy so many of the Earth's plants, animals, and ecosystems. All of this will come back to bite us sooner than we think. It will not be pleasant (Joel, 2022).

A photograph represents a message that serves to reveal messages with various meanings that need to be fully understood and accepted by the public (Husaini, Mustaffa & Adzrool, 2013; Mustaffa, 2011). It is said a picture worth a thousand words.' This proverb needs to be understood and analysed carefully. Even though it is a simple proverb, it requires someone to understand and digest the message that can be seen in realistic form or interpretive form (Mustaffa Halabi, 2011), which has a connection in its understanding and experience in different cultures and societies. Therefore, a photographic image is not only meant to be seen as a hobby by some people but the role and function are on par with any other medium of communication. From the moment we wake up in the morning until we go back to bed at night, thousands of photographic images surround us.

Visual Communication

According to the assertion of Ijaz (2018), Visual communication plays a significant role in connecting with the viewer. Visual communication has been evolving around from time, but it is not a current invention and has a history. Ijaz argued that visual communication is very useful in the contemporary world. Any display of a thing seen through sight falling in the form of a map, signal, painting, illustration, graphic, book, animation, web design, advertising, film, etc., is regarded as visual communication (Ijaz, 2018).

Günay (2021) also opined, "Visual communication creates the same feeling and emotion without it being necessary to speak a certain language among all the people." In his writing, Günay argued that the sense of sight is the most important sense organ for humans. The events happening in the environment, the existing objects, and situations are first identified upon being seen and tried to be understood. The information obtained through the sense of sight can be remembered more clearly than the information obtained via other senses.

Major Causes of Environmental degradation in Jema'a LGA

According to Ya'u (2021), environmental hazards are global problems that exert tremendous influence on the sustainability and healthy living of human beings in various manifestations. Existing challenges like climatic change, population change, and rapid urbanisation obscure the plan for a viable living environment. Trans-disciplinary cause and effect analysis and networked spatial thinking are required to tackle land use concurrences, environmental degradation, or social problems, and can even be useful to support sustainable decision-making for politics, Government, and individual citizens (Mande, 2020). Some of the most pressing problems in human affairs include increased populations, food scarcities, environmental pollution, including global warming, extinctions of plant and animal species, and all the attendant sociological and political problems—which are, to a great degree, ecological (Robert & Stuart, 2022).

Approximations submit that 50-75 per cent of the land space is becoming desert in places such as Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara states which is a major factor that contributed to the wrecking of agriculture and human livings, making many herders specifically, the Fulani migrate to Kaduna State in search of productive land (Babajide, Frank, Ekperi & Nwata, 2020). The migration of pastoralists from the far north to Kaduna South was initially seasonal, with herders spending December to May before returning to their places of origin (Agboola, 2020). Over the last two decades, however, available pastures shrank in the far north, making the herders stay longer from December to June or July (rainy season). More recently, some have chosen to graze their herds permanently

in Jema'a LGA because of the good land. It is evident that the presence of the Fulani herders and their grazing activities have been a major threat to the local farmers as crops are eaten by cows, trees are destroyed to feed the cows, and degrading the land turning into a semi a desert.



Image 1a: Open grazing in February 2022 around Aduwan 5 Jema'a LGA

Photo: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/5.6, Exposure Time: 1/140 sec.

ISO: 400, Focal Length: 24 mm, Aperture: 4, No Flash.



Image 1b: A Fulani man grazing his cattle during the rainy season, along the Jagindi-Kagum road

Photo: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/5.6, Exposure Time: 1/140 sec.

ISO: 400, Focal Length: 24 mm, Aperture: 4, No Flash.

Images 1a & b above show activities of open grazing which is one of the major environmental issues faced in Jema'a LGA. In the absence of farm owners, the Fulani could push their cows to feed on someone's crops and destroy the farm. Based on the researchers' observation and interaction with farmers around the Jagindi axis, people only farm cassava nowadays around their homes because of the destruction by Fulani herders. This issue needs to be addressed by the government of the day.

Pollution

Air Pollution refers to the release of harmful contaminants (chemicals, toxic gases, particulates, biological molecules, etc.) into the earth's atmosphere. These contaminants are quite detrimental, and in some cases, pose serious health issues. **Water pollution** is said to occur when toxic pollutants and particulate matter are introduced into water bodies such as lakes, rivers, and seas. These contaminants are generally introduced by human activities like improper sewage treatment and oil spills (Pradip, Ateeque, Qiaoqiao, Jonatas & Ezzat, 2020). Isife (2017) stipulated that Environmental degradation has resulted in the deterioration of Nigeria's urban and rural environmental quality, which is characterized by water shortages and floods that play a major role in the transmission of communicable diseases.



Image 2: Takau bridge in Jema'a Kaduna

Photographer: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/4, Exposure Time: 1/3200

ISO: 200, Focal Length: 22 mm, Aperture: 3.9, No Flash.

The above image shows indiscriminate dumping of refuse by humans around and under the bridge which is the major channel that drains the city of Kafanchan, Jema'a LGA. This is an eyesore and activity that can cause an outbreak of disease and facilitate floods during the rainy season.



Image 3: Refuse Dump in JemaKaduna.

Photographer: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/4, Exposure Time: 1/3200

ISO: 200, Focal Length: 22 mm, Aperture: 3.9, No Flash.

Image 3 is another evidence of the poor attitude of humans toward the environment, which not only degrade its beauty but causes air pollution, and blockage of the gutter which is one of the causes of flood in the town. This also shows that the environment is not well taken care of. This unlawful act should be checked and stopped by the appropriate quarters.

Deforestation

Forests are invaluable property of a nation because they provide raw materials to modern industries, timber for building purposes, and habitats for numerous types of animals and microorganisms. Good fertile and nutrient-rich soils having a high content of organic matter offer protection to soils by binding the soils through the network of their roots and by protecting the soils from the direct impact of falling raindrops. They encourage and increase the infiltration of rainwater and thus allow maximum recharge of groundwater resources, minimize surface run-off and hence reduce the frequency, intensity, and dimension of floods. Deforestation is the cutting down of trees to make way for more homes and industries. Rapid growth in population and urban sprawl are two of the major causes of deforestation. Apart from that, the use of forest land for agriculture, animal grazing, and harvests for fuelwood and logging are some of the other causes of deforestation. Deforestation contributes to global warming as decreased forest size puts carbon back into the environment.



Image 4: A tree cut down for timber.

Photographer: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/5.6, Exposure Time: 1/100

ISO: 200, Focal Length: 18 mm, Aperture: 3.6, with Flash

The above shows a tree cut down for timber. This tree was well-positioned in front of a residential home. The implication of destroying the tree is that a major wind-breaker has been

destroyed, exposing the house to direct disaster from the wind. Any house that stands in isolation and without trees around, its roof is under the threat of being destroyed by a strong wind. An example is shown in image 5 below.



Image 5: A roof affected by wind.

Photographer: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/5.6, Exposure Time: 1/640

ISO: 200, Focal Length: 20 mm, Aperture: 3.6, No Flash



Image 6: Firewood harvested from Gidan Waya's forest.

Photographer: Timothy Titus

Camera Model: Nikon D3000, F-stop: f/6.3, Exposure Time: 1/400

ISO: 200, Focal Length: 18 mm, Aperture: 3.6, No Flash

Image 5 above shows a bunch of wood harvested from the Gidan Waya's forest which is a concern because the trees are being destroyed and consumed without replacement. Based on experience as citizens of Nigeria, there are factors behind the destruction of trees for firewood in Jema'a LGA of Kaduna State. These factors include poverty and cultural belief. The majority of the people in the Jama'a villages cannot afford the cost of using gas for cooking. In the aspect of cultural belief, many people have the notion that food cooked using firewood tastes better than that cooked on gas.

Conclusion

Environmental degradation has become a topic of discussion and a world concern. Photography is a vital tool for communicating environmental issues modern words can. Therefore it is concluded that photographic images have the power of raising people's consciousness toward the environment and environmental conservation. It is evident that poverty contributes to the destruction of nature which is seen in the destruction of forest for firewood. It is also clear that humans contribute greatly to the degradation of the environment. This is shown in the photographic images explored for this paper.

Recommendations

For the purpose of improving the quality of the environment and its conservation, the following recommendations were tendered:

- i. The government should revisit the monthly public sanitation which was done every last Saturday of the month
- ii. Conservation photography should be encouraged to create environmental awareness to change the attitudes of people toward the environment.
- iii. There should be regular inspection by officials of Local and state governments to ensure that the environment is protected
- iv. Afforestation should be encouraged
- v. The government should enforce laws that will regulate the utilization of natural forest

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CASE STUDY ON RENEWABLE ENERGY STORAGE TECHNOLOGY

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ABSTRACT

Energy storage will be a critical aspect in the future of renewable energy (RE) systems, according to a widely acknowledged concern. The most recent research on the utilization of energy storage for high RE penetration has gotten a lot of press. We shall look at several energy storage methods, types, categorizations, and comparisons in this paper. Electrochemical and battery energy, thermal, thermochemical, flywheel, compressed air, pumped energy storage, magnetic, and chemical and hydrogen energy are some of the options. There is also research on new types of energy storage and key technological advancements in energy storage.

INTRODUCTION

Energy systems are critical in the production and transformation of energy from diverse sources to the uses that require it, such as industry, building, and transportation. Fossil fuels can be easily stored while not in use, but other sources of energy, such as solar and wind, must be collected and stored as soon as feasible.

Other previous evaluations have focused mainly on forms of energy storage for a single use, such as utility applications, thus it's critical to perform more comprehensive reviews that

encompass all types of energy storage to gain a better understanding of their differences. Furthermore, the area of energy storage is extremely broad, and several publications from both scientific and economic perspectives are published on it every year. The present page seeks to cover a broader assessment of different forms of energy storage and compare their qualities, whereas the previous article provided a bigger and more recent summary of each storage classification category.

Types of energy storage

We divided it into electrochemical and battery energy storage, thermal, thermochemical, and flywheel energy storage, compressed air, pumped energy storage, magnetic, chemical, and hydrogen energy storage from many types and categories.

THERMAL ENERGY STORAGE

The term "thermal energy storage" refers to storing heat or "cold" in a storage medium. There are three main types of thermal energy conservation: sensible, latent, and thermochemical. Such energy storage includes hot water storage, subsurface thermal energy storage [1], and rock-filled storage. The most common phase change materials (PCMs) employed as storage media include paraffin waxes, esters, fatty acids and salt hydrates, eutectic salts, and water [2]. PCMs are classified in Table 1.

When a thermal energy source does not provide energy at a constant rate and/or at a fixed cost, thermal energy is stored. Seasonal energy storage necessitates a larger energy storage system capable of retaining heat for usage after several months. An analogous concept could be implemented by storing solar thermal energy in the summer for use in the winter. These systems can also be used to store solar thermal energy throughout the day for use during the cooler hours when heating is required. The study of thermal energy storage systems is extensive, and numerous detailed assessments of various features of these technologies are available [3].

Table 1, solid- liquid phase classification modify materials

Type of phase change material	Operating temperatures (°C)	Compound groups	Examples
Organic	4–150	Paraffin compounds Non-paraffin compounds	Paraffin waxes Fatty acids Esters Alcohols Glycols
Inorganic	8–900	Salts Salt hydrates Metals	
Eutectic	12–600	Organic-organic Inorganic-inorganic Inorganic-organic	

PCM is a new method for analyzing fatty acids in vegetable and animal oils [4]. They describe the employment of PCMs in smart thermal grid systems with intermittent renewable energy sources as "interesting." Ground thermal storage is an increasingly widespread type of sensible thermal energy storage, in which a circulating medium extracts heat from a structure in the summer and stores it in the ground for use in the winter. [5] discusses ground heat exchanger models and their applications.

Water tanks are indicated as the most suitable solution from a thermodynamic standpoint [6] due to the high specific heat of water and their high-capacity values for energy charge and discharge. Aquifer thermal energy recovery (ATES) devices.

Electrochemical and battery energy storage

Electrical energy can be stored electrochemically in batteries and capacitors. Many types of electrode materials and electrolytes have been evaluated and suggested to enhance the cost, power density, energy density, cycle life, and safety of batteries with high energy densities and high voltages. [7] discusses lithium-ion batteries, flow batteries, sodium–sulphur and similar zebra batteries, nickel–cadmium and related nickel–metal hydride batteries, lead acid batteries, and super capacitors, as well as other electrochemical energy storage systems. Because of its high specific energy (energy per unit weight) and energy density, lithium batteries are becoming increasingly essential in electrical energy storage among the numerous battery types (energy per unit volume).

Capacitors are classified as electrolytic, electrostatic, or electrochemical because they store and deliver electricity electrochemically. Electrochemical capacitors, sometimes known as super capacitors, have the highest capacitance per unit length. [8] provides performance data for super condensers and lithium-ion batteries. Sharma and Bhatti [9] discuss the history of electrochemical double-layer capacitor technology, as well as classification, construction, design, research, and voltage balancing. Electrochemical capacitors have a high storage efficiency (>95%), making them possible to cycle hundreds of thousands of times without losing any energy.

In terms of useful energy density, a charged Li-air battery provides an energy source for electric vehicles that rivals that of gasoline (Fig.)

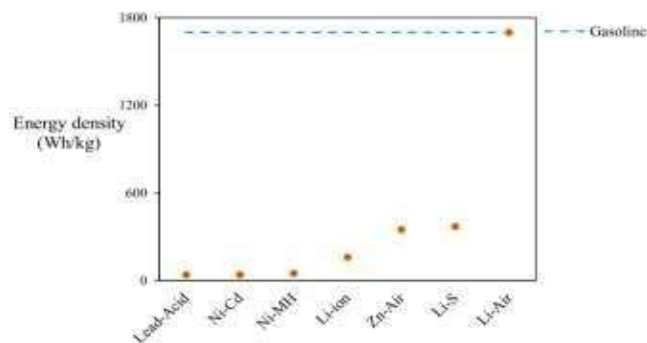


Fig. 1 . Rechargeable batteries and there energy densities, comparison to gasoline

Na-ion batteries have the potential to be the low-cost batteries of the future. Because sodium is widely available and inexpensive, it is ideal for smart electric networks that incorporate renewable energy sources.

Energy storage flywheel

Kinetic energy storage, often known as mechanical energy storage, is a type of mechanical energy storage. Depending on the charge/discharge mode, kinetic energy is transmitted in and out of the flywheel via an electric motor operating as a motor or generator. The flywheels drive generators to generate power. The flywheel system operates in the high vacuum environment. Because of their great efficiency, high power densities, and low rotor losses, magnetic devices are extensively utilized in flywheels [10]. Induction, bearing-less, and variable-reluctance machines are all different in terms of application speed limits, idle losses, vibration, noise, and cost. Magnetic bearings that function in a vacuum keep the rotating mass in place to reduce friction losses and safety concerns during long-term storage [11].

The magnetic bearing does not require lubrication because it has no frictional failure. The flywheel rotor and its housing are made of steel, alloys (such as titanium or aluminium alloys), and, more recently, heavier materials such as composites. Rotor components account for most of the production, and design and speeds of up to 10,000 rpms are currently possible. Flywheel energy storage systems are known for their high capacity and power efficiency, as well as their extended cycle life (tens of thousands of cycles), long operating life, high round-trip efficiency, and low environmental impact. When compared to batteries and super capacitors, flywheel energy storage systems have lower power density, cost, noise, maintenance effort, and safety concerns.

An innovative hybrid system design in which super capacitors are installed inside the flywheel spinning disc to maximize their power density. This allows for the exchange of pulsed power as well as the storage of large amounts of energy.

Storage of Thermochemical

Chemical reactions that require or release thermal energy are used in thermochemical energy storage systems. Endothermic dissociation, storage of reaction products, and exothermic reaction of dissociated products are the three operational phases of thermochemical energy storage: (See Figure 2).

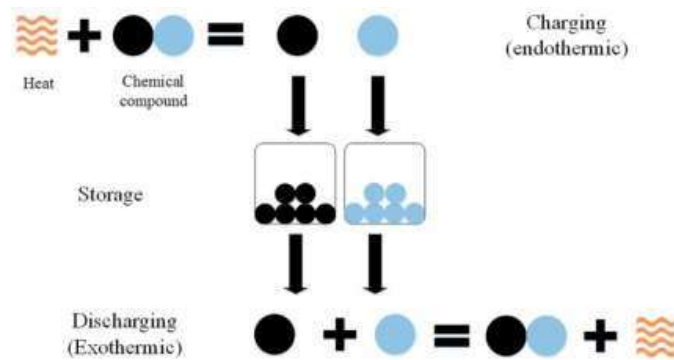


Fig. 2. Processes of thermochemical energy storage cycle

Thermochemical energy storage techniques can be described in a variety of ways, one of which is depicted in Fig. 3.

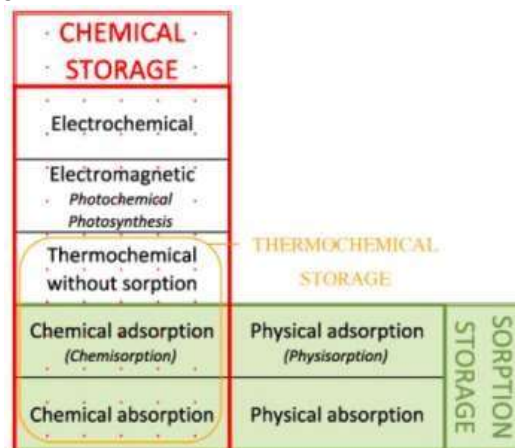


Fig. 3. Chemical storage classification

Because energy losses during storage are fewer for thermochemical energy storage than for sensible or latent TES composite materials, it has a lot of potential for long-term storage applications [12]. suggests that salt-impregnated materials are suitable for application in thermochemical storage systems. According to them, one area that requires more research is ensuring the consistency of salt addition to the adsorbent material for repeated stable long-term applications.

A study on thermochemical energy storage principles and recent improvements is published in [13], and thermochemical storage systems are compared to other TES systems. A new energy storage technology based on microwave-induced CO₂ gasification of carbon compounds. Various carbon compounds are evaluated to determine the quantity of energy used. The

device has achieved energy efficiency of 45 % in the laboratory and appears to be improvable to compete with existing energy storage devices.

Energy storage for compressed air

When additional energy is available, compressed air will be stored in an underground cavern in such a system. When energy is required, this pressured air can be released into a turbine to generate electricity. Commercially, compressed air energy storage systems are appealing because of their ability to shift energy consumption periods and, more recently, because of the need to mitigate the impact of renewable energy grid development that is irregular [13].

Liquid air has lower losses than compressed air because it may be kept at moderate pressures. As a result, it may be a safer option for long-term storage than compressed air. Liquid air is also denser, allowing it to fit into smaller containers. Liquefied air energy storage technologies outperform compressed air energy storage systems. Liquid air is the simplest approach, which is based on the Linde-Hampson cycle. To supply high-pressure air, liquid air is injected under high pressure at the discharge, evaporated, and heated. The basic work performance and quality of the system improves as the air temperature rises, making it like other energy storage systems. We can also raise the temperature by using combustion. The air or gas from a liquefied container can be expanded in generators to generate electricity. Any suggestions for reducing liquefaction waste and external energy requirements for liquefied air regasification have been made.

Hydro Pumped energy storage

Pumped hydro energy storage stores hydraulic potential energy by transferring water from a water body through a conduit to a higher water reservoir at a low level using an electric pump (Fig. 4).

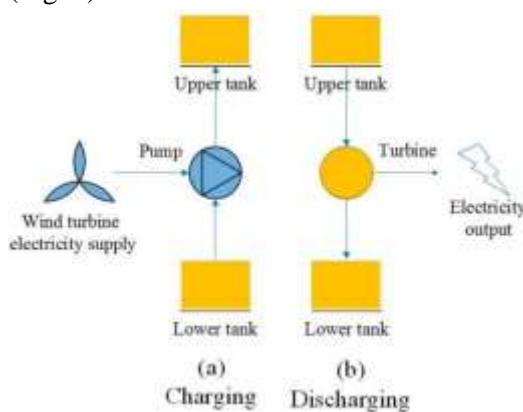


Fig. 4. Hydro storage with the pumping energy, provided by wind turbines as seen in (a) off-peak hours, (b) peak hours.

The energy can be released by allowing the water to flow from a high to a low height into

the turbine. The turbine is coupled to a generator that can generate power as energy is discharged from the turbine. To allow for variable power output, the incoming flow of water to the turbine can be adjusted using gates. When charging, variable-speed drives can also be employed to get power. Pumped hydro energy storage systems must meet a few conditions, including the availability of elevation gap sites and access to water. If the prerequisites are met, it is an appropriate solution for both renewable energy storage and the grid. [15] The efficiency of these systems ranges from 70 to 80 %, and they are commonly scaled at (1000-1500 MW) . Long asset life, i.e., 50 to 100 years, and low operating and maintenance expenses are also features of these systems.

The functional height difference between reservoirs and environmental ones, as well as large unit sizes, high maintenance costs, and topographical limits, are some of the scheme's downsides. Work on techniques and tools like is needed to assess locations and proposed timelines for the construction of new PHES, as well as to review patterns in development in depth. Also examine existing and potential PHES facilities, as well as the technological and economic aspects that influence them. With restricted capacity, PHES systems will vary the design pumping capacity from 60% to 100% and the generation capacity from 20% to 100% . Vasil-Be-Hagh et al. introduce a new form that does not require large water tank towers or long pipelines and can operate at a wide range of capacities depending on electrical surpluses. The design allows for steady pressure and speedier discharge, allowing for quick response to demand changes.

Storing magnetic energy

It is superconducting with a big coil, has no electrical resistance at near zero temperature, and can store electrical energy in liquid helium or nitrogen vessels.

The temperature of the superconducting coil is kept at a cryogenic level. Although energy losses in the coil are nearly insignificant due to superconductors' low resistance to electron flow, the cryogenic temperature preserving cooling system is associated with certain energy losses. SMES coils can quickly discharge large amounts of electricity and can perform an endless number of high efficiency (70 to 75%) charging and discharge cycles[16]. Some of the major characteristics in the SMES design that determine storage performance are coil configuration, energy capability, composition, and operating temperature. They propose that the cost of SMES technologies be divided into two categories: the cost of energy storage capacity (i.e., the cost of conductors, coil structure components, cryogenic vessels, refrigeration, protection, and control equipment) and the cost of energy storage capacity (i.e. the cost of conductors, coil structure components, refrigeration, protection, and control equipment).

In contrast to other research conducted through computer simulation or in laboratories, emphasizes the necessity of creating practical applications of SMES for power systems. They

also advise that effective control strategies be developed to integrate tiny ratings of SMES systems at various places to increase their power capacity.

Energy storage Applications

The significance of creating realistic SMES applications for the power sector Energy storage is a key enabler for a variety of applications. This section focuses on various energy storage applications, such as utilities, renewable energy, buildings and communities, and transportation. Table 2 lists some of the characteristics of energy storage systems that are now in use or being developed, as well as some of the attributes of such storage systems[17].

Utilities

The significance of creating realistic SMES applications for the power sector the usage of energy storage technology in power networks has become increasingly critical and a priority as more storage alternatives become accessible. Renewable energy penetration can be increased by combining renewable energy systems with energy storage technology.

While grid management and maintenance stability are provided, total system efficiency improves. Implementations of any of the energy storage technologies include

- Congestion reduction in the transmission system,
- Energy storage during times of low demand for use during high demand period,
- Under standard operating ranges, maintaining voltage and frequency,
- Compensating for unforeseen situations, such as a generating unit breakdown,
- A real-time equilibrium between generation and load is maintained.

Renewable energy utilization

The significance of creating realistic SMES applications for the power sector • The use of renewable energy is fast rising, helping to meet global demand for electricity while reducing environmental impacts, particularly those related to the electrical industry. Storage permits excess energy created by renewable energy sources to be stored and dispatched later when needed, resulting in a higher penetration of renewable energy generation. As a result of the inconstancy of clean energy sources, space is likewise spread.

Buildings, and communities

The significance of creating realistic SMES applications for the power sector • Because energy storage is a typical approach for buildings and communities, there is a lot of literature on storage categories and materials, as well as new advancements, thermal storage standards and performance, restrictions, and possibilities.

The significance of establishing realistic SMES applications for power enhancements. Buildings and neighborhood's may benefit from long-term and short-term storage. Thermal

energy storage, for example, can move electrical loads from peak to off-peak hours, making it a powerful tool in demand-side control programmes. This system is a relatively mature energy storage process, and research and development are ongoing to address technical issues such as sub-cooling, segregation, and material compliance, PCMs used to improve the thermal ability of storage when working at a constant temperature, underground thermal energy storage, and storage tanks to develop more effective and cost-effective TES facilities in buildings, such as building thermal mass consumption.

Transportation

The significance of developing SMES-based power applications • Batteries are the most common kind of energy storage in electric cars. Electrochemical capacitors, which offer a better power density than batteries, can be used in electric and fuel cell vehicles. In these applications, the electrochemical capacitor may store regenerative braking energy and functions as a high-power, short-term energy storage. For a long time, flywheels have been employed in public transit systems. Hybrid solutions combining flywheels and batteries, where flywheels can cope well with fluctuating power demand due to their high-power densities and batteries are the primary source of propulsion energy due to their high energy densities [18], can also be appealing options for improving energy storage energy density. As a result, for a global research effort focused on the development of physical and chemical hydrogen storage methods, new materials with increased efficiency, or novel approaches to hydrogen storage,

Comparisons and categorizations of energy storages

Many types of energy storage are defined and/or contrasted from technological and economic viewpoints in this section, rather than their categories and values. Similar research and comparisons have been published in the past and have been judged to be significant. The analysis in this section will be included in a revised comparison.

Economics point comparisons

There are multiple economic benefits and obstacles associated with the usage of energy storage technologies for various purposes. An energy storage facility's cost is also determined by the programme. Furthermore, the cost of an energy storage device for a particular application varies by geography, building method, and size, and the cost-effectiveness is determined by the price of the energy supply, such as natural gas. Economic studies, in comparison to a wide range of energy technologies, have a degree of uncertainty that must be considered. Nonetheless, Table 4 shows the approximate cost of capital for various energy storage technologies. It should be noted that the expenses shown below are collected from publications from various years.

In a few articles, the possible costs of energy storage systems were examined to determine

the viability of a specific system in the future, as well as the necessary expenditures to become competitive. Due to a paucity of information on technology developments, future breakthroughs, knowledge spillovers, and changes in commodity pricing, such analyses are ambiguous

Conclusions and future directions

A summary and critical examination of the existing energy storage systems is provided. Storage classifications, comparisons, implementations, current trends, and research avenues are all explored. Batteries are expected to be the most cost-effective energy storage option for applications with a relatively modest number of cycles. While pricing and the manufacture of electrolytes remain issues, batteries appear to be the best option for large-scale electrical energy storage (e.g., energy from renewable energy sources). Other types of electrical energy storage, such as flywheel energy storage, which is utilized for very short storage times and daily use, and magnetic energy storage, have received less attention. The major criteria for flywheels are reductions in electronic, electrical, and power-conversion losses. Hydro and compressed air pumped energy storage systems are modern, cost-effective, and reliable technologies that are employed on a regular basis.

Adsorption technologies are currently not commercially viable for storing thermal energy. Hydrogen energy storage systems are one of the many forms of energy storage systems that can help to improve the current energy structure significantly. Many scientific, economic, social, and political barriers must be overcome before hydrogen technology may be deployed in large-scale installations. If more renewable energy solutions are integrated with energy storage systems, the use of hydrogen and electricity as energy carriers is projected to rise in the future.

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RELIGION: A UNIFYING INSTRUMENT IN A MULTI-ETHNIC GEOGRAPHICAL ENTITY LIKE NIGERIA. AN APPRAISAL.

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Abstract

Religion as a concept has attracted various definitions and explanations over the years. In the words of various sociological scholars it is considered any relationship between man and the super- humans. To certain scholars of various works of life religion and religious groups may attract diverse meanings. Nigeria no doubt has been seen or known to be a country with different religious inclinations. It will not be out of place to say at this point that certain people see religious groups in Nigeria as just a few. That actually is not true. Nigeria has many religious groups in it. Be that as it may. The question is that from sociological angle or perspective, religion is considered one of the sub-structures making up the society. That in essence underlines its imperativeness. But every right thinking person will ask is to what extent has religion in Nigeria played the expected roles that it is expected to play? If no, what factors has actually hindered it from carrying out the expected functions. This research is occasioned by the fact that religion has fallen short in it discharging the roles it ought to discharge without anyone having sufficient answers to factors have been responsible. Various data collection techniques served as instruments of data collection in the course of the study. They included oral interviews, use of questionnaire, textbooks, the internet and journals to mention just a few. The interactionist school of thought was adopted for this study to serve as theoretical framework. The work concluded with the scholars making their unreserved recommendations on how religion can still take its pride of place in Nigeria.

Keywords: Religion, Unifying Instrument, Nigeria, Ethic Group.

DEFINITION OF KEY CONCEPTS.

It won't be out of place to establish that given key concept enshrined in the question above will definitely require some degree of explanations. Such words include but not related to these:

RELIGION

According to Oxford online dictionary, Religion is taken for the belief and worship of superhuman controlling power especially a personal God or gods. It can also be taken for a particular system of faith and worship .

UNIFYING INSTRUMENT.

According to the Collins online dictionary 2022 edition, Bringing about unification. Any instrument that brings things or persons together.

NIGERIA

A country in west Africa with close to 200 million population.

ETHNIC GROUP.

The number or population of people from different originalities making up a country.

THE POSITIVE IMPACT OF RELIGION IN NIGERIA.

It has to be stated that Religion has been discovered to be the most popular phenomenon eminence due to its overwhelming impacts and contributions in the Nigerian society. As a tangible and veritable agent of change, religion has undeniably exerted great deal of influence positively and negatively on the Nigerian people in many known ways.

Even if it is known that religion in Nigeria has fueled and led to tensions and conflicts.(Agi 1998) It is also important to mention that it is a great force of peace and unity according to Taraki (2010) It is evident too that Religious affiliations has been a uniting force in Nigeria. It is equally a known fact that religion no matter which in Nigeria has been able to successfully bind or unite the various ethnic groups in the country together and also make them exist side with each other.

According to Omoregbe (1996) , it can hardly be denied that religion has been the source of a lot of intolerance, feud, discrimination and devastating wars in the different parts of the world not only in Nigeria, both in the past and present. To say the fact as it is, religion has done more good than bad to mankind. In fact, it has produced saints in virtually every part of the world. That is not all, it has equally

Inculcated into many people the spirit of self discipline and dedicated service to ones fellow men. It has infact given meaning to several lives. Back home in Nigeria some of the predominant religions as Christianity and muslim religions have made huge impacts that cannot be overlooked. The two religions have been involved in the education of the Nigerian populace to a very reasonable extent. This has been through the establishment of various missionary and quranic schools in Nigeria, Lemu 2002, Mkpa (2010)

In his own observation, Schumacher maintains that development does not start with goods, it starts with people and their education, organization and discipline. This is a fact. It is actually people who are knowledgeable, competent, honest and skilled that builds a nation. In furtherance, it can therefore be said that the work of nation building solidly hinges on the way the state enjoys the goodness. The building of the nation is first and foremost the building of the people that make up the nation, which in effect boils down to the building up of the individuals themselves.- justice, love and peace which are essential ingredients for nation building.

Religion has also produced great leaders in Nigeria.

Understandably too the three major religions have equally contributed immensely in the political development of the country. They also produced competent individuals who championed the cause of leadership in the country.

As said elsewhere, religion is one of the key sub structures that make up every country. In essence therefore we cannot do without it.

THE NEGATIVE EFFECTS OF RELIGION IN NIGERIA.

In as much as we have taken a good look at the positive impacts that religion have made and even its benefits perse, it also have a million and one negative effects

Below are some of those negative effects .

BREEDING BITTERNESS AND RANCOUR

One of the things that religion has fallen foul of encouraging bitterness among Nigerians. I will be in sheer doubt if any body will come up to tell us that about 60 percent of wars fought in Nigeria is not religious. Though many scholars have always outlined the positive impact of religion neglecting the numerous hazards that it has done. To be frank though it tantamount to condemnation to say that religion is an ill wind which blows no one any good. It will important to draw analogy from the typical traditional Igbo society before the advent of colonialism. The people were so united, loved themselves and cared so much about themselves and equally defending the interest of all and sundry. Since religion craftily crept in with the white lords, the amount divisions existing or evident among the families, communities and societies. Things began to even fall apart when we started have break away from the central religion, like the case of Christians and other religious practitioners.

INSTRUMENT OF SEGREGATION

It has also been observed in recent times that religion has simply become instrument of segregation, division and discrimination. People now see practitioners of other religions as being evil believing only that their religious practices are simply the best and taht other

practitioners are evil or inferior. Therefore to a very reasonable but yet debatable extent, religion disintegrates rather than unites .

ELEMENT OR INSTRUMENT OF CHAOS

In as much as we praise religion as have brought about peace, and all what nots, scholars like us are also stating with all sense of conviction that religion as we see or have evidenced in Nigeria has served as an instrument for chaos, crisis, killings and maiming of people. For example, over the years in Nigeria, we have witnessed situations where religious disagreements have degenerated into violent killings .While will any one come up to tell us or preach sermons about how religion has done this or that with taking a recourse to such an unguarded statement. Since nothing on this earth has all the advantages without disadvantages, religion is not an exception.

INSTRUMENT OF SUBJUGATION.

It must be stated without mincing words that religion has created divisions and unhealthy cum unequal arrangement between people. This is solely because people from certain religious beliefs see themselves as being superior while others from different religions are considered to be inferior to them. A typical example is the situation where one simply thinks and adjudges him/herself as one that knows God while others of different faith are considered as infidel or inferior to them.

People get subjugated and relegated to the background simply because they are of different belief systems from them.

THEORETICAL FRAMEWORK.

Interactionism is a social behaviour that relates an individual's action to possible cost reward implications. It is a theoretical perspective that derives social processes from human interaction . It is the study of how individuals act within a society. It is therefore , understandable that that in a secular state like Nigeria, it is not unusual for people of different religious backgrounds to relate to one another wherever it will be more rewarding to them than to live in isolation , Blau 1969 describes reward to mean a positive reinforcement in any form that gratifies a person's needs. For example, religion is faith based reward that satisfies an individual's mode of worship, freedom of association and room for interaction with others, thereby satisfying some of the human needs. Coser and Rosenberg (1969) trace the origin of interactionism to the work of Simmel, Malinowski , Homan and Blau. They also observe that by Malinowski's conviction , basic obligations and rights must be understood in terms of reciprocal obligations which the members of society have towards each other as people worship in groups they interact with one another and conform to common doctrine.

The Nigeria constitution presupposes that an individual has freedom to practise religion of his or her choice without government interference. This is where secularism comes into play. Secularism is a legal position in the supreme law of Nigeria, stating that religious belief should not influence any public or/and governmental decisions. In other words, secularism is a documented position in a constitution relating to political belief in the separation of religion and state. While people are allowed to practise whatever they believe in as their religion, the government must not allow that to influence public policy. Religion is the service and worship of God or gods. The word 'religion' which was first used in the 13th century is Latin in its origin. From a sociologist perspective, the society creates religion as an instrument in moulding, controlling and directing societal thinking and behaviour (Durkheim 1915, 207-211). Durkheim's theory of religion further sees God as a personification of the society where all the laws and commandments of God are demanded from all members of the society for societal self-preservation. By this concept, a country ought to adopt a state religion to be in a position to demand good religious conduct from all members of her society. As Mayhovich 1980 explains, interaction theory assumes interpretative approach where the individual interprets the situation and thus determines his or her behaviour accordingly. Such behaviour does not appear to be a product of adherence to normative orientation to macro social structure (functionalism), he argues. Secularism in the constitution could have been borne out of previous experiences encountered for either non-inclusion or viewed from the population's diversity in beliefs culture and societal self preservation. It could also have been included in the constitution in fulfilment of human needs which generally arise out of existence of concrete histories of each society and to help colonial power subdue the people through religious conversion. Danbatta 2016, was alarmed by the inclusion of religion as a non governmental affair. He says, by writing a clause about religious freedom in our constitution, we are causing the elimination of that freedom, inviting unrest. Events that followed thereafter in over 50 years of Nigerian independence tend to confirm this alarm.

RECOMMENDATIONS.

Having summed up this scintillating treatise, we make these recommendations.

- 1) Let Nigerian Government do everything within her powers to constitutionalize the equality of all religions in the country.
- 2) Religious tolerance is a cross, let everybody pick theirs up and go no matter the cost.
- 3) Crimes against religion should not be treated with soft gloves to deter people from engaging in it.

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COMMON ERRORS IN THE USE OF ENGLISH LANGUAGE: A THREAT TO ENGLISH LANGUAGE USAGE IN NIGERIA

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ABSTRACT

English is a second language in Nigeria because it is non-indigenous, it was introduced by British Colonialists and Missionaries into the country. The roles and functions English language has assumed since its introduction into the country are outlined. Since Nigeria functions in virtually all spheres of life in English language, a variety known, internationally acceptable and intelligible exists as the standard Nigerian English. What is really of concern is the increasing deviations noticeable in the speech and writings of Nigerians from the grammar of English. The error laden English spoken by many people in the country may well be replacing the standard Nigerian English if the situation is not checked. The root causes of the problem are pointed out recommendations are made towards curbing the negative trend.

Keywords: English language, standard Nigerian English, grammar, errors, varieties of English, second language, mother tongue.

INTRODUCTION

As a widely used language, English is spoken in many regions of the world, and like other languages, it passed through stages of development to become the English language of the present day. English developed from Germanic and Romance (Latin) sources and it is traced to the Indo-European language family. It is spoken as a native language in Britain, America, New Zealand, Australia, Canada, South Africa and Ireland and as a non-native language in many other nations of the world (Nnamdi-Eruchalu, 2012). Similarly, Igbinnosa and Igbinnosa (2010) state that English is a West Germanic language that is rooted in Anglo-Saxon England. Colonization and its sundry impacts such as military, political, scientific, economic and cultural domination helped the British Empire in 18th, 19th and 20th centuries to export the language to many parts of the world. Presently, English language has become the lingua franca in many countries of the world. Its use as a second language is pervasive. It is the official language in Commonwealth countries and many international organizations, and it is one of the six official languages of the United Nations.

The position of English as a global language indicates that it is no longer the exclusive cultural property of the native speakers of English. Second language speakers of English out-number

the native speakers by a ratio of 3 to 1, Nigeria ranks third position with a population of 79 million speakers after United States (251 million speakers) and India (90 million speakers). This constitutes 53% of total Nigerian population (estimate 148 million) in which 4 million speak English as first language and over 75 million as second language (Wikipedia, 2009). Modern English described by David (2004) as the first global lingua Franca is the dominant international language in communication, science, business, aviation, entertainment, radio and diplomacy. Its spread has continued even more prominently since the United States attained the super power status after World War II. According to Onoyovwi (2010), English in Nigeria underscores the fact that the language is non-indigenous to Nigeria. It came to Nigeria in the 16th century and its learning became institutionalized in the 18th century by the British colonialists and missionaries. After the amalgamation of the North and South in 1914, English language developed not only into a lingua Franca among the educated, but also as the undeclared national language (Bamgbose, Banjo and Thomas, 2005).

English language assumed and performed many roles and functions before independence in Nigeria. Akporokah (2012) observes that English language has been widely used in the propagation of education in Nigeria and it is used in all facets of education. This seems to be the most important function of English in our society. It is also the language of government in Nigeria because almost the transactions in government offices are carried out in English language. Minutes, official correspondence, memoranda, circular, instructions and directives are given out in the English language. Proceedings of meetings are written and conducted in English in government offices. Most government protocol and propaganda are carried out in English. In commerce and industry, transactions are mostly carried out in the English language. It is the only language used in the board rooms during meetings by members of staff. Inter and intra business transactions are done in English language. Transactions in the banking halls are carried out in English. Trading in the stock exchange market is also performed in the English language. As a language of international communication, English becomes a readily available language to be used either in the country or outside the country. English language is the most extensively used language in the Nigerian media that is both print and electronic media. English is the language of law and legal drafting as almost all the books in law are written in English. The 1979 constitution is written in English. It is as well the language of science and technology and information and technology. It is also the language of social interactions among the people who are from various ethnic groups, be it for interpersonal communication or in most social gatherings.

The Nigerian nation and its people are obviously in a relationship which is inevitable with English language and it will remain so for a long time. For a language so crucial to a nation and its people, it remains to be seen why its teaching is neglected at all levels by government. The people pay little attention and show no interest in internalizing the language in its correct form. English language spoken and written by a vast majority of educated Nigerians is laden

with errors. This manifests in sectors such as education the media both print and electronic, entertainment (Music and the film industry), and government among others. Though scholars have agreed that there is a standard Nigerian English as a variety just as there are many other varieties worldwide, errors committed by Nigerians are not noticeable in other varieties of second language speakers of English. The form of incorrect English that is not acceptable in the educational system cannot be acceptable or intelligible at the international level. If this scenario is not checked by government and the educational sector, the wrong form of English may gradually become acceptable and regarded as a Nigerian variety of English, this therefore calls for the need for this paper.

VARIETIES OF ENGLISH AND NIGERIAN ENGLISH

The spread of English language beyond the shores of Britain where it originates has brought about the different varieties of the language. Studies by Dazie and Awonusi (2009) Nwaiwu (2008) show that the speakers of the language now total seven hundred million against the estimate of Baugh and Thomas (1983) of three hundred and fifty million, which the 1985 UNESCO report confirms were only for natives who constitute only thirteen percent of the population of the speakers of English language. Recent development of the world becoming a global village through computers and the internet has necessitated the infiltration of a number of varieties (Nwaisu, 2012). Varieties of English are “lects” of English found in different parts of the world. Among the varieties identified with native speakers include the British English, American English, Canadian English, New Zealand English, and South African English among others. On the other hand, non-native speaker varieties include Indian, Singaporean, Jamaican, Caribbean and Nigerian varieties. Within a particular variety, there may be a number of sub types as there are in the “lects” that make up the British variety to include Scottish, Welsh and Irish English. This is exactly the problem with the standard Nigerian English (SNE) which has to content with multiplicity of “lects” which not only impede functional communication but threatens the future of communication in the country (Awonusi, 2009 in Nwaiwu, 2012).

As far as Nigerian English is concern, there are conflicting views among scholars. For the likes of Banjo, Jibril, Afolayan, Bamgbose among others, there is a consensus that there is a Nigerian English (NE) with varieties or sociolects according to ethnic, social and educational distinctions. According to Banjo (2005), Nigerian English exists in its own right as the localized, Nativized or the Nigerianized variant with the distinctive features of intonation, diction and idiomatic expressions. As such, not all deviation from the British English should be classified as error. Banjo (2005) comments that as far back as 1966, following Grieve’s report to the West African Examination Council on the status of English language in the educational system of the country, the concept of a standard form of the Nigerian English was born. The concept still in operation, refers to the English that has high prestige at home and

reasonably easy intelligibility abroad. It should pass the test of grammaticality, intelligibility and acceptability internationally. Oluwole in Bamgbose (2005) notes that this is the English of the educated, the acrolect that has little or no mother tongue interference and is closest to the standard British English (BrE).

The Standard Nigerian English is internationally intelligible and generally acceptable but once the common core criterion disappears off a class of English dialect and invariable becomes a new language, it can hardly be generally acceptable and cannot be intelligible internationally. Nwaiwu (2012) opines that this is the case with a number of substandard varieties that now infiltrate into Nigerian writings in the name of standard variety. A cursory look at the nation's daily newspapers, weekly and monthly magazines and journals, fictions, text messages and textbooks reveals that significant number of expressions contained in their writings lack the criteria of acceptability and intelligibility. The current trend of wide spread use of deviant expressions by Nigerians in the English language is what Nwaiwu (2012) refers to as sub-standard Nigerian English, which educated Nigerians need not to be associated with.

ERRORS IN THE ENGLISH OF NIGERIANS

It is acknowledged that there is a standard Nigerian English. The standard Nigerian English is however threatened by the wide spread wrong usage. The deviations are clear errors because speakers do not adhere to the rules of the grammar of the language. Though it has been said that not all deviations from the standard British English are errors, non-conformity with the rules of English grammar is error. A brief explanation of the term may help put issues in clear perspective at this point. In the course of learning a second language, learners regularly produce utterances in speech and writing which is judged by the rules of the target language are erroneous or mal-formed. Deviation from the rules of the language constitutes an error or may cause a breakdown in communication. Errors are therefore unacceptable forms and patterns that occur in the speech and writing of speakers and users of a language. They occur in such areas as phonology, morphology, syntax, lexis and usage (Okafor, 2010). Error analysis has its origin in the rationalist theory of learning propounded by Chomsky. To the rationalist, man possesses some innate capacity that predisposes him to look for basic patterns in language. In the course of this, he may commit errors which in any case should be seen as facilitative rather than inhibitory in the learning process. An error is a systematic deviation from the target language by a non-native speaker. It is a breach of the language code which is made up of set of rules for generating well -formed sentences, when the rules are not applied accurately, it may result in error.

The errors which occur in the English of Nigerians are committed because of clear ignorance or misapplication of the rules that are inherent in the English language. Corroborating this, Onoyovwi (2010) indicates that the volume of ungrammaticality pervasive among the elite is a pointer to the fact that relegation of intensive teaching of grammar cannot produce a standard

level of English that is internationally acceptable. It is common to hear embarrassing grammar when a highly educated personality is called on to speak especially in the aspect of subject-verb concord. We cannot defend aberrant forms based on ignorance of the basic rules of the English language as variety because this will fall short of the two tests for determining varieties globally (Okafor, 2010). English being a second language to a vast majority of Nigerians is not an excuse for many not to strive to achieve competence in the language. No internationally acceptable variety for instance will condone incorrect sentences and expressions made every day by prominent Nigerians such as the following:

- *That your sister is very beautiful.* ‘That’ and ‘your’ are determiners and in English determiners do not co-occur. In other words they are not used as pre-modifiers in the same environment. Therefore whenever any of the articles, demonstratives or genitives which have been previously enumerated, one choice disqualifies the choice and the inclusion of any other for the modification of a particular noun in the same sentence. Therefore the correct version of the wrong sentence should be. **That sister of yours is very beautiful or your sister is very beautiful.** Similarly instead of saying that my book say that book of mine.
- *I don’t think she need a help from me.* In this context ‘help’ should be used as an uncountable noun and so should not be preceded by the article ‘a’ Besides it should neither require the numerals – one, two, three nor be pluralized thus it is incorrect to say she needs two helps or she needs helps the correct equivalent of the sentence is **I don’t think she needs help from me.**
- *I came to your office last week Wednesday.* The use of ‘week’ in this sentence is otiose the correct version will read. **I came to your office last Wednesday.** Similarly one should not say next week Wednesday. Rather one should say next Wednesday note that the same thing is applicable to other days of the week one should always say next Monday next Tuesday or last Monday last Tuesday as the case may be.
- *This land belongs to Shiolbial family.* Good English requires the definite article before Shiolbial family. Hence one should say. **This land belongs to the Shiolbial family.**
- *The election of the new president was announced on radio yesterday.* There is the need for a definite article before radio. Its omission alone renders the sentence faulty. The correct version is. **The election of the new president was announced on the radio yesterday.**
- *My mother gave me an advice during the holiday.* ‘Advice’ has been used here as a countable noun the fact that it is uncountable notwithstanding this is wrong the correct expression is. **My mother gave me advice during the holidays. Or my mother gave me some advice during the holidays.**

- *We do not have enough stationeries in the office.* Like all other uncountable nouns, the word stationery should not be pluralized. A plural noun is what caused the error in the sentence. One should say. **We do not have enough stationery in the off**
- *I came to your office yesterday but you were not on seat* (not on seat is un – English). What is said in English is. **I came to your office yesterday but you were not there.**
- *That girl is a gossip I don't like to associate with her.* 'Gossiper' is not an English word but 'gossip' is, we should therefore say. **The girl is a gossip I don't like to associate with her.**
- *He is a clergy,* the word 'clergy' is a plural noun meaning the people who have been officially made priests or ministers especially in a Christian church. Therefore one person cannot be 'clergy' what is said in English is. **He is a clergyman.**
- *I was invited for the book launching.* The correct English expression here is 'Book launch' to be accepted the sentence should read. **I was invited for the Book launch.**
- *My sister schooled at immaculate heart college Shendam.* The verbs to 'schooled' implies to teach, to instruct or to train, for instance one can say. He has been properly schooled in the basic techniques of drawing. There is therefore a mis use of the verb in the above sentence. The correct verb is 'attend' the sentence should be re written thus. **My sister attended school at immaculate heart college Shendam or my sister attended immaculate heart college Shendam.**
- *He has eaten all the money for his school fees.* Here is another problem of direct translation from mother tongue in good English one (spends) and (not eat) money the right sentence is as follows. **He has spent all the money meant for his school fees.**
- *We discussed about it yesterday.* The 'verb' discuss is a transitive verb and as a result should be obligatorily be followed immediately by the object of the sentence. Unfortunately, in the above sentence it has been wrongly used as if it were an intransitive verb having been followed by the preposition 'about' rather than the object 'it'. The correct sentence is. **We discussed it yesterday.**
- *Are you with my notebook?* This is incorrect English. Good English demands that we should say. **Do you have my notebook?**
- *I prefer living in Shendam than living in Jos.* 'prefer' does not go with 'than' but with 'to'. The correct version is. **I prefer living in Shendam to living in Jos.**
- *Cornelius has gone to barb his hair.* It should be reiterated that the word 'barb' does not mean to cut one's hair. It means the point of an arrow, a fish – hook or a remark what is intended to hurt somebody's feelings. 'Barb' in this sentence is therefore a misnomer what is said in good English is. **Cornelius has gone to get his hair cut or to have his hair cut.**

- *The little girl is very plumpy.* There is no word in English as ‘plumpy’. It is therefore a false adjective the acceptable adjective is ‘plump’. In correct English we say. **The little girl is very plump.**

(Culled from discussions on national television, radio and personal conversations)

In Nigeria most people use English in addition to their first language or mother tongue. Mother tongue interference cause many people to use English the same way they use their mother tongue. For this reason the use of English in Nigeria is special. However, errors especially grammatical ones cannot be justified after learning is expected to have taken place. Since languages are not the same, it is normal that different rules govern different languages. For instance, errors in sentences A above are indicative of ignorance of the basic rules of the grammar of English which ought to be mastered at the primary and secondary levels of schooling. In Goemai the language of the author for example, the subject-verb agreement differs in English and Goemai. In the English language the 3rd person singular verb in simple present tense must take the suffix ‘s’ to show agreement with the subject in number and person while in Goemai Language there is no agreement of person for example:

English –	she eats food
Goemai –	Ni t’s’e t’so
Transliteration –	she/he eats food

In the above sentence the verb eats agrees with the subject in number and person in English sentence but in Goemai, the verb t’s’e which means ‘eat’ has no number marking the verb can agree with both singular and plural subjects.

English –	Naanzem breaks the pots
Goemai –	Naanzem P’yram wang hok
Transliteration –	Naanzem break (Pl) pot def

The verb ‘breaks’ agrees with the subject in numbers and person while in Goemai there is no agreement between the subject and the verb rather the agreement is between the verb p’yram (Pl) and the object wang (pot) there is no number marking on the noun pot the verb indicates the plurality of the noun pot. In respect to demonstratives in English language there is agreement between demonstratives pronouns and the nouns and the demonstrative precede the nouns. However, in Goemai language there is no agreement between demonstration and the nouns the nouns precede the pronouns as in.

English -	This child is lazy
Goemai –	La noe a goed’ai
Transliteration –	Child the foe lazy,

It is clear for the sentence above that in English the demonstrative pronoun (this) (s) agrees with the noun in number – child but in Goemai language there is no agreement between the noun and the demonstrative.

English –	These children are lazy
Goemai –	Jap noe a moe dai
Transliteration –	Children the foe lazy.

These agrees with children (Pl) in English language while in Goemai there is no agreement between the noun Jap (children) and ‘noe’ this. The example above is an aspect of grammar which shows that Nigerian languages are different from English. The same could be said about other levels like phonology, morphology, semantics etc. it is expected that in learning any language, the fact that languages have different rules should be taken into consideration to enable learners learn the target language with its inherent peculiarities. This may account for why other countries like Ghana, Kenya among others where English is also a second language, people use English with less noticeable errors.

ISSUES RESPONSIBLE FOR WRONG USAGE OF ENGLISH BY NIGERIANS.

In any second language (L2) learning situation, learner errors are inevitable. In the case of Nigeria, learners study English language mostly in school against the backdrop of their first language or mother tongue which they have acquired in their communities. Researches on language teaching focus on learner errors which reveal that there are sources of other differences with the target language. Proponents of error analysis distinguish between errors, which occur “interlingually” and those which take place intralingually. The term “interlanguage” is referred to as the approximation system” and the “idiosyncratic dialect” of the language. All can simply be defined as “the deviant linguistic system actually employed by the learner attempting to utilize the target language. “Intra-lingual errors” are those which reflect the general characteristics of rule learning such as faulty generalization of rules and failure to learn conditions under which rules apply (Okafor, 2010).

The problem with the use of English by Nigerians is that errors such as described above do not only occur in their use of English at the different stages of learning the language but even long after they are expected to have mastered the workings of the language. The reason for this may not be farfetched when a close look is taken at the practice in the educational system of the country. According to Onoyovwi (2010), in the earliest days of the introduction of English as a language of education in Nigeria, there was adequate emphasis on grammar. Through intensive use of drills, substitution tables, fill in among others, a pupil mastered the rudiments of grammar by the end of primary school. Unfortunately, when the teaching of structures (structuralism) came in the late sixties, this method which immersed the learner in the rudiments of grammar branded as ‘traditional grammar’ was neglected in pursuit

of Chomsky's 'communicative competence'. Methods and texts changed in a bid to have the L2 learner acquire English as the mother tongue (MT) user. The major problem here as Onoyovwi (2010) points out, is the L2 user is not exposed to the same volume of raw linguistic data as the mother tongue user. The L2 speaker learns it in school after which he reverts to his MT, so reinforcement through daily social interaction is absent.

Having reviewed the curriculum for English in the secondary school, Azikiwe (2007) comments that: The reason for the neglect of grammar could be as a result of the call for second language learners to learn L2 just like the native speakers hence, the recent emphasis on the use of the direct natural method in second language lessons. Regarding this, Azikiwe (2007) summarizes that the failure in English at terminal examinations increases at an alarming rate. It is clear that learners of English language since the adoption of the new approach have learned English without intensive teaching of its grammar. This negligence has existed for long as it was exposed when the Lagos State Ministry of Education in 1991 organized a workshop for teachers on "Teaching Grammar for communication". It was discovered that only 25% of them taught some form of grammar at all, and they also went through training without being taught grammar. The products of those teachers are now teachers and lecturers in schools. It follows naturally that the present day teachers are unable to teach what they do not know.

In the primary school level, a teacher teaches all the subjects in his or her class including English language. Some teachers may not be as knowledgeable in the language as expected as many exhibit a complete lack of mastery of the English language. Hence teachers' in public schools at this level use local languages for instruction, though in the most uncoordinated manner. Any attempt by the teachers to speak English usually results into speaking pidgin English to the pupils (Alhassan, 2010). English lessons conducted by these teachers will make anybody wonder whether they are aware of the existence of a scheme of work or a syllabus to be adhered to. Such teachers (Umolu in Alhssan, 2010) refers to as teachers of English who teach reading using inappropriate strategies such that pupils simple parrot words after them without understanding the meaning of the forms that they pretend to read. Commenting on the crop of incompetent teachers pervading the educational institutions in the country, Omole (2008) notes that the knowledge of English exhibited by many primary and secondary school teachers is indeed appalling be it in spelling, grammar or pronunciation.

The decreasing number and scarcity of English language teachers in schools complicate issues further. Schools operate with only one or no English language teacher. In such schools, teachers who were not trained as English language teachers are allowed to teach the language whether they have mastery of the language or not. The perennial neglect suffered by these two tiers of education can only leave its mark on the educational system. The primary and secondary levels of learning are very crucial stages of learning. They are the formative stages where most habits and skills are developed. But not much attention is given to activities going

on (especially in public schools) where majority of Nigerian children obtain their primary and secondary education. The prevalent wrong usage of English by many Nigerians is a repercussion of the situation in Nigerian public schools. Like Clark, (1995) rightly points out; as teaching goes, so goes the nation.

CONCLUSION

As a second language in Nigeria, English has been adopted for a wide range of functions. The situation is the same for many African countries and the world over. Learning and functioning in it certainly have their attendant problems. A clear aberration and deviation from Standard English need not to be considered as any form of variety in Nigeria. The earlier stake holders in education tackle the menace and nip it in the bud, the better for the future of the English language in Nigeria. As Onoyovwi (2010) suggests, let our contribution not be bad grammar, we cannot afford to defend deviant forms based on ignorance of basic rules of the English language as 'Nigerian English'. Have you ever wondered at the English of Ghanaians? Onoyovwi (2010) asks. If we try hard enough, we can do better, rather than ignore or defend forms which are obviously and globally faulty.

RECOMMENDATIONS

In order to arrest the problem of wrong usage of English in Nigeria, scholars need to agree on what errors are and when deviations occur in the English of Nigerians. The idea that not all deviations are errors creates some confusion. Deviations regarded as errors in India, Ghana, Kenya among others should be regarded as errors in Nigeria as well. Rather than adopting a sit-on-the-fence attitude, government both at the local and federal levels should encourage the effective teaching and learning of English. All necessary efforts must be made to ensure that the language in which Nigerians function in all spheres of life is well taught and learned. This should be by the provision of equipment and personnel, as well as supervision and monitoring in schools at primary and secondary levels.

The adoption of communicative language teaching approach is not yielding good results here in Nigeria. There is a need for the teaching of the grammar of English in schools. This will help learners recognize that the language is rule governed and also help improve their skills in grammar. The teaching of Oral English should be introduced at the primary school level. The teaching of English language at the secondary school level should not be for all. It should be for qualified and trained teachers. Workshops and retraining programmes should be organized for such teachers to update their knowledge and methods.

The teaching profession needs to be made more appealing to draw more people into it. Good incentives should be given to teachers of English as this will help curb their declining number in schools. Provision of language teaching aids and language laboratories in schools is important in order to enhance the learning of English especially in teacher training institutions.

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A REVIEW OF THE IMPACT OF USED TYRES ON THE ENVIRONMENT AND PROPERTY VALUE

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Abstract

End of Use tyre also know as end of life tyres, are form of tyres that have already used its life time and are no longer in use for the purpose they were made for. The used tyres have become threat to the environment because it does not under go degradation easily. As the population of the world is increasing with over 7.74billion people on earth The need for the use of automobile increases . In the year 2020 more than 2 billion tyres are being produced annually and research show that by 2026 more than 2.7 billion tyres will be produced annually. In Nigeria, More than 10 million tyres are used annually and this end of use tyres are becoming problem to the environment if not property stored, handled and disposed. The common means for disposing the end use tyres are mostly landfill and burning. Which eventually courses environmental degradation like flooding, soil erosion and air pollution there by affecting the inhabitants of that area and in extension affects the Property Value , capital infrastructure and advanced effect to health and environment.

Key word: environment, used tyres, property value and waste management.

Introduction

End of life tyres refers to tyres that has ceased to perform its original function having exhausted all its re-use options. End of life tyres (ELT's) are not reasonable as a second hand

purchase. They are special types of waste. They are municipal waste rather than hazardous waste.

Transportation is a very important sector. It drives socioeconomic and technological development. By the year 2050, population of the globe will exceed 9 billion and number of automobiles will be about 2.4 billion, population increase, urbanisation, standard of living, and demand for mobility have enlarged demand and supply of tyres.

According to the European Environmental Agency, pollution is the introduction of substances or energy into the environment, resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems, and impair or interfere with amenities and other legitimate uses of the environment (Mathew 2015).

Environment in the general term refers to every living and non-living thing in a particular habitat. It includes land, air, water, plants and animals, buildings and other infrastructure, and all of the natural resources that provide basic needs and opportunities for social and economic development of man (Social Report, 2003). Rapport in Omar (1993) maintained that environmental quality deals with the physical environment as well as the perceived environment and defined as the material aspects of the physical which have certain effects on people. Environment in the context of this study is confined to the physical component of the environment, that is, the built environment which is basically everything that is humanly created, modified, arranged or maintained (Choudhary & Adane, 2012) and such includes houses and infrastructure supporting the houses.

Value of real estate is a function of physical, locational and legal characteristics of the property (Ling & Archer, 2006), influenced by increase or decrease in population, change in age distribution of population, change in taste and fashion, change in technology, change in building methods, change in building cost, inflation and deflation, change in culture and planning control, institutional factor, location and complementary uses (Millington, 1979; Oyebanji, 2003).

Related studies (Jim & Chen, 2006; Chun-Chang *et al.*, 2013) have attributed increase in property values to improvement in environmental quality. However, with the present deplorable conditions of most neighbourhood infrastructure as evidenced in poor roads, broken water pipes and blocked drainages amongst others in Minna peri-urban areas.

To understand why scrap tyres are environmental hazards, it is important to understand the properties of tyres. A tyre is a rubber covering, pneumatically inflated and placed round a wheel to provide a flexible cushion and form a soft contact with the road (Uzo *et al.*, 2011). Tyres are manufactured for use in almost all forms of mechanical vehicles such as passenger cars, bicycles, tricycles, vans, trucks, airplanes, etc. The materials of modern pneumatic tyres are synthetic rubber, natural rubber, fabric, wire, carbon black and other chemical compounds. Most times, when tyres have served their original purpose, they are usually discarded in landfills or stockpiled or burned in open field. Proper management of end of life tyres (ELTs)

is important in Environmental Management as well as Property Management. Globally, about one billion ELTs are reported every year. Its existence as solid waste which has a significant economic and health effect as a result of poor handling of the ELTs, majority of these waste tyres accumulate in landfills sites or are being illegally disposed off to the open land fields (Viglostry, Klurkon and Joze., 2017).

Problems caused by End of Life Tyres

Various studies quantify the global waste tyre problem at between 1 billion and 1.8 billion used tyres disposed-off worldwide each year. This represents approximately 2-3% of all waste material collected. The US alone sends between 246 million and 300 million end-of-life tires to waste annually.

The problem is also growing. With a rising population worldwide – especially among emerging middle classes in poorer countries gaining more access to vehicles – there comes an increase in vehicle use. As more miles are driven, more tyres are replaced and more waste tyres have to be dealt with

An estimated 48 million equivalent passenger unit (EPU) tyres reached their end-of-life in Australia in 2009–10. Of these approximately 66 per cent were disposed either to landfill, stockpiled or illegally dumped or categorised as unknown, 16 per cent were domestically recycled and 18 per cent were exported.

Apart from the costs to the community and governments through littering our landscapes and waterways, and taking up scarce landfill space, end-of-life tyres can be a source of health and environmental concerns; fires in stockpiles can release toxic gases; and tyre stockpiles provide breeding habitats for mosquitoes and vermin.

Proximity and Distance: One of the problems that lead to degradation of the environment and property value is as a result of distance. So many people chose to dump their refuse or unwanted materials in the drainage water ways which eventually lead to flooding and erosion in the affected areas thereby affecting the property value.

The menace of dumping end of use tyres increase the risk of land pollution, thereby affecting the quality of water by surface runoff.

Improper dumping of End of Use tyres serve as a habitat for mosquitos and other rodents which also affect our health.

Uses of End of Life Tyres

1. Creates New Products

You can recycle waste tires into useful products. Particularly, you can derive fuel that is even more efficient than fuel derived from coal, from recycled tires.

2. Reduces Volume of Tyre on Landfill Space

Because of their large sizes and hollow shapes, tires take up plenty of space in landfills. By recycling tires, we are saving up space on landfills for other difficult waste recycling.

3. Helps to Prevent Diseases

When you discard old tires at home, you are providing an enabling environment for disease-carrying rodents. Waste tires accumulate stagnant water, which breeds mosquito and causes malaria, amongst others. Tires are also potential homes for snakes, rodents, and other vectors.

4. **They are Used as Ornaments on our homes** eg flour caves and rubber tiles.

5. Prevents Fires and Pollution

We must also mention that while tires serve as fuel, burning them leads to serious environmental pollution. Apart from being difficult to quench, they produce black, thick smoke. This, in turn, contaminates soil and water in the surroundings, causing serious damage to marine life, soil nutrients, and agriculture for many years.

Literature Review

End-of life tyre (ELT) or scrap tyre refers to tyre that has ceased to perform its original function having exhausted all its re-use options. It is a non-reusable tyre in its original form. ELTs are not re-usable as a second hand purchase (David,2018) ELTs are a special type of waste. There are municipal solid wastes rather than hazardous wastes (Adewole, 2018) When it is decided that the used tyre is neither reusable nor reconstructable, it is discarded and the recycling or recovery process begins. Since the 1972 Stockholm Conference on the environment, environmental sustainability has been a recurrent theme in the face of increasing environmental pollution. Pollution is the introduction of substances into the environment whose by-products in time have harmful or negative effects on the environment. Environmental pollution arises because of man's activity that directly and indirectly affects the environment. When a foreign substance is introduced into the environment in a high and unmonitored concentration, it becomes a pollutant and a threat to the environment. According to the European Environment Agency, pollution is the introduction of substances or energy into the environment, resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems, and impair or interfere with amenities and other legitimate uses of the environment (Ben et al., 2013).

Traditional Methods of Scrap Tyre Disposal

The increasing pollution caused by the increased use of automobiles and other vehicles has become a cause for alarm around the world. However beneficial tyres may be to mobility, scrap tyres negatively affect the environment when improperly disposed off. Below are examples of methods of scrap tyre disposal that negatively affects the environment.

1. Landfilling/ Stockpiling

Landfilling is one of the most common methods of scrap tyre waste disposal in the world. Yearly, millions of tons of tyre waste go into already overcrowded landfills. Tyres occupy so much land space in landfills due to their large mass. Tyres are basically non-biodegradable

because of their complex chemical and physical composition. Thus, they could take decades to decay and are extremely difficult to compact in landfills because of their buoyancy. Finding suitable space for the appropriate disposal of scrap tyres constitutes a major problem in scrap tyre disposal. The increase in the production and consumption of automobiles has equally increased the incidence of illegal stockpiling. When tyre wastes are stockpiled, they tend to collect water and thereby provide suitable breeding ground for malaria causing mosquitoes. The negative environmental impact of landfilling or stockpiling of tyre wastes is huge. Although, landfilling is generally the cheapest and most convenient method of disposing of solid wastes such as ELTs, landfilling of whole or shredded tyres is entirely prohibited in some countries for reasons stated above. In the EU, landfilling of whole and shredded tyre is banned while in South Australia, whole tyres are banned. Landfill bans or restrictions when well planned and implemented with sufficient time for adjustments, can produce significant reductions in disposal of tyre wastes and increase resource recovery (Ijebor, 2016)

2. Burning

Scrap tyre burning offers ephemeral relief from scrap tyre menace and long term negative environmental impacts. Open burning of scrap tyres in dumpsites and landfills is a major occurrence in underdeveloped countries as Nigeria. Open burning of scrap tyres generates a thick black toxic smoke and large quantities of hazardous gaseous emissions. The thick black smoke and toxic residues emitted from burning tyres may cause environmental harm, nuisance and pose direct threats to the economy, public health and safety. More so, the toxins released from the smoke can contaminate soil quality, groundwater and surface water. Airborne emissions from the open burning of scrap tyres are common occurrence in Nigeria (FME, 2019).

There is also the incidence of tyre fires. A Tyre fire is an event that involves the unintentional combustion of large quantities of tyres, typically in locations where they are stored, dumped, or processed. The toxicity is even stronger if this contains metals such as nickel and tin, which you get when you throw the whole tyre into the furnace. Tyre fires could cause asthma and respiratory complications, irritation, cough and chest pain, central nervous system depression, high blood pressure and subsequent heart disease; cancer and inflammation of mucous membranes. However, burning scrap tyres at industrial facilities during the process of pyrolysis does not pose these health risks if conducted properly as it is an eco-friendly process (FME, 2019).

END OF LIFE TYRE WASTE SITUATION IN NIGERIA

The rapid increase in Nigeria's population growth and income growth has resulted in a corresponding increase in the importation and purchase of all forms of motor vehicles. This change in consumption pattern has caused an increase in the amount of scrap tyres generated periodically. The number of scrap tyres in Nigeria increases monthly thereby amounting to

high concentration of this solid waste in environmentally harmful quantity. It is estimated that thousands of tons of scrap tyres are abandoned in various parts of the country. (FME, 2019) Many ELTs in Nigeria also end up in the waterways and on the streets. Many are also burned during festivities; as roasting material in abattoirs and in extrajudicial killings of suspected criminals. Tyres have been stock piled around the country for years both legally and illegally in landfills and open dumpsites. These open dumpsites, which are usually indiscriminately located near residential settlements, causes leachate to contaminate nearby soil, surface and underground water bodies that are relevant to the residents who completely depend on those resources. This situation is aggravated by the absence of a scrap tyre waste collecting system as well as designated specially constructed landfill sites in the country for tyre wastes. This further highlights the need for a comprehensive national solid waste management policy that would incorporate this present scrap tyre menace (FME, 2019).

Recycling is still a nascent concept in Nigeria and as such has not received much attention from the government. Material recovery or recycling operations are carried out mostly by the private sector that employ scavengers to sort refuse for a fee and salvage any recyclable waste material prior to the ultimate disposal of the waste. Presently there is no tyre recycling or resource recovery facility in the country. Thus, legislations, policies as well as technologies championing tyre recycling; resource recovery and addressing issues of tyre manufacturing, haulage, disposal, storage, processing, etc. are practically non-existent.

GREEN TYRE RECYCLING OPTIONS TOWARDS SUSTAINABLE WASTE TYRE DISPOSAL

Tyre recycling is the process of repurposing vehicle tyres that are no longer suitable for use on vehicles due to wear and tear or irreparable damage. The process of tyre recycling involves the collection and separation of tyre waste materials, the preparation of scrap tyres for re-use, processing, and re-manufacture; and the re-processing, re-manufacture and re-use of these materials. Since ELTs are difficult to dispose off, they could be converted into potential economically viable and sustainable products instead of being left to constitute environmental menace. This has spurred research into ways to successfully dispose of or recycle tyres into economically viable and sustainable products. Scrap tyres are indeed not only an environmental issue, but also as an economic benefit. The tyre and rubber waste recycling business is a very thriving industry. It is the major sector of the economy of the United States and it generates a whopping annual sum of 959.2 million dollars from registered and licensed Tyre and Rubber Waste Recycling companies in the country. The industry also employs several thousands of people. Despite the huge capital outlay, the market for recycled tyres is huge and can accommodate loads of investors. Tyre recycling is a very profitable venture. To convert the waste tyre into a valuable product, it must first be reduced in size and then recycled. Tyre recycling reduces the negative environmental impacts of tyre stockpiling, burning and

landfilling. It has become a resource-efficient approach to tyre waste management and pollution control. It makes for sustainable development as it not only protects the environment; it is both economically and socially beneficial. Popular tyre recycling methods practiced around the world are examined below:

1. Retreading

Retreading used tyres is a form of tyre recycling. When a tyre's lifecycle comes to an end, the tyre tread depth reduces. At this point, the best course is to repair or retread the used tyre and then re-use it for the same original purpose for which it was designed. One of the best uses of ELTs is to retread them, but this process is quite expensive and very few countries resort to it. Retreading gives used, worn out tyres an extended useful life because during the process, about 80% of the original material value of a tyre is available for re-use. The U.K. has benefited from reusing and exporting retreaded tyre casings. The U.S. has taken advantage of the growing market in retreaded tyres because it is highly sustainable. According to the American Remanufacturing Industries Council and Future Marketing Insights, the cost of retreaded tyres is 30-5- per cent lower than that of a new tyre and generates huge income for the American economy. Retreads are definitely greener than new tyres and the retreading process produces less carbon emissions and uses far less oil than the production of a new tyre (Ben, 2013)

2. Material Recovery Or Waste Transformation

When used tyres reach the end of their lifespan, their physical and chemical composition could be recovered before final disposal. The complex physical and chemical composition of tyres makes them a highly valuable resource for various secondary raw materials that may be recovered such as rubber, steel, powder and fibre. In the process of material recovery of tyres, whole tyres, which are the larger particles of waste tyres, could be shredded into rubber chips that are useful in civil engineering. Other smaller particles of tyres are converted into rubber granules and powder that are used in the market to sell car parts and components, compounds in bitumen or varnish. The market regarding bitumen production has increased considerably (Ben, 2013).

The process of waste transformation and material recovery in all its aspects saves landfill space and save the environment from attendant pollution. Recovery methods involve three main aspects: materials recovery, energy recovery and re-use in a whole or part form for miscellaneous physical purposes. The traditional method of stockpiling tyres or dumping in landfills is fastly becoming out of tune with modern and sustainable environmental practices. Efforts are now geared towards reducing the amounts of waste generated; thus, the emphasis on waste transformation, resource recovery and recycling (Ben, 2013).

This process of material recovery of waste tyres is truly sustainable and should be practiced by Nigeria. The UK has derived great environmental benefits in recycling and processing whole tyres, tyre shreds, rubber granulates and rubber powders. Several technologies are developed and practiced to encourage waste transformation and material recovery from scrap

tyres. Such technologies are cryogenic, shredding and pyrolysis. Statistics of the European Tyre and Rubber Manufacturers Association (ETRMA) shows that about 95% of Europe's ELTs were successfully recovered through energy and material recovery processes. In the U.S., 4.39 million tonnes of waste tyres were recovered through energy and material recovery process (Ben, 2013).

3. Tyre shredding or Rubber Crumbing.

Tyre shredding or rubber crumbing is usually the first procedure in the tyre recycling process. The process involves the reduction of used tyres into small manageable chips separated into major components of rubber and steel called crumb rubber. This form of recycling is environmentally friendly, and allows used tyres to be used repeatedly. Tyre shredding or crumbing is done to provide a raw material in a form of rubber crumbs or to reduce the volume of tyres before landfilling.

Shredded tyres and Crumbed Rubber are also known as Tyre Derived Aggregate (TDA). They have many civil engineering applications such as barriers for collision reduction, for sound and impact absorption properties; as insulation in building foundations and road base material; highway crash barriers, sound absorbing walls, boat fenders on harbour walls. Also, entire homes 'green buildings' can be built with whole tyres by ramming them full of earth and covering them with concrete, known as earth ships. It is also used as sub-grade fill, light rail vibration and embankments, back-fill for walls and bridge abutments, sub-grade insulation for roads, landfill projects, and septic system drain fields, coastal protection and off-coast break water, erosion control on steep slopes or roadsides, rainwater runoff, blasting mats, wave action that protects piers and marshes, and sound barriers between roadways and residences. It is used as raw material in the rubber and steel industry; for flooring of indoor and outdoor sports courts, as roofing material, walk pads, carpet padding or underlay, dock bumpers, patio decks, railroad crossing blocks, livestock mats, sidewalks, rubber tiles and bricks, animal bedding, movable speed bumps, and curbing/edging, etc. The rubber can also be moulded with plastic for products like pallets and railroad ties. Rubber from tyres is sometimes ground into medium-sized chunks and used as rubber mulch. Rubber crumb can also be used as an infill, alone or blended with coarse sand, as in infill for grass-like synthetic turf products such as Field-turf (Ben, 2013).

4. Pyrolysis Process or Energy Recovery

Tyre Derived Fuel (TDF) popularly referred to as waste to energy process, is amongst the first market for scrap tyres on the global scale and remains the most beneficial and highly sustainable end use as supplemental fuel in Europe, Asia-Pacific and the United States. Pyrolysis is a thermal degradation process in which organic material is decomposed at high temperature usually from 500-600 degree celsius in either an oxygen-free or low-oxygen atmosphere. The purpose of pyrolysis is to break the tyre into its original components of oil, gas, solid residue (char), and low-grade carbon black, which cannot be used in tyre

manufacture. Pyrolysis of scrap tyres offers an environmentally and economically feasible method for transforming waste tyres into heat and electrical energy. Pyrolysis of scrap or waste tyres (WT) is an attractive alternative to disposal in landfills, allowing the high energy content of the tyre to be recovered as fuel. The products of pyrolysis have properties that would allow their easy re-use. Using tyres as fuel produces equal energy as burning oil and 25% more energy than burning coal. Tyre pyrolysis plants are in use in several countries now, including the USA, Japan, India, and France. The black Carbon black produced by pyrolysis application (CBP) or rubber char is more economical compared to carbon black produced primarily from petroleum and is more price-efficient. It is to be used as a raw material in the following industries such as the electric cable jacketing, the conveyor bands; carrier bands; home and doormats; black nylon bags; hoses, doormats, rubber additives; cable jackets; automotive spare parts; heat isolation; black colorant in rubber materials; plastic pipes; black colourant in industrial rubber products, plastic pipes and fire fighting.

The pyro process converts scrap tyres into Pyro Diesel Oil (PDO). High grade Light Speed Diesel Oil (LDO) and Industrial Furnace Oil (IFO). Recovered LDO and IFO can be used to generate electricity and help mitigate the nation's power shortages. LDO and IFO are suitable fuel oils for rural pump sets and gen sets. The U.S. EPA acknowledges tyre-derived fuels as a viable alternative to the use of fossil fuels so long as proper regulatory controls are in place.

The use of ELTs (whole tyres, half tyres, shredded rubber wood chips) is increasingly regarded as a valid alternative fuel in the cement industry. Since tyres are largely composed of hydrocarbons, they may provide an alternative non-fossil fuel resource when they are burned in special incinerators or kilns. Tyres may therefore be burnt to provide energy for the production of steam for vulcanisation, electricity, cement, lime paper, steel wires, zinc oxide and sodium sulphate. However, it is currently being challenge due to the steep fall in oil prices in recent years.

5. Other ELT Repurposing Options

Scrap tyres can be vulcanised when they have reached a point whereby their re-use option is exhausted. Then, the physical properties of the ELTs can be exploited beyond the original purpose mainly for aesthetic purposes. Used tyres in a whole condition or mashed, cut or sliced, can be utilised in garden beds as bark mulch or rubber mulch to hold in the water and to prevent weeds from growing. Rubber mulch is also good in playgrounds as it has elasticity, which gives it a springy quality when used in a thick layer. This makes it a natural choice for playgrounds, where the extra springiness provides additional safety for children when they fall off playground equipment.

Follow Up Studies on Residential Property Value Determinants

Some studies can be found in the literature with the objective of examining an influence of different factors on the value or sales price of residential properties. Nachmen (2007), Ventolo

& Williams (2005), and Rodgers (1994) stated that the most important are adjustments due to the size, view, condition, and age of the residential property (physical characteristics of a property), appeal of architecture, the age of the building, and parking (or traffic). Buriskiėne, Rudzkiėne & Venckauskaite (2011) stressed the location and prestige of a property, the age of building, type of house (construction of external walls), ecological state of a district (air pollution and noise level) and other factors such as number of storeys, number of rooms and total useful area of a property. Nachmen (2007) also emphasised the location of the property (including the reputation of the neighbourhood) and convenience (including functional characteristics). Nachmen (2007) also emphasised the location of the property (including the reputation of the neighbourhood) and the convenience (including the functional characteristics). Ventolo & Williams (2005) have additionally investigated the impact of the type of heating and cooling as well as outdoor areas, such as the terrace and atrium. Rodgers (1994) has included in the adjustment process also ventilation, attic, and fireplace as important factors for a particular group of buyers. Eksioėlu, Cetintahra & Cubukcu (2014) emphasised the importance of the environmental aesthetic value of a street.

Langerholc & Grum (2012) list natural factors among the most important factors influencing the value of property, which included not only noise, amount of sunlight, and view, which were already taken into account in estimating the value of residential properties, but also avalanche, flooding, number of foggy and clear days, odour, windiness, quality of air, and the occurrence of hailstorms and sleet.

Location of property according to neighbourhood is the most important factor in the evaluation of value and represents one of the most demanding elements of analysis, which was proven by Mbachu & Lenono (2005). Namely, 73.3 % of all interviewed property owners have specified that location is a very important factor in the value of a property.

Economic characteristics considered in the appraising of properties include negative environmental factors, such as the proximity of industrial facilities, busy roads, and business and shopping centres. The influence of busy roads on the value of apartments in Hong Kong was reported in 2010 by Jim and Chen. They found that the view of the road with heavy traffic reduced the value of apartments by 1.39 %. Another significant negative factor on residence value is noise. Total noise pollution is the result of the operation of all noise sources (e.g. roads, railways, industry sources) in a given area and represents the true burden of population and areas with noise. Areas of noise pollution are those that exceed the acceptable limit of the daily noise level (55 dB) and night- time noise (45 dB). (Epi Spektrum, 2009).

Conclusion

After reviewing the literature, it can be concluded that many different types of factors have great impact on the value of residential properties. Because the value of residential properties

depends on the type of influential factors and of the contribution of these factors to the value of a property.

End of Life Tyres have negative impact to the environment if not properly handled, because it results to erosion, flooding, reduction in quality of water, livelihood of the people, and negative impact on the value of Real Properties.

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**OUTSOURCING CLEANING SERVICES AS AN ALTERNATIVE TO IN-HOUSE
CLEANING IN AN ORGANIZATION: A CASE STUDY OF THE BANK OF
AGRICULTURE (BOA), BAUCHI PLAZA**

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Abstract

The meritorious effects of outsourcing cleaning services are being examined in the Bank of Agriculture Plaza in Bauchi, Bauchi State, Nigeria. Purposive sampling was used to choose 36 Bank workers and questionnaires were used to collect primary data from these individuals. The analysis was done using descriptive statistics. The results demonstrated a significant variation in cleaning service quality between the two scenarios. This suggests that the cleaning service's caliber improved once it was outsourced. Given the satisfaction

gained from continuing the contracted cleaning solutions, the study advises the Bank to do so in order to improve operational effectiveness and resource allocation.

Keywords: Outsourcing, Cleaning Service, In-House, Bank of Agriculture, Bauchi.

Introduction

Outsourcing is handing off to a third party some of the duties that were previously handled within the organization. It is a deal when one business hires another to deliver services that might be done internally as well. Outsource has been employed as a business strategy for a long time. The industrialization served as its foundation (Common, Flynn & Mellon, 2016). Numerous businesses that had benefited from economies of scale were already diversifying discovered that they required multiple management layers. As a result, management systems grew out of control, which limited their capacity for adaptability and creativity. Due to the above, businesses had to create a new approach that concentrated more on the main business while outsourcing non-essential functions in order to remain competitive on the global arena. This was the beginning of outsourcing's development as a business model (Smith, 2021).

Whenever a company decided to outsource, it turns over the duties of completing non-essential tasks that had previously been handled internally by employees of the company to a third party, allowing the company to concentrate on its core business. Universities and other educational establishments are starting to turn to outsourcing in an effort to assure cost efficiency, improved service delivery and competitiveness in the face of declining monetary backing (Kanter, 2019).

Since many businesses were concerned with cutting costs in the nineties, they expanded the variety of services they might outsource to include cleaning, accounting, human resources, data analysis, and security. The number of emerging service providers, particularly foreign contractors operating on a worldwide scale, also increased. . In the United States service sector, for instance, call center and technical support services were outsourced, which benefited many young Filipinos who were proficient in American English. To remain price viable, several businesses in wealthy nations have also hired Russians for their quantitative and analytical talents (Da Cruz, 2018).

Of course, the main reason to outsource facility care to an office cleaning business is to save money. First and foremost, experienced, qualified and resourced office cleaning service will save you money right away. This savings is achieved in part through scale, cheaper bulk cleansing supplies and equipment, and the like, in addition to structured and systematic recruitment, on-boarding and education. The Janitorial Company engages in this process on a regular basis. Larger cleaning firms are established and have a lot of bulk purchasing power, which allows them to save money on supplies, and consumable goods, among other things, which they passed on to you (Russel, 2017).

Contracting workplace cleaning services saves you money and time spent on cleaning personnel recruitment, training, screening, and management. When you consider how much money is spent on administration, benefits, healthcare, screening, and other time-consuming management and administrative activities, it is clear to see the advantages of outsourcing to a professional office cleaning business (Adebayo & Aderinto, 2017). Choosing the best office cleaners for your facility will give you more bangs for your buck. Any experienced office cleaning business may provide a better service at a lower cost (and fewer headaches for you). Cleaning is not a component of their business (Adebayo & Aderinto, 2017).

Literature Review

Farndale, Thite, Budhwar and Kwon (2021) defined outsourcing as acquiring anything that was never originally sourced internally or might have been sourced domestically despite the choice to outsource it. Outsourcing as described by Peng (2014), is the transfer of an organizational activity to an outside supplier who will undertake it on behalf of the focus enterprise. Miroudot and Cadestin (2017) described outsourcing as the acquisition of a value-creating activity from a third party. Outsourcing is also characterized as a process strategy in which a company contracts out the production process or service delivery activity inside its value and distribution network, resulting in lower techniques of production and transactional economics costs (Dakare & Ikenwa, 2016). Dakare and Ikenwa (2016) observed that these definitions usually fall under the categories of content, context and process perspectives.

Outsourcing is also known as "vertical disintegration." Vertical dissolution, the inverse of vertical integration, occurs when a firm's value chain operations are leased out to another organization that can accomplish them more efficiently (Woodcock, 2020).

Outsourcing is defined as a service or production optimization strategy option aiming at increasing resource appropriation from value chain activities that are not the focus activities of an institution's core business or important functional domains for the purposes of this study. We contend that when outsourcing is correctly incorporated into an organization's operations strategy, it improves flexibility, strategic effectiveness, and strategic competitiveness (Zhu, Ng, Wang & Zhao, 2017). Outsourcing is typically a difficult decision for business managers to make since it requires the business to weigh the potential cost savings against by the expenses of losing control over the service. The prevalent argument behind outsourcing decisions in Nigerian universities is that rather than spending so much money on operations that are not fundamental primary activities, university administrators now outsource them to independent vendors to offer the services. There are several reasons why universities outsource. It varies from of the necessity to reduce expenses to the transfer of cost-related risks to third-party service providers. The primary motivation for exporting is the desire to keep competition which drives firms to outsource where others can do it better resulting in savings (Adebayo & Aderinto, 2017).

According to Isaksson and Lantz (2015) firms consider their outsourcing decision to be successful when the advantages realized exceed the expenses of carrying out the tasks in-house. On the other hand side, various negative consequences of outsourcing have been identified, including unrealized savings, hidden expenses (Kakabadse & Kakabadse, 2000), and the potential loss of technology and corporate confidential data (Katz-stone, 2000). The dearth of an appropriate cost estimate, the institution's failure to choose a suitable supplier, which resulted in poor performance of the outsourced activities, unrealistic expectations of the outsource provider due to overstated promises, poorly designed contract terms and agreements without well-defined key indicators, which makes it difficult to figure out where things are at, have all been cited as reasons why outsourcing has failed.

Pahiranthan (2017) claimed that customers' decisions on the corporate strategy to use to suit their demands can be heavily influenced by the quality of the service. And although providing cleaning services is not a basic function of an academic setting, it is essential for the wellbeing of students and faculty members as well as the academic community at large. A safe environment reduces the likelihood of infections spreading. No pupil desires to study in a messy setting. No employee can function effectively in a messy setting. As a result, it must be kept tidy. It is enough to declare that every university that wants to accomplish its main goals, which are teaching, research and community work, Notwithstanding the alleged risks connected with outsourcing, will eventually need to consider outsourcing its support services like cleanliness and information systems.

Muraguri, Ng'ang'a and Omondi (2015) found that external cleaning offer higher-quality services than those offered by internal cleaning service workers after researching the impact of outsourced cleanliness operations on service quality in Kenyan public universities. Additionally, it was discovered that even though the cleaning service was more expensive, a higher value for the money was obtained. However, a study by Beckwith (2016) examined public institutions in New South Wales, Australia, using a two ordinary differential econometric model and data from sixty-one (61) cleaning service contracts, provided evidence demonstrating that, whereas the performance of cleaning services provided by cleanup agencies was preserved (that is, neither altered nor managed to improve), the rates were moderately reduced.

In a similar manner, Mohammed, Sani and Musa (2018) confirmed that outsourcing is a crucial way to increase IGR in higher education institutions and hence offer an additional source of funding for those establishments through with a study of outsourcing as an alternative for higher education financing (HEF) in Nigeria using Adamawa State University and Gombe State University as case studies. A survey on university community satisfaction with in-house sourcing versus outsourcing among chosen government universities in Ethiopia was conducted by Mohammed, Abebe and Wondim (2019). Outsourcing gave universities the chance to better resource management, reduce administrative stress, staff complaints,

operating costs, and recruitment costs. Additionally, a rise in delivering services quality was observed.

To determine if outsourcing improves the quality of service in public healthcare institutions in South-East Nigeria, Arisi- Nwugballa (2016) used a field survey approach. The results showed that outsourced generated significant performance improvements through the outsourced services. Ogbogu (2017) evaluated the outsourcing process in a Nigerian university employing quantitative analysis. According to the study's findings, outsourcing has boosted quality of service, cut costs, boosted efficiency, and allowed the university to focus on its main activities. Prempeh and Nsiah-Asare (2017) conducted the study using the same set of factors among Ghanaian technical universities and found comparable results. Overall, despite the fact that outsourcing does not constitute a new occurrence in Nigeria, a review of existing literature on public sector outsourcing schemes has shown a dearth of empirical studies on outsourcing in Nigerian universities.

Methodology

An epistemological convergence, which involved the adoption of both an interview method and a qualitative descriptive method to collect data from respondents chosen through purposive sampling and who are employees of the Bank of Agriculture, was combined, made it easier to achieve the study's overall goal. Marshall (2002) gave some assurance that the conclusions drawn from a study won't be theory- or insinuation. Given that it would enable the collecting of public opinion regarding the management of the bank's choice to outsource cleaning services, the decision to utilize a surveying method to collect primary quantitative data using a questionnaire approach was considered appropriate for this research. The interviewing method resulted in main qualitative study that reflected first-person evaluations from respondents' unique viewpoints on the quality outcomes of the outsourcing of cleaning companies. The interviewing technique produced primary qualitative data that reflected first-hand assessments from respondents' views on the quality outcomes of the outsourced cleaning service. The data were used as a supplement to the quantitative data's analysis. Quality effectiveness is the factor used in the study to determine whether to outsource. Two sections made up the questionnaire: The participant's personal information, including gender, employment history, and academic background is contained in Part A. The respondents' views on the quality of the cleaning service both before and after it was outsourced are covered in Part B of the questionnaire. Because they have direct contact with the service providers and are the ones who evaluate their performance, the researcher thought that the client representatives would make ideal respondents. In order to evaluate the data gathered on the respondents' personal information and to quantify the significance of the difference between the quality of the cleaning services that were outsourced and those that were internally sourced before and after, descriptive statistics like mean, deviation, and percentage were used.

Discussion of Results

Two stages of the analysis were completed. The bio-data of the respondents were analyzed in the first section using descriptive statistics, and the quality of the cleaning services before and after outsourcing was examined in the second section using a t-test technique. The comments made by the respondents during the interviews were employed to clarify the quantitative results at each phase of the presentation of the findings.

Profile of the Respondents

From the answers in Table 1, it is clear that there are more male than female respondents. In particular, male participants make up 52.7% of the population sample while female respondents make up 47.2%. 19.4% of respondents, who are drivers and securities, had a secondary school diploma, according to an analysis of the respondents' educational backgrounds. A National Diploma is held by 11.1%, a Bachelor of Science/Higher National Diploma (BSC/HND) by 50%, a Master's degree by 19.4%, and a PhD by 0% of those in attendance. This suggests that the participants are well-educated and are able to comprehend the questions and provide accurate answers. 94.4% of the respondents have worked for the bank for more than five years, according to the amount of years they have spent there. This suggests that the respondents can provide highly accurate information about the cleaning service in the bank before and after the effort, which began about twelve (12) years ago.

Table 1: Profile of the Respondents

Characteristic	Frequency	Percentage
Sex		
Male	19	52.7
Female	17	47.2
Total	36	
Education Qualification		
School Certificate	7	19.4
ND	4	11.1
BSC/HND	18	50
MSC	7	19.4
Total	36	
PHD	-	
Number of Years Spent with Bank		
Less than Five (5) Years	2	5.6
5 – 10 Years	3	8.3
10 – 15 Years	15	41.7

15 – 20 Years	11	30.5
Above 20 Years	5	13.9
Total	36	

Source: Field Survey, 2022

Table 2: Respondents Perception on the quality of cleaning service before and after Outsourcing

The results of the calculated mean score are shown in Table 2 below. The respondents agreed that the outsourcing cleanup provider acts promptly to requests than the in-house cleaners, with the mean score of 2.46 for before outsourcing and 3.39 for after outsourcing, which measures the degree of promptness of cleaners to requests made by client's representatives. In an interview, a participant said, "When it comes to promptness to demand, I award it to an outsourced firm.

Similarly, the professional cleaning supplying bank was rated higher on reliability, which considers the cleaners' capacity to ensure client safety and provide assurance that there will be a resolution to their difficulties, with a mean score of 2.20 for before outsourcing and 3.30 for after. One respondent stated, "I prefer the outsourced services over our in-house cleaning since they have a way of handling issues."

Prior to outsourced, respondents' opinions on service quality in terms of tangibility were 2.34 and 3.30, respectively. The available physical facilities, equipment, employees, and communication materials are tangible outsourcing quality metrics. According to the analysis conducted, a greater percentage of respondents concur that providers employ existing tools that makes their work more efficient than in-house cleaners. "Unlike earlier, our office equipment is now dusted using a vacuum cleaning machine," said one responder during the survey.

The outsourced professional cleaning provider was evaluated higher on competency, which measures the capacity of the external contractor to deliver care and individualized attention to customers, with a mean score of 3.31 after and 2.34 before outsourcing. One respondent stated, "The contractors are superior to our workers in that they enjoy flexible hours. The cleaning company was rated with a mean score of 3.3 over the in-house cleaners after outsourcing cleaning services and 2.75 before in terms of its capacity to provide individualized attention, carry out their tasks at convenient times, have the best interests of the client at core, and also deal with customers with care.

	BEFORE		AFTER	
	Mean	Std	Mean	Std
Responsiveness				
.Level of prompt service	2.43	.244	3.50	.723

.always willing to help	2.28	.233	3.22	.698
.never too busy to respond to client.	2.66	.223	3.44	.705
Average	2.46		3.39	
Reliability				
.do what they promised at the right time	2.85	.338	3.22	.723
.sincerely showing interest in solving problems	1.66	.233	3.45	.710
.do something at certain time as promised.	2.10	.299	3.38	.689
Average	2.20		3.35	
Tangibility				
.the use of modern equipment	2.44	.622	3.60	.755
.outfit of the cleaners	2.25	.520	2.80	.625
.the working condition of the equipment	2.33	.785	3.51	.690
Average	2.34		3.30	
Competence				
.knowledge to answer question	2.88	.727	3.54	.765
.clients safety when dealing with the service provider	2.65	.560	2.95	.688
.ability to relate courtesy	2.73	.793	3.51	.550
Average	2.75		3.31	
Attention				
.give individual attention	2.69	.755	3.55	.815
.carry out their activities at convenient time	2.80	.625	3.13	.725
.having best interest of the client at heart	2.51	.690	3.25	.790
.deal with client with care	2.98	.420	3.30	.755
Average	2.75		3.3	

Source: Field Survey, 2022

Conclusion

It is impossible to overstate the advantages of outsourcing cleaning services because they have a huge positive impact on businesses. A competent cleaning staff can complete more work in less time, and a professional maintenance business may obtain better prices on machinery, consumables, and refill items like toilet paper, towels and hand soap. As a result, there are frequently significant huge savings. Further than the immediate cost-cutting measures, there is also reduction of the significant expenditures associated with personnel hiring, training, management, and recruitment.

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LOCALIZATION OF TEXTILE INDUSTRY IN NIGERIA

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Abstract

Petroleum resource dependent Nigerian economy along with poor governance, challenges the Nigerian textile industry. Moreover, there is a sheer lack of political will to formulate policies directed at industrial growth by the Nigerian political class. The growth of textile industry is essential if Nigeria is to foster structural change and translate its potentials. This article examines how poor policy implementation stunted the development of the Nigerian textile industry from 1985 to 2015. The textile industry's decline reflects internal challenges and the failure to provide supportive policy measures and critical infrastructure for the growth of the sector. This is also related to Nigeria's overreliance on petroleum at the expense of other economic sectors. This article focuses on the neglect faced by the textile industry. Our findings indicate that overreliance on petroleum resources emboldened imports of foreign made products especially from China. It calls for the application of an industrial policy to increase the competitiveness of the Nigerian textile industry globally. The article provides an understanding into the reasons for the collapse of the textile industry. It also contributes to the need for industrial policy consideration for resource dependent economies.

Keywords: Industrial policy, Dutch disease, Manufacturing, Petroleum, Textile, Infrastructure

Introduction

For decades Nigeria has experienced an upsurge in the global production of petroleum resources. Petroleum resources have become the mainstay of the economy while manufacturing and other sectors suffer (Odularu 2008). The opportunities provided by an increase in oil revenues to transform the economy came to nought. Government effort to diversify the industrial sector of the economy is relatively weak. The neglect of the textile subsector is due to the government's overreliance on the oil sector. The manufacturing sector on the whole suffered as the country shifted attention and focussed on oil as the main revenue source. The non-oil export industry (manufacturing) stagnated while the dominantly export-oriented petroleum sector thrived (Otaha 2012; Ilegbinosa, Uzomba and Somiari 2012). Dependence on the petroleum resources increasingly became stronger by the day as the world experienced an oil shock that triggered a sharp upsurge in oil prices. Huge petroleum earnings made the government ignore other buoyant sectors in preference to the petroleum industry.

This phenomenon is encouraged by the government's concern in developing the petroleum sector that is seen as a more lucrative sector compared to the manufacturing sector (Luqman and Lawal 2011) which requires heavy investment in infrastructure development. Although many countries around the world continue to provide direct support to their manufacturing industries, it is believed that the best form of defence against global competition is efficient infrastructure facilities and result oriented government policies.

Worthy of note, textile factories in Nigeria are increasingly stripped of government support. Thus, the defining challenge for the sector to remain competitive has shifted, especially in the wave of continued shrinkage of international borders from comparative advantage to competitive disadvantage (Porter 1990). In this context, the motivating questions for the article are how can textile manufacturing in Nigeria improve its position in the global textile sector? In particular, the recent developments notwithstanding, is there a policy gap in the development of the Nigerian textile sector? Is the major development challenge in the country the result of overreliance on the petroleum sector, the financial crisis, or infrastructure deficiency? These questions are important because of the policy linkages between supporting the manufacturing sector (textile production) and economic development. The article therefore focuses on the failure of policy to contribute to economic development due to the neglect of the textile sub-sector. UNIDO (2003) report shows how many developed and developing countries have announced varying stimulus plans to reinvent the manufacturing industries. Those are countries without power failure and exorbitant interest rate regimes. Loans from the Bank of Industry and other similar institutions are not forthcoming. Where they are obliging, the interest rate is always very high. The high cost of transporting industrial goods and other materials from the Lagos port to Kano is of equal importance. In addition to that, it is evidently clear that lack of good governance and political will to redress the situation of the dwindling manufacturing activities had adverse effects on textile production and commerce. This assertion is substantiated in the statement of Budina, Pang and van Wijnbergen (2007), which contends that Nigeria's petroleum resources failed to enhanced growth and development in the country's non-oil sector.

There are diverse empirical literature that discusses the Dutch Disease phenomenon and the neglect of the manufacturing sector (Fardmanesh 1991); poor governance (Otaha 2012) and immiserizing growth syndrome (Hassan 2015; Onyeiwu 2015). Humphreys, Sachs and Stiglitz (2007); Onyeukwu (2007); Van der Ploeg (2011); and Frankel (2010) identified oil and other natural resources as a source of riches, which often crowd out other economic sectors especially manufacturing and cause job loss. Inflow of oil revenue often leads to currency appreciation, a phenomenon that encourages corruption. Earlier studies including that of Otaha (2012); Budina, Pang, and van Wijnbergen (2007); Ucha (2010) identified abundance of natural resources as the primary reason for poor governance and conflicts in Nigeria. Nevertheless, Sanusi (2010); Luqman and Lawal (2011) claimed that the government failed

to implement growth-enhancing reforms that will ensure the provision of critical infrastructure for industrial development. They pointed out that the phenomena persist because of corruption; rent-seeking enterprises, recurrent unrest, and erosion of social capital as some of the reasons associated with it (Stevens and Dietsche 2008). Greater emphasis on government accountability and institution-building is the possible way out of the resource curse.

Another argument from Balogun (1997) and Remi Aiyede (2003) indicated that Nigeria is experiencing imperious governance from the colonial period to date. They argued that colonial rule dislocated the economic system by reorganising the economy to suit the economic interests of the colonial power. Thus, the previously prosperous textile industry was stifled by colonial economic policies. This provided avenue for foreign merchants to take full control of economic activities. Britain undoubtedly dominated the economy with resource extraction and local industries suffered due to imports of British goods especially textile. At independence with the discovery of oil in commercial quantity, governance continued as it was during the colonial period (Omeje 2001). The manufacturing sector was ignored by the government in preference for easy money from petroleum resources. Scholars including Ojameruaye (2004), Fardmanesh (1991), Ezeala and Harrison (1993), and Davis (1995) argued that the best possible explanation for the neglect of the manufacturing sector was the deindustrialization process. The outcompeted sectors include textile, rubber, cocoa and other manufacturing industries. Ilegbinosa, Uzomba, and Somiari (2012) maintain that the value and quantum of non-oil exports drastically declined. It has been established that the traditional manufacturing sector provides more efficient growth opportunities better than the extractive industry.

Previous studies have not provided a detailed rundown on the multivariate evidence that spurs the wanton neglect of the textile manufacturing industry. Moreover, little attention has been paid to the dominance of the petroleum industry and its concomitant effects contributing to the poor performance of the textile industry. Certainly, many a times and in different circumstances, natural resource affluence has unleashed economic disorder. Our article seeks to reposition the textile industry by making recommendations to the government on a number of measures that could be carried out. It is about consistency in policy implementation by government agencies, reduction in an influx of smuggled goods, adequate supply of energy and LPFO, fiscal policy incentives, support to cotton production and revamping the textile industry. The article is also of value to academia and to policy makers who are interested in studying China-Africa relation.

The Nigerian Textile Industry

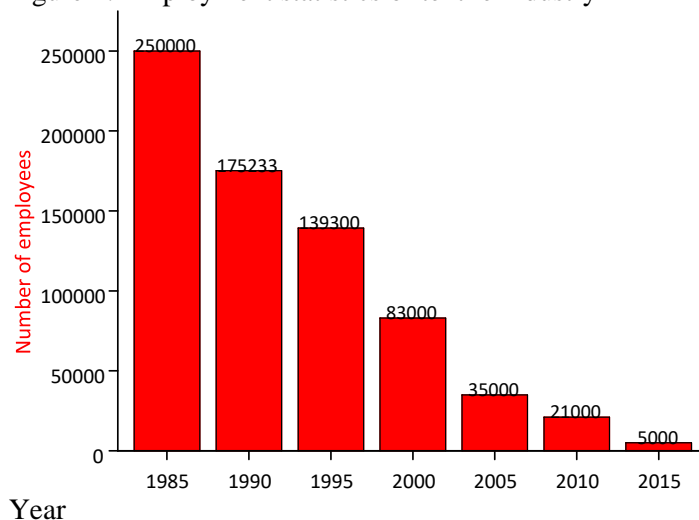
Nigeria, Africa's second biggest economy had once a prosperous textile industry till the mid 1980's. Before 1985, the export of textile products, just as other manufactured exports in Nigeria was remarkable. The textile sector had an annual growth rate of 67 percent. Its labour force in 1985 was 25 per cent in the manufacturing sector (NTMA 2009). The inability of the

Nigerian textile industry to compete is chiefly due to its failure to produce at lower cost. The causes of the textile industry's decline are predominantly caused by policy neglect besides that a range of local and global policy measures also contributed to the situation it is in today. Neoliberal reforms and changing trade agreements, inadequate infrastructure for providing electricity and water, reduced cotton production and increased textile imports have all contributed to the industry's decline.

The early independence years of the 1960s to the mid-1970s came to be known as the industrial development period aimed at converting abundant raw materials to manufactured goods. Encouraging traders to convert and become manufacturers was the single most significant impetus to the growth of the textile industry in the country. 112 factories were involved in spinning, weaving and garment production by 1980. The domestic manufacturing sector could have surged if not for the impediment experienced because of the introduction of Structural Adjustment Programmes in the mid-1980s. It is irrefutable that when right policies are implemented the textile sector has the potential to contribute to economic growth for Nigeria's development.

By 1985, the textile industry had become the largest employer of labour after the government. These factories have a direct 250,000 unionised workers, millions of cotton farmers as well as suppliers and traders (Aremu 2005). Direct employment afterwards declined to 175,233 in 1990, 83,000 in 2000 and 21,000 in 2010 respectively (see Fig. 1). The industry's share of jobs and value addition was placed at 20 per cent in the mid 1980's. Textile and weaving apparel was the leading industry contributing 19 per cent of total consumer commodity industry employment in 1983. The textile industry is followed by beverages, food, as well as the tobacco industry (Brandell 1991).

Figure 1: Employment statistics of textile industry



Source: Central Bank of Nigeria and Field Survey

Considerably, the industry's turnover has been placed at N8 billion meters per year. On replacement basis, the installed textile manufacturing capacity was set at N420 billion, and US\$3 billion investments in 1990 (UNIDO 2003). With a population over 180 million, Nigeria has the prospect of generating 1.2 billion meters of cloth per annum.

When the ECOWAS sub-regional market is factored, Nigeria is a strategic textile location in the world. The industry can engage 3 million people. 26 out of the 36 Nigerian federating units grow cotton of long and short staple lengths. From this sound and solid context, the textile industry in Nigeria began to decline since the mid-1980s.

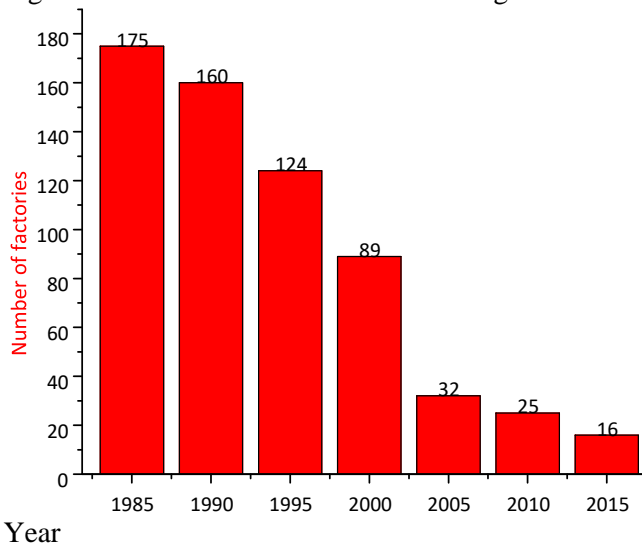
As Nigeria takes on more economic liberalisation, the manufacturing industries got weakened with a reduction in aggregate demand, which dampens domestic production and manufacturing output. It also reduces the level of income and the level of employment. The rapid decline in government expenditures has continuously reduced aggregate demand within the economy. It has created serious underutilisation of industrial capacity in the economy. Gross Domestic Product increased by only 1.3% with the annual population growth rate at 2.1%. Aggregate index of industrial production declined by 5.1%, which was more severe in the manufacturing sub-sector that fell by 8.1% as it contributed only 0.9% to the GDP from its 0.5% contribution of 1991 (CBN 2000).

The Central Bank of Nigeria in its annual statement for 1999 reported that the local textile industry suffered from cheaper foreign textile dumping and the sector recorded persistent output contraction or outright closure (CBN 2000). As at April 2000, President Obasanjo observed that the characteristics of the Nigerian industrial sector include low capacity utilisation, which averages 30% in the last decade. The industrial sector had a low and declining contribution to national output, which averages 6% from 1997-1999. This contributed to declining growth rates; dominance of light assembly type consumer goods, low value-added production due to high import dependence for inputs and the prevalence of unviable state-owned enterprises. Overall, the fiscal narratives of the year 2000 showed that the country's economic performance was largely below average (OPS 2001). The long-standing constraints to manufacturing activities have not abated. Thus, the sector was still characterised by the crippling effects of past policy mistakes and undue competitive pressures due to the economic liberalisation policies of the country.

1985 was the most boisterous year in textile production with over 175 big, medium and small textile factories. By the year 2000 three years into the endorsement of the liberalisation policy, thirty-five textile factories closed down leaving behind 89 factories. Within the span of five years by 2005 the number of factories fell to 32. The effect eventually manifested itself in continued unabated dumping reducing the factories to 25 and 16 in 2010 and 2015 respectively (see Fig. 2). Other challenges include reduction in capacity utilisation; absence of investment

in the industry and the situation deteriorated by the day. The factories could not compete with comparatively affordable materials from East Asia. The challenge was further worsened by increased smuggling as the government did nothing to stop the illegal imports. There was also a problem of undeclared products and non-payment of duties even by legitimate importers. Nigerian market was flooded with imported textiles. Total textile imports into Nigeria were estimated at USD 1.7 billion most of which entered through porous borders. All these denied the local manufacturers the essential competitive advantage (NUTGTWN 2005).

Figure2: Number of textile factories in Nigeria 1985-2015

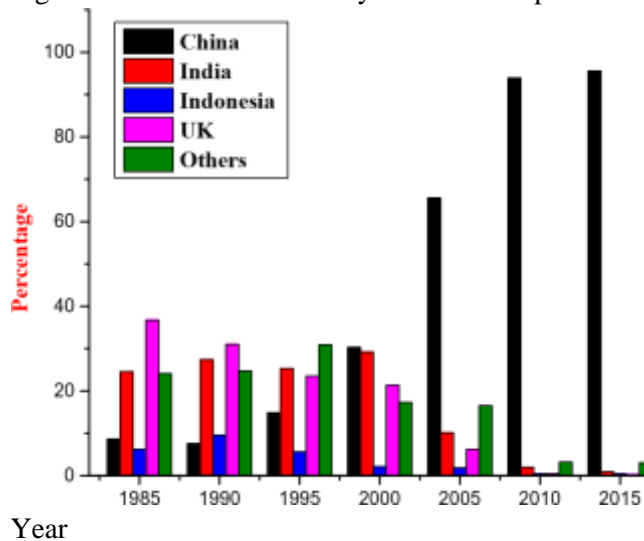


Source: Central Bank of Nigeria and Field Survey

The overall performance of the textile industry in Nigeria is in a state of crises. Average capacity utilisation rates fell from 79.7 percent in 1976 to an all-time low of 48.0 percent in 2005 (CBN 2005). By 2008, over 160 textile companies were closed. Capacity utilisation was estimated at less than 20% with ten factories employing barely 18,000 workers. Senator Walid Jibrin asserted that over two million Nigerians whose jobs were attached to the industry, such as traders, contractors, cotton farmers and the textile workers lost their means of livelihood due to the challenges facing the industry (Muhammad 2011). As of 2010, there were less than forty textile units in Nigeria out of the close to 200 in existence formerly (Aremu 2015). The distress the closures caused in the communities where the factories were located are enormous. According to NUTGTWN, more than one million persons whose means of livelihood are tied to the industry were adversely affected including traders and cotton farmers. The socio-economic consequences were colossal.

With the fall of Kano, Kaduna and Lagos textile sector, imported textiles from China and other core trading partners from India, Indonesia and the UK dominate the market (see Fig 3).

Figure 3: Volume and Country of Textile Imports to Nigeria



Source: Central Bank of Nigeria and Field Survey

In a way, textile manufacturing has returned to the condition it was in during colonial times in the 1950s when Nigeria imported finished textiles from the United Kingdom. Chinese textile companies and retail companies with foreign offices in Nigeria now distribute to local wholesale and also retail textiles directly to consumers.

Nigerian Industrial Policies

Industrial and economic development in Nigeria is facing enormous challenges due to the lack of policy and also poor implementation of critical infrastructure development. Several policies including industrial policy, trade policy, export and import policy, fiscal and monetary policy, have been promulgated. Not much success was achieved on policy implementation. Nonetheless, evaluation on the performance of the country's economy by looking at its many policies over the years suggests that the country is still battling to achieve industrial development. These policies are not home-grown policies made to suit the unique traits of the local economy. Industrial policy and development policies in Nigeria are interwoven and carefully knitted from the colonial era to contemporary times. Structural Adjustment Programme (SAP) was introduced in the mid-1980s to the late 1990s. The policy emphasises the role of the private sector and discourages government interventions through subsidy, regulations, restrictions or control. Measures launched include the introduction of foreign currency domiciliary accounts, abolishing of import licensing and the introduction of Second-tier Foreign Exchange Market (SFEM) (Oviemuno 2007). Other measures include scraping

commodity boards and the significant reduction in the items on the list of banned imports. Like most developing countries, Nigeria had encountered severe balance of payment crisis caused by the cumulative consequences of the oil crisis. The country also witnessed a decline in commodity prices and the growing import needs of domestic industries. In response to the crisis, IMF and the World Bank described the crisis and the lack of industrial development mainly as the result of poor national policies. The 1986 - 1994 policy prescription was based on the findings of the Berg Report on Accelerated Development in Sub-Saharan Africa published by the World Bank in 1981. The report contended that Africa's economic and industrial performance was weak because of policy inadequacies. Thus, the policy domain came in contrast to widely accepted view among African policymakers that industry should be promoted through strategic government intervention.

To fully realise SAP objectives, Export Oriented Strategy of Industrialization (EOI) was unveiled to diversify the productive and export base of the economy. However, the EOI has put Nigeria on a low-growth course, crippling the economic diversification attempts. It triggered a crisis in the textile industry especially in northern Nigeria (Tsauni 2009). Specifically, the emphasis on liberalisation of markets coupled with the rapid withdrawal of several forms of interventionist policies promoting manufacturing drove many domestic firms out of contention. Cases of the closure of industries and operation below capacity utilisation become evident. To chart a course and move away from SAP failure, Guided Deregulation Policy also known as Vision 2010 was introduced from 1994 to 1998. The policy was adopted to continue with the neoliberal measures of privatisation, deregulation, and commercialization along with the withdrawal of government intervention in the economy. Specific government interventions were later returned, and a properly designed vision for the growth of the country was enunciated with lessons from the industrialised Asian Tigers. Structural adjustment strategies hampered the development of the manufacturing industry most specifically in the textile sub-sector. The continued weak performance of the economy starting from the 1980s through 1990s along with the WTO entry of both China and Nigeria prepared the ground for China's textile dominance.

On the return to democracy after almost two decades of military intervention, the government re-launched market-oriented reform strategies which was the National Economic Empowerment and Development Strategy (2003 -2007). Others were the 7-point Agenda (2007 – 2010) and the Economic Transformation policy (2011 - 2015). These measures were the reinvention of SAP driven strategies which have impaired sustained growth and development in Nigeria over the years (Aremu 2015). These policies were promoted with the aim of addressing unstable exchange rate, weak fiscal and monetary policy coordination. It was meant to develop the wherewithal to counter the threats to industrial competitiveness. Most importantly, the past policy measures were not tailored to suit Nigeria's conditions but rather, they adhere to universal approaches which in most cases is not in conformity with the

local circumstances. These measures have not focused on the country's distinct economic difficulties that are the main elements to sustained industrial growth. The measures are inappropriate, and typically they do not usually stand the test of time as they were regularly revised, adjusted, or entirely discarded. Additionally, corruption and indiscipline contributed profoundly in the non-implementation of some policies over the years. Others could be due to inadequate institutional capacity, political instability, insufficient energy supply, poor infrastructure and bad governance. To put it succinctly, the overall marginal performance of the Nigerian economy and the lack of industrial and economic development could be attributed to neoliberal policies.

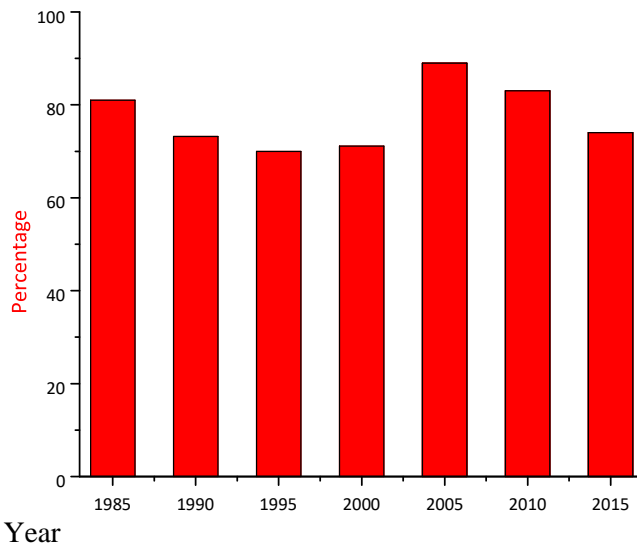
Evidence of Policy Neglect of the Nigerian Textile Industry

Nigerian textile industry has experienced and is witnessing major challenges coming as a result of neglect. Concisely, for lack of policy direction to attain industrial and sustainable economic development to overcome global competitiveness the economy has been slowly turned into a mono-cultural economy by successive regimes. Despite abundant resources to gain the desired goal of manufacturing development easy revenue is sought from oil. The general performance of the government to transform the textile industry is very poor. Moreover, key infrastructural provision is neglected. On the whole, industrial, trade, fiscal and monetary policies promulgated suffer from government inaction (Harvey 2005).

Overreliance on the Petroleum Sector

The phenomenon of overreliance on the Petroleum sector causes the manufacturing sector to fall from a towering 7% and 10% in 1967 and 1970 to a mere 3.8% and 3.4% in 2002 and 2006 respectively in terms of its contribution to the nation's GDP (World Bank 2000). By 1975, the manufacturing sector's contribution to the GDP was 9.5% which decreased in 2007 to 3.52% and rose in 2009 to 4.0%. From a huge 80.0% capacity utilization in 1975, it declined to 47% in 2009 (MAN 2011). In contrast, the petroleum sector's contribution to GDP increased from 2% to 29.1% in 1960 and 1980 (Utomi 2008). The growth and the increased revenue from the oil industry caused manufacturing's GDP share to decline. However, the oil revenue is never stable from the 1980s (Ross 2003). In addition, petroleum seriously dominated government revenue and export earnings. Summarily, in 1970 and 1975 oil revenue accounted for 63% and 83% of total revenue earned. Moreover, it was 96%, 73.2%, 71.1% and 83% in 1980, 1990, 2000 and 2010 respectively (see Fig. 4). The macroeconomic challenges were so damning that structural adjustment strategy was reintroduced to overturn it (Interview Ismail 2015; Ezeala and Harrison 1993). This measure did not arrest the dwindling growth in the industry instead it stifled growth and development of the textile industry (Interview Kano 2015). The economy instead of recovering further returned to a descending spiral.

Figure 4: Percentage of Oil Revenue to Total Revenue Earned



Source: Statista (2016)

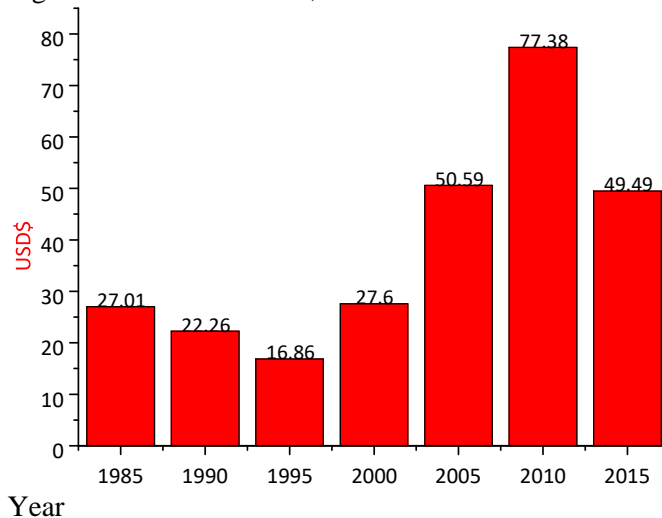
Evidently, heavy reliance on the petroleum sector at the expense of critical manufacturing sector did not augur well on the economy (Ross 1999). It harmed employment in the textile industry. Moreover, it gave room for mismanagement and misapplication of resources to fester. Investment in critical infrastructure was not made to push the textile industry to grow. These elements wrecked the growth potential of the local textile industry while fuelling the dominance of imported Chinese textile (Interview Sagagi 2015). Despite the promised diversification of the economy, more focus was put on the petroleum sector to bolster the oil reserves and to earn more from the sector.

The Manufacturing Sector and the Financial Crisis

Nigeria found itself in a financial crisis forcing the government to borrow from the international financial market. This is as a result of the spending spree of the government and the consumption habit for foreign manufactured goods, which led to mounting import bills. Additionally, the government sourced for foreign loans pushing the economy into the abyss of external borrowing whenever the oil revenue falls short of earmarked output or price. The administration of President Goodluck Jonathan (2010-2015) and Muhammadu Buhari (2015-Date) did not pursue a strategy of an exchange rate that could have improved the competitiveness of the manufacturing sector (Sala-i-Martin and Subramanian 2012; Interview Adhama 2015). Furthermore, the government allowed the local currency to depreciate thereby

wrecking the manufacturing sector competing for space in the domestic economic landscape with the petroleum sector. Petroleum prices were at \$27.01, \$16.86 and \$49.49 in 1985, 1995 and 2015 respectively (see Fig. 5). The price was the highest in 2010.

Figure 5: Petroleum Price, 1985-2015



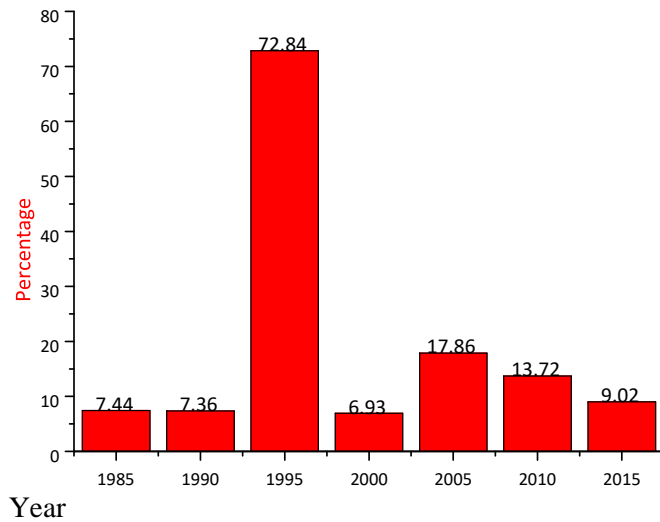
Source: Statista 2016

Trade liberalisation altered the operating conditions of the manufacturing sector. The implications were massive shut down of factories from across the country. Factories could not cover average variable costs. Factories could not afford high lending rates from banks resulting from the liberalisation of interest rates leading to high production cost, higher consumer prices and weak demand. Most factories experienced a financial squeeze. Indeed, the market-based economic reforms planned to promote domestic production proved incongruous for the nascent industrialisation in the country. Moreover, given the raw materials import dependent nature of most manufacturing industries, the huge depreciation of the local currency affected the cost of imported raw materials, which contributed to an increase in the cost of production (Obansa et. al. 2013). This directly affected the levels of production, capacity utilisation and employment in the sector. Hence, unless the national macroeconomic structure is corrected, the economy was generally affected.

Furthermore, the exchange rate was fixed at N21.8861 between 1994 and 1998 despite the fact that the country was witnessing soaring inflation rates (see Fig. 6). In most of these periods, the petroleum prices were at its low ebb. High inflation is typical of Dutch Disease troubled countries. Large capital inflows raise the money supply and therefore cause inflation as more money will increase demand and consequently prices. Another inflation causing factor is the increase in liquidity which is as a result of the increase in petroleum earning (Joseph 1978; Odularu 2008). For example, the price of petroleum was \$17.89, \$16.21, \$17.34, \$20.7, \$19.4 and \$12.77 per barrel in 1993, 1994, 1995, 1996, 1997 and 1998 respectively. By the turn of the century when democracy was restored the country enjoyed yet again increase in the price

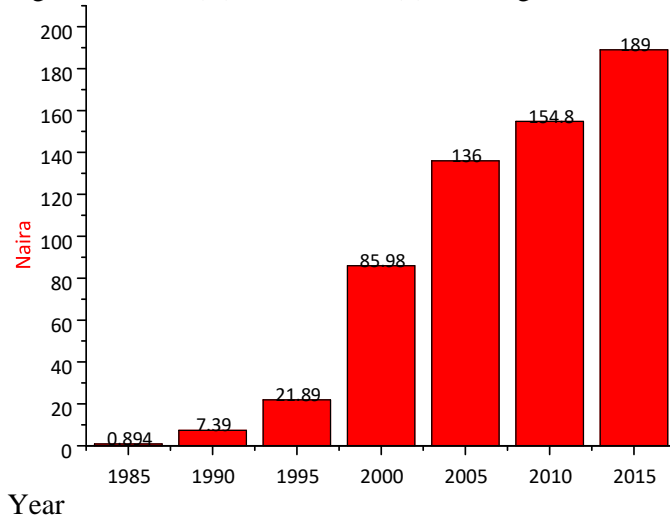
of oil which was not adequately managed. The oil price was \$18.07, \$27.6, \$24.50, \$25.15 and \$28.67 in 1999, 2000, 2001, 2002 and 2003 while the official exchange rate fell greatly from 0.894 in 1985 and 7.39 in 1990. The exchange rate too fell further from 1995 to 2015 (see Fig. 7).

Figure 6: Inflationary Rate, 1985-2015



Source: Central Bank of Nigeria, World Bank, OECD

Figure 7: Naira (N) to US dollar (\$) exchange rate



Source: Central Bank of Nigeria

Policy Inconsistencies and the Nigerian Textile Industry

Manufacturers in Nigeria saw government policies as punitive and constituting the bulk of factors responsible for de-industrialization (Interview with respondents Tofa 2015; Adhama 2015; Sani 2015). Neoliberal policies forced factories to source for inputs including machinery and raw materials. These inputs were non-existent locally as the local factories are import-dependent. Moreover, the low exchange rate of the local currency made it difficult to replace obsolete plants as a result of the exorbitant cost of imports. This made several factories to fail throughout the country. Washington consensus influenced liberalisation policies such as deregulation and the relaxation of government restrictions, and the high-interest rate had adversely affected the growth and competitiveness of the textile industry. Sadly, some banks gave the scarce foreign exchange for use in unproductive ventures. The lack of banking and financial support to manufacturers also led to many withdrawing from manufacturing and partaking in trading in foreign made goods (Interview with respondent Nabegu 2015).

It is common knowledge that privatisation, deregulation and liberalisation of the economy are central in the economic policy landscape. Market forces determine production, supply and purchase in the industry. These policies triggered other challenges (Interview Ismail 2015; Tsauni 2015) where businesses could only thrive in an environment where there are fewer policy challenges (Interview Solomon 2015). Unsteady policies and deregulation also encourage smuggling and dumping of cheap goods. The only thing constant about industrial policies in Nigeria are frequent policy changes which in turn discourages long-term planning for industrial and business development. For example, between the late 1980s and 2004, industrial policies have been altered more than five times (Tsauni 2009; Interview Tsauni 2015; Nabegu 2015). In 2003, based on recommendations made by UNIDO the government announced certain key fiscal measures to boost fresh investment in textiles and encourage exports. These measures include an export incentive in the form of Export Expansion Grant (EEG) and a prohibition on the import of all textiles. These measures were to be sustained for four years from 2003 till 2007. However, there were several policy changes in the next two years, ranging from suspension of export incentives to waivers.

There have also been a series of waivers even after the official ban. Policy inconsistency facilitated the collapse of many textile factories, as it undermined planning by investors. For instance, the waiver was given to lace manufacturers to import polyester filament yarn, viscose yarn and base fabric (Interview Bello 2015). Earlier a government committee set up by the Minister of State of Finance to assess the capacity of various textile mills at Lagos and Kano had discovered that there was adequate local capacity for polyester filament yarn. Given the importance of policy stability, it must go *pari passu* with economic discipline. It is equally important to note that adopting result oriented policies to changing circumstances is vital to sustained industrial growth and development. Nigerian policy makers must be aware that no single economic path is appropriate to all economies irrespective of their location, and level

of development. Economic policies must take cognizance of the history, politics and culture of the country. The careful design and implementation of specific economic policies must be context appropriate. That is why it is wrong to design World Bank/IMF medium-to-long-term economic packages for all of Africa from Cape to Cairo, from Swaziland to Zanzibar, or even from Lagos to Kebbi (LaRouche 2001). The problems of poor leadership in all its ramifications and lack of patriotism contribute significantly to policy inconsistency and this should be researched and understood in order to address the economic problems faced by Nigeria. Furthermore, the policy of the government is being dwarfed and undermined by the internal collaborators who believe that they earn more by undermining the country through shortcuts rather than to follow the rules (Interview Kwaru 2015).

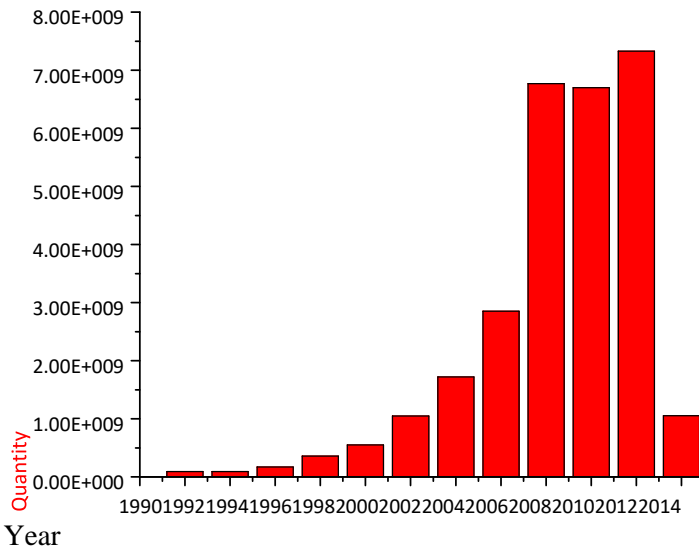
The relationship between policy consistency and industrial growth is very easily identifiable. Where there are consistent policy guidelines, industries can plan production and enhance efficiency. Where consistency is absent, industries cannot plan production and where they do, implementation becomes a serious problem. In the last three decades or so, Nigeria's import procedure guidelines have been changed about five times from Pre-Shipment Inspection to Destination Inspection or 100% Examination. Even though ports are concessioned, but instead to bring infrastructure and equipment to bear on cost and efficiency, importers, especially manufacturers are trapped in the midst of these sudden and frequent policy shifts – thereby putting them in tight corners. This has seriously affected industrial production; some of these industries had to close down. In addition to import policy, multiple taxations on raw material imports and infrastructural deficit are the major challenges facing the industry.

Unfavourable Import Policies

The deregulation of the economy has made a way out of the country for huge capital flight through imports, thereby wielding pressure on the local currency. Many local producers discard production activities for imports (Aremu 2005). Exports of textile products became difficult because of the high selling price as a result of high cost of production. Capacity utilisation remains very low in the manufacturing sector while being import dependent. On import waivers, Nigeria has forfeited a huge sum of N1.4 trillion in the last three years (Aremu 2015). Moreover, more than 65 per cent of stimuli on export were for non-productive ventures. Hundreds of billions of naira that will accrue to the government account are being lost as government carelessly grant import and export stimuli on the unproductive venture, with no significant bearing on the economy (Interview Tofa 2015; Nabegu 2015). Nigeria has for a decade, and a half become a “container economy” with the manufacturing sector contributing less than four percent in value addition (Aremu 2015). The country has become textile imports hub rather than an investment destination. As indicated in Figure 8 from the data obtained from harmonized commodity description and coding system UN Comtrade, China has substantially increased its textile exports on annual basis to the Nigerian market. This mass

influx of textile products deprive the local industry its competitive advantage. Moreover, imports from China to Nigeria dominate the trade relations between the two countries when compared with meagre or nonexistent exports from Nigeria to China in the 1980s and throughout the 1990s. The volume of trade between the two countries increased substantially from the year 2000 to 2006 as indicated in Figure. 9.

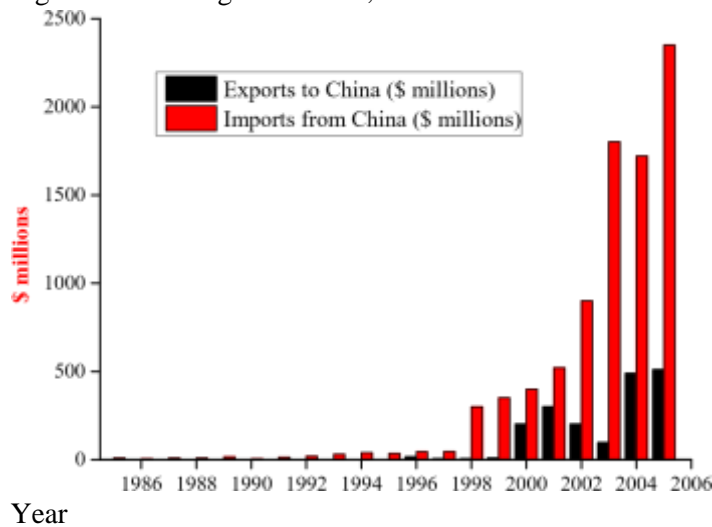
Figure 8: Import of Textile Items to Nigeria from China



Source: UN COMTRADE

Import duties assumed unique influence when neo-liberal deregulation takes centre stage. The industrialisation agenda was abandoned. It is bad enough that productive economy was replaced with an importing economy. The economy is managed in the fashion of the colonial system more than five decades after independence. Huge imports of finished foreign goods are firmly operated while exporting raw materials (Aremu 2015). It is however clearly a disservice that these imports are not taxed under the regime of waivers. These imports are clearly not taxed which gave an advantage to the importers to further wreak havoc to the manufacturing sector operating at a high cost of production (Interview Tofa 2015). The phenomenon of wholesale waivers regime has inadvertently legalised the status of Nigeria as a non-productive corrupt economy that is avoidably losing scarce revenue, jobs and local goods and services to waivers (Sandbakken 2006). One of the policies that undermined most local textile factories apart from wholesale smuggling and lack of electricity is the waivers for imports of finished textile products at a time when local manufacturers could not break even (Akinrinade and Ogen 2008).

Figure 9: Sino-Nigerian Trade, 1986-2006



Source: IMF (2006) Gulliver's Troubles page 348

Multiple Taxations

Taxes have been recognised as impediments to investment growth especially where the taxes are too many.

Unfortunately, from 17 to 40 different taxes are currently being paid by textile factories and commercial outlets (Salami 2011). Uncoordinated tax administration manifested in multiple taxations is one of the major challenge faced by the textile sector (Oduola 2006). The committee set up by Kano state government on industrialisation listed 39 different taxes manufacturers are subjected to (Interview Audu 2015; Tofa 2015; Adhama 2015). Taxes are the most important sources of revenue by the three tiers of government (central, state and local governments). The determinant of multiple taxations in Kano is varied and multiple in nature. These include but not limited to usage of unfair revenue formula by the federal government to generate revenue. There is poor definition of powers of each level of government and attendant overlapping of tax demands on businesses by the three tiers of government. There were even mounting road blocks to collect taxes using hoodlums (Interview Audu 2015; Bello 2015). Tax legislation is never reviewed as at when necessary by retaining obsolete laws which do not reflect realities. There are unhealthy rivalries between the tiers of government. There is an absence of political will to stop multiple taxes by the government. Moreover, there is no laid down procedural guidelines from the tax authorities. Poorly equipped and inadequately trained revenue agencies staff and greed on the part of tax officials are also impediments to investment growth.

Multiple taxes are unfriendly to investments, and as such it reduces economic growth. It does not help business to grow; rather it destroys the image of the country within the international business community. Moreover, it brings about uncoordinated tax systems because each tier of government will be competing with one another to raise a new form of taxation. Anyanwu (2000) submitted that the presence of multiple taxes distorts production, consumption, investment and employment. On the same note, Odusola (2006) insist that multiple taxes are fatal to small, medium and large scale industries. These taxes are also collected by many government departments including NAFDAC, NESREA, CPA, SON, and others. This is in addition to corrupt and embarrassing treatment against industries by various levels of revenue collectors. Too many taxes force manufacturers to increase prices of the manufactured goods which have the effect of discouraging consumption. In addition, too many taxes lead to lean profits and sometimes even loss (Interview Kwaru 2015). The end result was that some industries found it unbearable and therefore moved out. In other words, multiple taxes are a disincentive to industries.

Conclusion

Our study succinctly presented an in-depth analysis of the neglect experienced by the Nigerian textile industry. This is as a result of huge reliance on the petroleum sector and the total disregard of the manufacturing sector. Consequently, this phenomenon is also related to the lack of investment in critical infrastructure, poor governance and corruption.

Our results show that there is complete policy neglect for the growth and competitive ability of the Nigerian textile industry. We discussed critical elements that are neglected including the absence of a diversified economy away from over-reliance on petroleum resources. The overreliance on the petroleum sector is manifested in the neglect of the manufacturing sector which breeds corruption and frivolous spending attracting spontaneous financial crisis. There is a lack of good support and sound government policy on the development and maintenance of infrastructures which are vital for the success of the industry. Other inadequacies that are as a result of poor governance include lack of long-term finance; high interest rates on short-term loans; lack of adequate electric power supply; rampant smuggling; wrong policies adopted by the government on import of foreign goods; non-availability of petroleum products; shortage of water to the industrial estates; poor road networks in industrial areas; high cost of transportation due to lack of railway service; multiple taxation by different tiers of government; high cost of importation of machineries, spare parts and chemicals and high foreign exchange rate.

By and large, there are remarkable evidence of neglect to the industry. This makes it unprofitable for manufacturers to invest in the industry. Other challenges encountered include raw material crisis, shortages and outages of the power supply, high cost and non-availability of LPFO, AGO, HPFO and an efficient transport system. This study is a call on the

government to develop a policy framework to allow the industry to compete. However, this work has explained some of the challenges confronting the industry. Nigerian textile industry will succeed if right decisions and policies are put in place. The revival of the industry will go a long way in revamping the ailing economy in job creation and improved Gross Domestic Product. The article discussed elements which would stand on their own as areas of further extensive study.

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DATA VISUALIZATION: CHALLENGES AND TOOLS

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Abstract:

Data is being processed daily as the result of activities of users on the internet. An activity of a single user for instance on a social media platform can generate volumes of data every day. When such users in their millions or even billions generate huge data, the resultant data is called big data. This data is so huge that processing and interpreting it becomes so challenging. Challenges like loss of information as the result of increase in response time can affect data visualization. Representing such huge data in a textual form will not convey all the information needed to be communicated. To convey such information fully and efficiently the data has to be represented in pictorial or graphic format for easier communication and interpretation. This paper explains the challenges of data visualisation and the various tools used to visualise big data.

Keywords: Big Data, Challenges, Visualisation, Tools and Pictorial.

Introduction

Data visualisation gives researchers, analysts and data scientists an opportunity to interpret and analyse huge volumes of data easier comprehension and usage. This could be achieved through showcasing momentous information in different formation. Interpreting huge data in a textual form won't reveal the intended message or information entirely. Such data must be disseminated and presented in a pictorial form to allow for easier understanding, conveyance and interpretation of data. Users can obtain data and make use of it after analysts and professionals have worked on it. To visualise data skills are needed. Experts and users must be creative and able to simplify data into a visual form so that consumers of such data can significantly comprehend and interpret and analyse it. Data analysts may encounter challenges while trying to visualise or represent data for consumption and interpretation.

The importance of data (Big data) nowadays cannot be over emphasized. So many organisations and industries rely upon big data to make information decision. Big data

visualisation avail us with the opportunity to recognize current trend and patterns and also explore them accordingly. To visualize data several tools are used to present these data in a form of chart or diagram. Data visualisation tools make it possible for users and experts alike to represent data in graphic form for easier interpretation and interaction. The essence of data visualisation is to make the data justifiable, understandable and readily available for use and consumption. Relationship between data is captured and made more meaningful when represented in form of diagrams charts or maps.

Relationship between data and their pattern will become more visible and comprehensible when presented in graphic format.

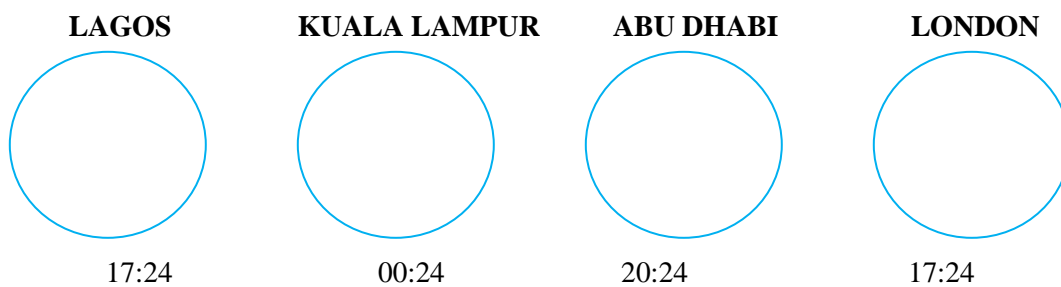
Data visualisation has now presented an excellent opportunity for big data analysts and data scientists to make more money while solving business problems. Industries, Tech companies and government organisations cannot do without data visualisation. To manage organisation or take decision managers needs data that is simplified using various tools and softwares. Such vast data can be used to plan budget and promote business organisations.

Data visualisation.

The process of representing data pictorially to display meaningful and useful data. User creativity determines the beauty and meaning of the data that is presented. To achieve this creativity visualisation tool must be used. Selection of the tool depends on the intent of the user or expert.

The figures below display data depicting different data visualisation styles. Figure 1 shows different time zone in the world. The data is represented in a pictorial form. The figures represent visual format of how data is visualised.

Figure 2 shows different types of chart represented inform of graphic. The figure displays different data for various tasks. Both the figures convey vital information in a meaningful and easier way. Users must first make their choice of which data visualisation tools to use for their tasks.



Tue, 18th Oct, 2022. Wed, 19th Oct, 2022. Tue, 18th Oct, 2022. Tue, 18th Oct, 2022.

Fig 1: Data Visualisation Depicting World clocks.



Figure 2: Data visualisation using various charts.

Survey on the concept of data visualisation and its tools.

As the business of big data analysts continue to boom, professionals in that field are bringing new ideas and tools to make their profession more secured and also offer better services to various business organisations and industries. Services of data analysts and professionals are being sought for everyday by organizations and industries to offer better decisions and promote businesses. Customers and consumers of such services supply information to the various organizations through their daily activities. Such information could be used by the business entities to promote their business and offer solutions.

[1] discussed the importance of data visualisation and its tools in their paper. The authors revealed that data visualisation technology could be used to uncover hidden facts and trends. Industries must find ways of visualising data using best tools available in order to offer good services and solve business problems. Without these tools and softwares industries that are involved in huge data cannot interpret their data for better usage and management. Sophisticated tools like Datawrapper, Tableau, and Infogram etc. must be used in order to increase comprehension of data visualisation.

According to [2] summarising information or findings using tables and numbers poses a great danger because any information that may come out from such practice may result to provision of inaccurate or complete information.

Several factors determine the quality of the visualisation output. One has to make his choice first before creating a data visualisation. Such practice could guarantee better and accurate result for interpretation and analysis [3].

Presenting and analysing data is a major task for data analysts and experts. Data visualisation tool is an app that creates the pictorial representation of the data. The essence of the visualisation is to interpret data into a meaningful and plain form for use mostly by business organisations and industries [4].

[5] examined that the momentousness of data visualisation in providing opportunities for users to interpret, interact and explore data presents the opportunity to uncover and understand new trends in data science and big data analytics (BDA). Currently the new trend is called BDA. BDA makes it possible to interpret huge volumes of data into an easier and understandable format.

According to [6] the ever-growing data makes it possible for analysts and professionals to devise new means of analysing big data quickly and efficiently. The authors further stated that big data visualisation brings about a number of opportunities for uncovering new trends and patterns. Visualisation tools must be continuously improved as big data keeps on growing at a rapid rate.

Data visualisation tools

Different types of visualisation tools have been developed to cater for data visualisation needs. Developers and designers of these tools focused on significant feature which is interaction. Every tool must be interactive and user-friendly so that users can work with them freely and easily. There numerous tools developed to handle data visualisation. The most common and important ones are:

Tableau

This is user-friendly software that is used in business for the purpose of visualising data easily and accurately. As with every data visualisation tool, tableau is easily manageable and simple.

Google charts

This is awesome charting software by Google. It supports JavaScript and can be used to embed *HTML/SVG charts into web documents*.

MetricsGraphics

This is also a charting application derived from D3.JS. It is used for time series data representation. It has simple user interface for easy interaction. It allows for easy and quick design without having to use tedious codes.

D3.JS

This is a tool that supports numerous features like HTML, CSS and SVG. Although it is not user friendly because it involves using a lot of coding. However, it is a library that gives birth to so many libraries. Tools like MetricsGraphics are derived from D3.JS.

Sigma

This is a tool for graphic drawing built on WebGL and canvas. Experts that need sophisticated graph drawing tool make use of this tool.

Infogram

It is a tool that has drag-and-drop feature. Inexperienced users can use this tool to design powerful pictorial data representation. It is used for designing marketing reports, social media records, etc.

Datawrapper

This tool can be used to beautify stories by adding new features such as maps and charts. For example, website developers can use Datawrapper to beautify their website pages. Media houses also use it in their newsroom to write and published effective and qualitative stories.

Fusionchart

Web developers use this tool to design website easily because it is a JavaScript based tool. It has simple interface that makes so interactive and easy to use. Codes are readily available for use by designers. This tool can be used even by novice.

Grafana

This is an open source tool for visualising data that allows users to create powerful designs. It supports over 40 data sources via add-ons. It has superior features than many open source visualisation tools.

Sigmajs

This is a customisable purpose visualisation tool that is JavaScript based. It has modest user interface that makes it easier for modest users to make superb designs. Although it is limited to creating only one type of visualisation. However, it is suitable for creating network graphs.

Challenges of Data visualisation

The ever-growing data has posed a great challenge to experts and professionals, who interpret, represent and analyse data. As the data keeps on growing exponentially sophisticated visualisation tools also keep on emergency. The features and capacity of these tools must be increased at a rapid pace. This will make the visualisation tools more capable, interactive and quick to provide solutions easily without delay.

Big data has several types of data from structured to unstructured and semi-structured. To process each of these categories of this data one need to choose the pattern of data carefully so as not to reduce data dimensions which may lead to loss of information. One of the challenges of data visualisation is parallelisation. Such challenge can only be tackled by splitting the issue into individualistic task that can run separately [7].

These new approaches use Hadoop and R language to help process data at the same time without encountering overlapping or over-plotting issue [8]. Other challenges of data visualisation tools are low capacity in versatility, usability and time taken by the system to respond [9] to overcome this challenge new method have been invented.

Big data visualisation has problem of visual noise that makes it complex to separate objects in datasets. Information loss is another challenge of big data visualisation. It emanates as a result of increase in response time. Problems like high accomplishment requirements, image perception, high rate of image change during visualisation are some challenges that militate against data visualisation.

Conclusion

Big data visualisation remains the surest way to represent or present huge data into a meaningful format for easier communication. Several sophisticated tools are designed to help users and professionals to achieve significant success in presenting huge data for better decision making. This article presents the important tools that are used daily to present data in pictorial or graphic formats. Each of the tools explained focused on user-friendly feature that makes the tool so interactive. Data analysts and professionals are determined to always come

up with new tools and software to help business organisations and industries understand new patterns and trends so that they improve their services and satisfy their customers and consumers.

Before making any choice as to which tool would be used. Users have to know their requirements and targets; this way suitable tool can be selected for better result. Big data visualisation challenges become visible as the data keeps on growing daily. New methods are being proposed to help visualise data easily without losing information.

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