An Open Access Journal available online

Covenant Journal of Research in the Built Environment (CJRBE)

Vol. 5 No. 1, June, 2017

Publication of the School of Environmental Sciences,
Covenant University, Canaanland.

Website: http//Journal.covenantuniversity.edu.ng/cjrbe/

ISSN: Print 2384-5724
Online 2384-5716

Published by Covenant University Journals,
Covenant University, Canaanland, Km 10, Idiroko Road,
P.M.B. 1023, Ota, Ogun State, Nigeria

Printed by Covenant University Press

Articles

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Influence of Variation in the Composition of Fine Aggregate on the Properties of Sandcrete Blocks

O. J. Ameh[1] & D. N. Nwaigwe[2]

Department of Building, University of Lagos, Nigeria
[1] oameh@unilag.edu.ng; 2dantechnig@yahoo.com

***Abstract*:** Sandcrete block is predominantly used for the construction of walls. Sandcrete block is made from a mixture of cement and fine aggregate (sharp sand). This study investigates the influence of variation in the composition of fine aggegate on the properties of sandcrete block. Laboratory experiments were conducted on the materials used as well as on the hollow sandcrete block samples. A total of 120 sandcrete block samples were produced using cement and sharp sand at different mix ratios of 1:6 or 1:8 mixes, as well as mixes containing partial replacement of sharp sand with fine sand or granite dust at 1:6:2, 1:5:3 and 1:4:4 by volume. Result revealed that the compressive strength at 21 and 28 days curing age for 1:6 mixes are 3.87 N/mm^2 and 4.17 N/mm^2 respectively and for the 1:8 mixes are 2.81 N/mm^2 and 2.95 N/mm^2 respectively. For cement, sharp sand and fine sand constituents of 1:6:2, 1:5:3 and 1:4:4; the compressive strength at 28 days curing is 2.24 N/mm^2, 1.72 N/mm^2 and 2.5 N/mm^2 respectively. Similarly, for cement, sharp sand and granite dust constituents, 28 days compressive strength are 2.13 N/mm^2, 1.61 N/mm^2 and 1.42 N/mm^2 respectively. The study recommends appropriate mix proportion for sandcrete block constituents to avoid huge lifecycle maintenance cost.

Keywords: Granite dust, masonry units, material properties, sandcrete blocks

1.0 Introduction

Sandcrete block is a masonry unit which is predominantly used as walling materials in the construction of shelters and other infrastructures (Abdullahi, 2005; Onwuka, Osadebe and Okere, 2013; Adeyeye, 2013). Sandcrete block is made from a mixture of cement and sharp sand in the ratio of usually 1:6 with minimum amount of water. In some cases, admixtures are added. Sandcrete block could be made hollow or solid and are available in sizes of 450x225x225mm, 450x150x225mm, or 450x100x150mm. In Nigeria, sandcrete blocks are used both as external and partition walls in over 90% of buildings (Hijab, Halilu and Hadi, 2010; Anosike and Oyebade, 2012; Alohan, 2012; Oladeji and Awos, 2013). Sandcrete blocks have also been used for the construction of load bearing and non-

load bearing structures such as roof gutters, drainage ditches and foundations among others.

The quality of sandcrete blocks produced in Nigeria differs from one manufacturer to the other due to the different methods employed in their production and the properties of the constituent materials (Adeyeye, 2013; Awolusi, Soyingbe and Oyeyipo, 2015). Ewa & Ukpata (2013) reported that aesthetic value of a building is lost to cracks and other defects partly due to poor quality of sandcrete block as a walling units. The poor quality of sandcrete blocks affects their compressive strength, making them susceptible to any tragedy such as seismic activity (Abdullahi, 2005). Previous researches on the quality of sandcrete blocks sold by commercial bock manufacturers show that they exhibited compressive strength far below the standard requirement for the construction of buildings (Awolusi et al., 2015; Aladeloba *et al*., 2015; Omopariola, 2014; Hamisu and Mohammed, 2014; Akeem and Umar, 2013; Onwuka *et al.*, 2013; and Anosike and Oyebade, 2012). NIS recommends that the lowest crushing strength of individual load bearing blocks shall not be less than $2.5N/mm^2$ for machine compacted and $2.0N/mm^2$ for hand compacted sandcrete blocks.

The quality of sandcrete blocks is also partly influenced by the quality of constituent materials (Awolusi *et al*., 2015) as well as the mix proportion (Akeem and umar, 2013). Omopariola (2014) averred that lack of uniformity in the production of sandcrete blocks by commercial block producers stem from ignorance of the existence of any relevant code or specifications relating to block production. He further stated that standard process of sandcrete block production and quality control are not ensured leading to low quality sandcrete blocks. According to Alohan (2012), the majority of sandcrete blocks used in the Nigerian building industry fall short of minimum specification. Akeem and Umar, (2013) and Alohan (2012) confirmed it by stating that the production of low quality blocks may have led to the increase in collapsed buildings in recent times.

NIS 84:2000 specifies the use of cement-sharp sand of 1:6 mix ratio for sandcrete block production. Oyekan & Kamiyo (2008) observed that instead of the standard mix proportion of one part of cement to six parts coarse sand (1:6) by volume, many local sandcrete block manufacturers use a mix proportion of 1:8. In another study by Omopariola (2014), the mix proportion being used by commercial block producers in all the sites visited varied from 1:10 to 1:12 of cement and sharp sand constituents by volume. Another common practice among sandcrete block producers is combining sharp sand with fine sand, clay or granite dust in a bid to improve its plasticity. However, as observed by Anosike and Oyebade (2012), this practice will not only weaken the bond between cement and the constituents in the green state, it could have a deleterious effect on the compressive strength of the blocks. The effect of partially replacing sharp sand in the production of sandcrete blocks with either fine sand or granite dust is a gap in existing literature. Furthermore, there are no specifications for the use of fine sand and granite dust in the manufacture of sandcrete blocks. This scenario has therefore prompted the need for this

research since it is a common practice among sandcrete block manufac 2 Lagos, Nigeria.

The aim of this study was to investigate the influence of partial replacement of sharp sand on the properties of sandcrete blocks. The specific objectives of the study are to: investigate the physical and chemical property of sand and granite dust used in the production of hollow sandcrete block and determine the effect of partial replacement of sharp sand on the compressive strength of sandcrete block samples.

2.0 Materials and Methods

2.1 Materials

The materials used for this research work include cement, fine aggregate (sharp sand, fine sand and granite dust) and water. Ordinary Portland Cement (grade 32.5) with the trade mark "Dangote Cement" which complied with BS EN 197-1 and fully certified by Standard Organisation of Nigeria (SON, 2003) was used as the binder. The sand used for this study was sharp river sand dredged from the Lagos Lagoon in Ibeshe-Ikorodu. Physical inspection on the sand indicates that it was free from deleterious materials such as dirt and sea shells. The fine aggregate used were those that passed through 5mm British Standard sieve and had a specific gravity of 2.63 and an average moisture content of 9.07 %. Clean Tap water, free from particles and good for drinking as specified in BS EN 1008 (2002) was used for mixing.

2.2 Apparatus

The apparatus used for the laboratory experiment comprises the following: Weighing balance, Set of sieves, Electrically controlled sieve shaker, Cleaning brush, Measuring cylinder (250ml capacity); Block molding machine; Curing tank; Muffle furnace; Oven; Compression testing machine; Spectroscope

2.3 Experimental Procedure

The procedure for carrying out the laboratory experiment as described in the relevant sections of the British Standard is presented below:

(i) Particles size distribution/Sieve analysis. The dry sieve analysis method was adopted in determining the proportion of various sizes of particles in the aggregate so as to ascertain whether the particle distribution is in compliance with recognized standards. The test was carried out for all the aggregates according to standard procedures (BS EN 933-1, 1997).

(ii) Specific gravity of aggregates. Specific Gravity (G_S) is the ratio of the density of a substance to the density (mass of the same unit of volume) of a reference substance. The specific gravity of a soil is often used to describe the relationship between the weight of soil and its volume. The test method adopted for the test is in accordance with BS 812-2: 1995.

(iii) Silt/Clay content test. The silt/clay content test is carried out to determine the quantity of silt and clay present in the fine aggregates. The presence of silt and clay in fine aggregate prevents a good bond between it and cement. If the silt and clay present in the sand is in large quantities (above 35%), it results in increased water absorption which will have significant influence on the strength of the sand Crete blocks. The test method is in accordance with British standards BS 812-103: Part 2 1989.

(iv) Organic matter content test. Organic matter influences many of the

physical, chemical and biological properties of soil. Some of the properties influenced by organic matter include soil structure, soil compressibility and shear strength. Loss on ignition test was performed to determine the amount of organic matter present in the fine aggregate. The organic matter content is the ratio, expressed as a percentage, of the mass of organic matter in a given mass of soil to the mass of the dry soil solids. The method adopted for this test is in accordance with British standards BS 1377-3:1990 (Standard Test Methods for Moisture, Ash, and Organic matter of peat and Organic soils).

(v) Moisture content. Moisture content is the quantity of water contained in a material. It is the ratio of the water present in the soil mass to the weight of the soil solids. The moisture content of the fine aggregate was determined by means of the oven-dried method according to BS EN 1097-5(2008). Known weight of aggregate was oven-dried for 24 hours at a temperature above 100°C, the weight was then taken after drying to determine the weight of water evaporated and that of the dry soil.

(vi) Chemical analysis test. The chemical analysis of the sharp sand was carried out to determine the percentage composition of the compounds present in the sand. The test was determined using Atomic Absorption Spectrophotometry (AAS). This is a technique in which the absorption of light by fine gaseous atoms in a flame or furnace is used to measure the concentration of atom in a given sample. The radiation produced corresponds to the emission spectrum of that element and so the required line may be readily isolated by the monochromator. Individual hollow cathode lamps are available for large number of elements.

(vii) Compressive strength test of blocks. The compressive strength is a measure of the strength of blocks. The test was performed in accordance with BS EN 12390-3 (2002) specifications. The compressive strength test was carried out on the blocks after they were cured for 7, 14, 21 and 28 days.

3.0 Results and Discussions

3.1 Preliminaries Investigation

The results of investigation conducted to determine some characteristics of the aggregate as previously described are presented in Table 1. There is no much difference between the specific gravity of sharp sand and soft sand as indicated in Table 1. However, the specific gravity of sand is a little higher than that of granite fines. They all fall within the range of specific gravity of the solid substance of most inorganic soils which varies between 2.60 and 2.80. The specific gravity of granite fines indicates the presence of organic or porous rock particles. The high moisture content of the aggregate as indicated in Table 1 may not be unconnected with the rainy season. In addition, the silt content of the sharp sand is within the acceptable limit of 8%, which makes it suitable for sand Crete block production.

From the result obtained from the organic matter content test of the sharp sand, it was observed that the percentage composition of the organic matter such as decayed vegetation humps, coal dust etc present in the sharp sand is 0.48%, soft sand is 0.36%
and granite dust is 0.48% respectively. The organic matter in the aggregate is quite negligible as it is far below 1.5 % limit defined by **BS** EN 13039:2011 hence, the sharp sand, soft sand and

granite fines are relatively free from organic matter. Sand containing more than 30 percent organic matter is not suitable for construction purpose.

Table 1: Aggregate Characterization

Property	Sharp Sand	Soft Sand	Granite Fines
Specific gravity	2.63	2.64	2.54
Moisture content (%)	9.07	3.93	7.33
Silt content (% by volume)	2.51	16.6	-
Loss on Ignition (LOI) at	0.48	0.36	0.48

3.2 Particle Size Distribution of Aggregates

The results for the particle size distribution of the sharp sand, soft sand and granite fine is presented in figure 1. The percentage by mass of soft sand finer than BS sieve 150μm (No. 100) was 22.52%, which exceeds the allowable grading limit of 0-15% for sieve size 150μm . This indicates an excess of fines. The particle size distribution curve of sharp sand shows that the sharp sand used falls between the medium sand to coarse sand region (BS 882:1992) and is uniformly graded. While the particle size distribution of Granite fines shows that the granite fines used falls in the coarse sand region (BS 882:1992). The sharp sand and granite fines are both suitable construction material especially for the production of sand Crete blocks.

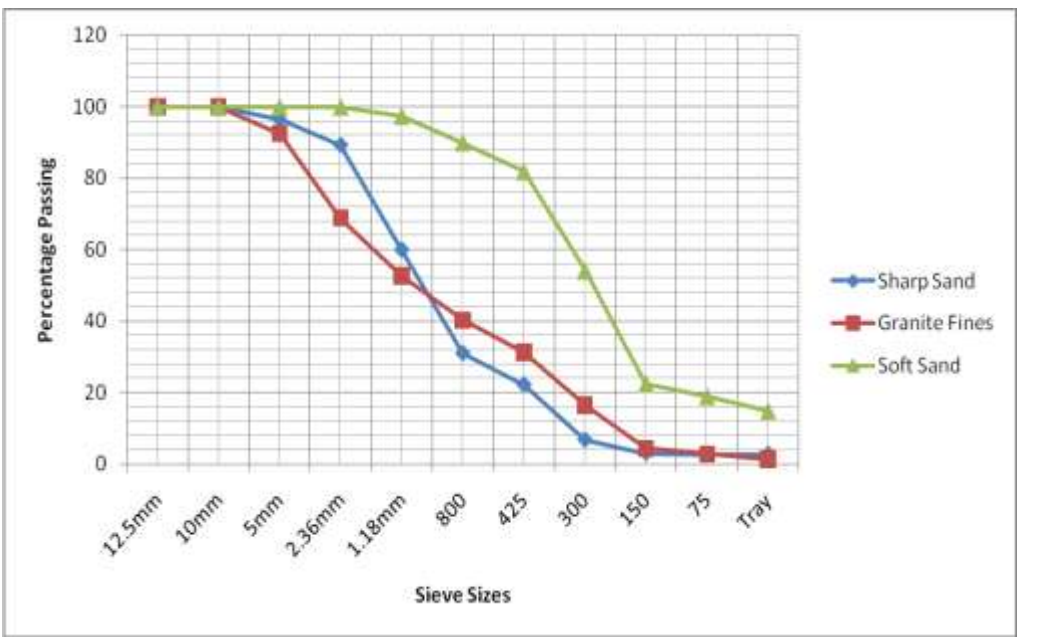

Figure 1: Particle size distribution of the aggregates (sharp sand, soft sand and Granite fines)

3.3 Chemical composition of aggregate (sharp sand, soft sand and granite fines) sample.

The result of the chemical analysis of sharp sand, soft sand and granite fines is shown in Table 2.

The amount of chloride ions (Cl^-) = 165mg/kg and sulphate ions (SO_4^-) = 24mg/kg present in the sharp sand used are within the acceptable limit according to NIS 87:2000, which makes is suitable for sand Crete block production.

Table 2: Chemical analysis result of sharp sand, soft sand and granite fines

Chemical Components	Percentage composition		
	Sharp Sand	fine Sand	Granite dust
Silica Oxide (SiO_2)	97.22	98.50	62.48
Sodium Oxide (NaO_2)	0.003	0.0025	Nil
Potassium Oxide (K_2O)	0.002	0.01	3.18
Calcium Oxide (CaO)	0.008	0.001	4.83
Magnesium Oxide (MgO)	0.005	0.0025	2.56
Aluminium Oxide (Al_2O_3)	0.026	0.43	18.72
Iron Oxide (Fe_2O_3)	0.002	0.22	6.54
Sulphur Oxide (SO_3)	0.000	0.001	0.000
Cl^- (mg/Kg)	165.0	Nil	Nil
SO_4^- (mg/Kg)	24.0	Nil	Nil
pH	5.70	5.70	5.70

3.4 Water Absorption Capacity of Sandcrete Blocks

The results of percentage water absorption of the standard mixes 1:6 and 1:8 are 4.0% and 5.16% respectively. Also, the percentage water absorption of the sandcrete block containing cement, sharp sand and soft sand composition for 1:6:2, 1:5:3 and 1:4:4 mixes are 5.94%, 5.14% and 4.81% respectively. These indicate a decrease in the water absorption capacity of sandcrete block samples as the percentage replacement of soft sand increases. This could be because of its fine content, which reduced the void between the particles making the sandcrete block samples more compact. Similarly, the percentage water absorption of the mix proportion containing granite fine increased significantly as the percentage replacement of the sharp sand by granite fines increases from 3.84% for the 1:6:2 mix to 7.0% for the 1:5:3 mix and 7.81% for the 1:4:4 mix. This could be because of more pores created by the granite fines. This result is in tandem with that of Oyekan & Kamiyo, (2008).

Water absorption capacity values shown in Fig. 2 satisfy the permissible values. According to BS 5628 part 1, water absorption value below 7% is regarded as low, while those above 12% as high As shown in Fig. 2 below, the water absorption for all the sandcrete block specimens fall below the upper limit of

12% (BS 5628 part 1), hence the blocks can be used in moist environment.

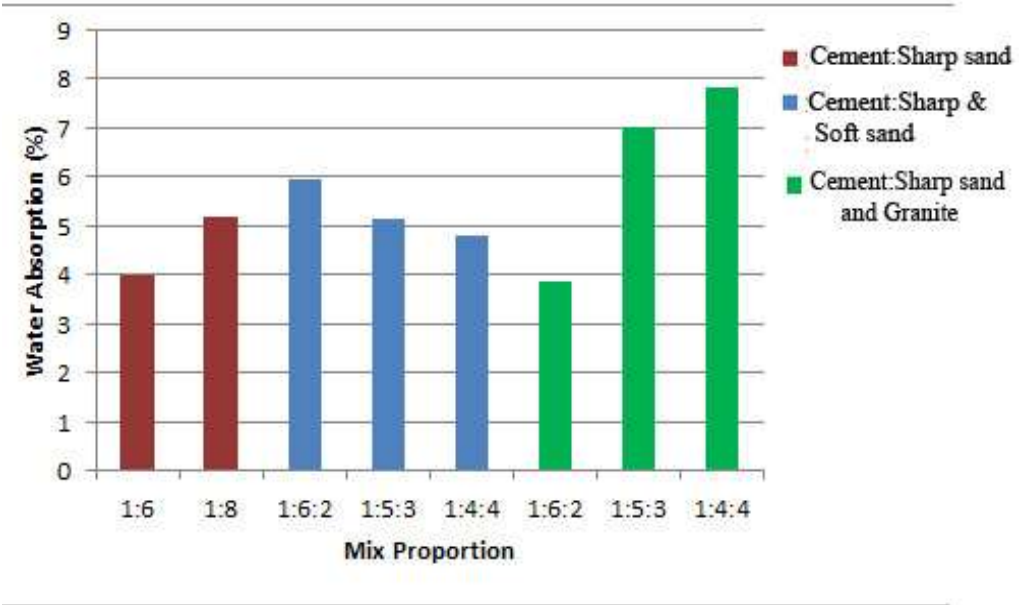

Figure 2: Water absorption capacity of various sand compositions and mixes of the sandcrete blocks

3.5 Compressive strength test of hollow sandcrete blocks

The results of the 7, 14, 21 and 28 days compressive strength test carried out on three hollow sandcrete block samples each of size 450 x 225 x 225mm made from different mix compositions is presented in Figure 3 and 4. The results show that the compressive strength of the block for the standard mixes of 1:6 and 1:8 (with sharp sand composition) increased significantly from 2.30N/mm^2 at 7 days to 4.17N/mm^2 at 28 days and from 2.08 N/mm^2 at 7 days to 2.95 N/mm^2 at 28 days respectively. Similarly, the compressive strength of the block with soft sand composition of 1:6:2 (cement, sharp sand and soft sand) mix increased from 1.72 N/mm^2 at 7 days to 2.24 N/mm^2 at 28 days as sown in Figure 3. These satisfy the minimum requirement of 1.60N/mm^2 specified by the National Building code (2006), for non load bearing wall.

For the 1:5:3 (cement, sharp sand and soft sand) mix, compressive strength raise steadily from 1.55 N/mm^2 at 7days to a peak of 1.81 N/mm^2 at day 21 and then dropped to 1.72N/mm^2 at 28 days. Compressive strength of 1:4:4 (cement, sharp sand and soft sand) compositions increased from 1.40 N/mm^2 at 7 days to 2.50 N/mm^2 at 28 days which meets the required NIS standard of 2.50N/mm^2 for non load bearing walls.

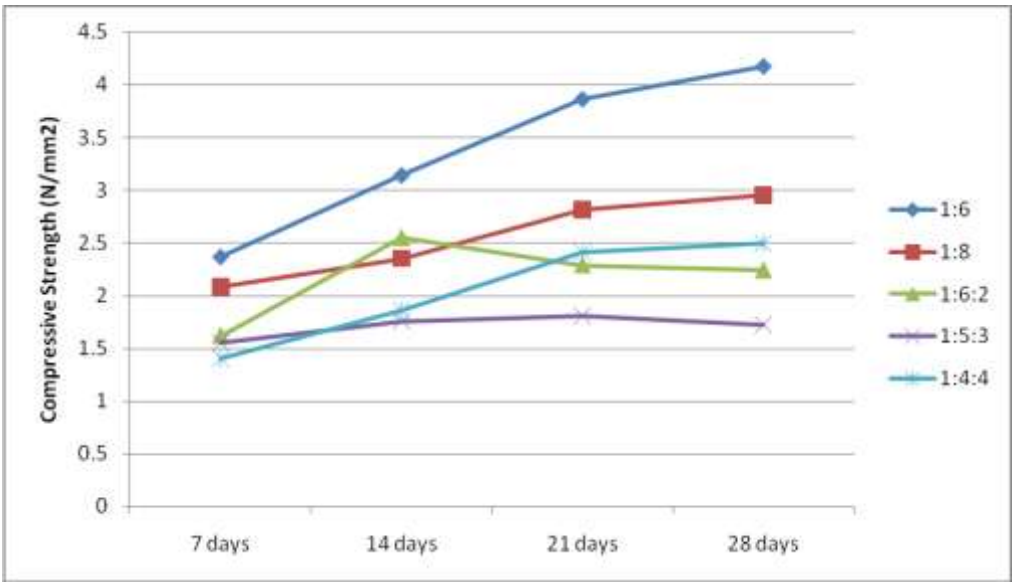

Figure 3: Compressive strength of block (cement, sharp sand and soft sand mix) at different curing days

For the mix composition using granite fines in Fig 4 below, the 1:6:2 (cement, sharp sand and granite fine) mix recorded a compressive strength of 1.90N/mm^2 at 7 days and increased steadily with age of curing up to 2.13 N/mm^2 at 28 days. Similarly, the 1:5:3 and 1:4:4 mixes recorded a compressive strength of 1.85N/mm^2, 1.61N/mm^2 and 0.84N/mm^2, 1.42N/mm^2 for 7 days and 28 days respectively.

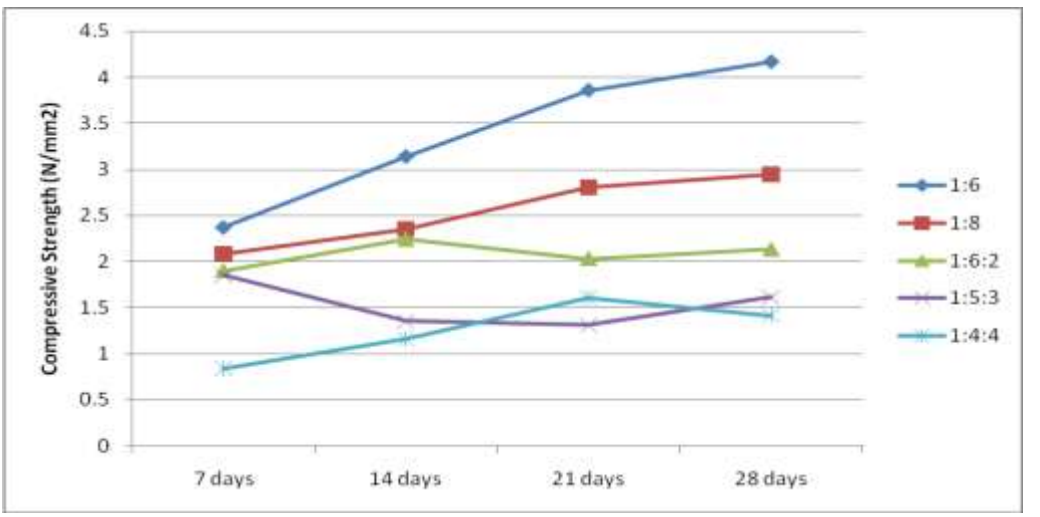

Figure 4: Compressive strength of sandcrete block (cement, sharp sand and granite fines

4.0 Conclusion

The result of variation in the fine aggregate component of sandcrete blocks reveals that the compressive strength of the block with cement, sharp sand and soft sand composition of 1:6:2 and 1:4:4 by volume increased progressively to a peak of 2.24 N/mm^2 and 2.5N/mm^2 respectively at 28 days. These meets the required NIS and National Building code standards for non load bearing walls. The compressive strength of 1:5:3 cement, sharp sand and soft sand compositions is within the permissible strength recommended by the National Building code but the strength reduces with age. The compressive strength of cement, sharp sand and granite fine composition of 1:6:2 by volume satisfied permissible values recommended by NIS and National Building code. However, 1:5:3 and 1:4:4 cement, sharp sand and granite fine composition recorded steady decline as the block sample age, hence, not suitable for block production. The water absorption capacity of sample with granite fine is the highest in comparison to others It is therefore recommended that the practice of using granite fines as partial substitute for sand in sandcrete block production should be discouraged. However, for soft (plaster) sand, the mix proportion of 1:4:4 by volume is recommended.

5.0 References

Abdullahi, M. (2005). *Compressive Strength of Sandcrete Blocks in Bosso and Shiroro Areas of Minna, Nigeria. AU Journal of Technology*, 9(2), 126-132.

Adeyeye A. O. (2013**).** Strength Properties of Commercially Produced Sandcrete Blocks in Ado Ekiti, Akure and Ile Ife Nigeria. *International Journal of Engineering Science Invention*, 2(8), 25-34.

Akeeem U. and Umar G. (2013). Quality Assurance of Hollow Sandcrete Blocks Produced by Block Moulding Factories in Gombe Metropolis. *Journal of Science, Technology & Education*, 2 (1), 61-65.

Alohan, O. (2012). *Impact of Vibration Time on Compressive Strength of Hardened Sandcrete Building Blocks. Buildings*, 2, 153-172.

Anosike, M.N. and Oyebade, A.A. (2012). Sandcrete Blocks and Quality Management in Nigeria Building Industry. *Journal of Engineering, Project and Production Management*, 2(1), 37-46.

Awolusi, I.G., Soyingbe, A.A and Oyeyipo, O.O. (2015). An Appraisal of the Quality of Sandcrete Blocks used for Construction in Lagos Metropolis. *Journal of Building performance*, 6(1), 40-49.

BS EN 13039:2011 Determination of content, Ash determination, Organic matter determination, Test equipment, Precision, Reports

Ewa, D.E. and Ukpata, J.O. (2013). Investigation of the Compressive Strength of Commercial Sandcrete Blocks in Calabar Nigeria. *International Journal of Engineering and Technology*, 3(4), 477-482.

Hamisu, B. I and Mohammad, S. Y (2014). An Appraisal of Sandcrete Blocks Quality; A Case Study of Katsina, Nigeria. Proceeding of the Second International Conference. on Advances in Civil and Structural Engineering,.31-35.

Hijab, M., Halilu, A. H. and Hadi, A.A. (2010). Compressive Strength of Marketed Sandcrete Blocks Produced in Yola, Nigeria. *Journal of Engineering and Applied Sciences*, 2, 74-81.

Keralli, A.G., (2001). *Durability of Compressed and Stabilised Building Blocks.* A Ph.D Thesis, University of Warwick.

NIS 87:2000**.** *Nigerian Industrial Standard: Standard for Sandcrete Blocks*. Standard Organization of Nigeria, Lagos, Nigeria.

Oladeji, O.S and Awos, O. A. (2013). Assessment of Materials and Process Variables on Regulatory Compliance of Sandcrete Blocks: A Case Study of Ogbomoso, Nigeria. *International Journal of Engineering Research and Applications*, 3(6), 793-799.

Omopariola, S.S. (2014). An Appraisal of The Quality Control Practices in Sandcrete Blocks Production in Yewa South Area of Ogun State, Nigeria. *American Journal of Engineering Research* 3(4), 1-7.

Omopariola, S.S. (2014). An Assessment of the Compressive Strength of Solid Blocks in Idiroko Area of Nigeria. *Research Journal in Engineering and Applied Science*, 3(1), 38-42.

Onwuka, D.O., Osadebe, N.N. and Okere, C.E (2013). Structural Characteristics of Sandcrete Blocks Produced in Southeast Nigeria. *Journal of Innovative Research in Engineering and Sciences*, 4(3), 483-490.

Oyekan, G. L. & Kamiyo, O. M. (2008). Effects of Granite Fines on Some Engineering Properties of Sandcrete. *Proceedings of 33rd Conference on our world in Concrete & Structures*: Singapore, 25 – 27 August.

Oyekan, G. L. & Kamiyo, O. M. (2008). Single and mixed size coarse aggregates in sandcrete block production. *Proceedings of 33rd Conference on our world in Concrete & Structures*: Singapore, 25 – 27 August.

Oyekan, G. L. & Kamiyo O. M. (2011). A Study on the Engineering Properties of Sandcrete Blocks Produced with Rice Husk Ash Blended Cement. *Journal of Engineering and Technology Research*, 3(3), 88-98.

An Open Access Journal available online

Impact of Selected Project Characteristics on Construction Claims in Niger State, Nigeria

[1] Bajere, P. A. [2] Galadima, U. N. & [3] Durodola, O. D.

[1, 2] Department of Building, School of Environmental Technology,
Federal University of Technology, Minna, Niger State, Nigeria
e-mail: paulbajere12@gmail.com

[3] Department of Estate Management, Covenant University,
Otta, Ogun State, Nigeria
e-mail: Daniel.durodola@yahoo.com

***Abstract*:** Over the last three decades, the construction industry in the developing countries has experienced continuous increase in claims, liability exposures and disputes, along with increasing difficulty in reaching reasonable dispute settlements. The research aimed to investigate the impact of project characteristics on construction claims in Niger State. It was hypothesized that there is no statistically significant difference between size of a project or the project duration and claim amount in building projects in Niger State. The review of literature revealed five main causes of claims. The study used both quantitative and qualitative methods through administration of questionnaires and the analysis of secondary data such as the estimated project duration, and actual completion dates of 196 projects using descriptive and inferential statistics. The research revealed that unrealistic time targets, and poor communication, are two of the five major causes of claims. The study revealed that duration of project is the characteristic with the most influence in Niger State, and that both size and duration of a project have the tendency of increasing or decreasing simultaneously. It was recommended among others, that key players in construction projects should ensure that sufficient float is built into the schedule so that when delays do occur, they are absorbed into the contract and are less likely to become critical to the overall construction schedule.

***Keywords*:** Claims, duration, project characteristics, project complexity,

1. Introduction

The construction industry is one of the sectors that provide crucial ingredients for the development of an economy (Leibing, 2001). For example, according to the Nigeria Bureau of Statistics, the construction industry in Nigeria accounts for 3.05 % of the Gross Domestic Product (GDP) and also provide employment opportunities for over 11 million Nigerians (NBS, 2015). Despite its importance, in the past three decades, the construction industry in the developing countries has experienced increase in claims, liability exposures and disputes, along with increasing difficulty in reaching reasonable dispute settlements in an effective, economical and timely manner (Barrie and Paulson, 1992; Semple, 1994; Ibbs, 1985; Glenn and Keoki, 2005; Diekmann and Nelson, 1985; Jagboro and Aibinu, 2002; Ashworth, 2007; Levin, 2008; Doloi, Sawhney, Iyer, and Rentala, 2012; Yau and Yang, 2012; Pourrostam and Ismail, 2011; Vidalis, and Najafi, 2002; Ajanlekoko, 1987; Odeyinka and Yusuf, 1997; Aibinu and Jagboro 2002; Frimpong, Oluwoye and Crawford 2003). The existence of claim could result in dispute between the parties, arbitration, litigation or total abandonment of a project (Jagboro and Aibinu, 2002).

Ajanlekoko (1987) observed while investigating ways of controlling project cost in the Nigerian construction industry, that the performance of the construction industry time-wise is poor. Similarly, Frimpong et al. (2003) observed that 33 (70%) out of 47 projects in Ghana experienced delay. Odeyinka and Yusuf (1997) further confirmed that seven out of ten projects surveyed in Nigeria suffered delays in their execution. Semple (1994) opined that in Canada, more than half of the claims constituted an additional cost of at least 30% of the original contract value based on their survey of construction projects. In addition, about a third of claims amounted to at least 60% of the original contract value. In some cases, the claim amounts were almost as high as the original contract value. Onyango (1993) found that 52% of all UK construction projects ended up with a claim of some type.

Claims can be frequent in large projects and can cause budgetary difficulties to employers and loss of liquidity to contractors (Bassioni *et al.*, 2012). According to Thomas (2001), many projects were subjected to claims as a result of extension of the contract period, additional payment proclaimed by contractor for any additional work that is out of the initial scope of the projects.

Akinsola *et al.* (1997) claimed that construction projects are generally unique, accommodating different designs, sizes and construction methods. Each project has different characteristics influencing how the project is initiated, designed, organized, managed and the final outcome of the finished product. In recent years, the number of claims within the construction industry continues to increase as a result of increase in construction cost, the continuous fall of naira value compared to the United States dollar, leading to increase in the price of building materials, high competition among contractors, increased project complexity and risk, and reduced profit

margin to contractors (Ho and Liu, 2004). Other project characteristics considered to be important include type of project (housing estate, dam, road); special weather condition and project lifespan among others.

Revay (1990) defined construction contract claims as request or application for something or notification of presumed entitlement to which the contractor considers, believes or contends. Levin (2008) also defined claim as a demand or assertion by one of the contractual parties who seek, as a matter of right, adjustment or interpretation of contract terms, payment of money, extension of time, or any other relief with respect to the terms of the contract. Although, refusal by the owner to recognize the claim does not ordinarily authorize the contractor to discontinue or stop field operations, Clough, Glenn and Keoki (2007) submitted that almost any extra cost or time required of the contractor by the action or inaction of the owner or owner's agent can be a valid basis for claim against the owner.

Delays are incidents that impact a project's progress and postpone project activities. Delay-causing incidents may include weather delays, unavailability of resources, design delays among others. Ibbs (1985) observed that what was found to be true about larger projects was that they were susceptible to more serious disputes and claims. This is not surprising, since they generally had more expensive and sophisticated products, which more often were targets of disputes.

A project may be regarded as a successful endeavour when it satisfies the cost, time, quality and performance specification attached to it. However, it is not uncommon to see a construction project failing to achieve its goal within the specified cost, time and quality (Nega, 2008). According to Enekwechi (1992), out of a total utility of 100%, the client places the following importance upon the three functional aspects as follows; quality 45%, price 35% and time 20%.

Many researchers have defined various characteristics affecting project performance. (Favie and Maas, 2008; Ling, 2004; Dissanayaka and Kumarawamy, 1999; Tukel and Rom, 1998; Baccarini, 1996; Bennett, 1991; Naoum, 1989;). For example, Favie and Maas (2008) examined 43 project characteristics that influence project performance as identified by previous authors and ranked them according to their importance. The study indicated that complexity of project (special ground condition or technological requirement) was ranked as the most important project characteristic. Size of the project (value, number of stories, kilometre of roads) was considered as the second most important project characteristic, project environment as the third, and the duration of project ranked 4th in the list. Project density was considered the least important project characteristics.

The aim of this research work is to examine the impact of project characteristics on construction claims in Niger State, Nigeria, so as to possibly reduce or avert claims. Objectives of the study are as follows: (i.) To identify the major causes of claims in public building projects in Niger State, Nigeria; (ii.) To examine the frequency of construction claims in public building

projects in Niger State, (iii.) To examine the impact of selected project characteristics on claims in Niger State, and (iv.) To determine, the relationship between value of claim and selected project characteristics of public building projects. There are two research hypotheses developed for the study. (1.) **Ho_1**:There is no statistically significant difference between size of a project and claim amount in building projects in Niger State. (2.) **Ho_2**:There is no statistically significant difference between duration of a project and claim amount in building projects in Niger State.

The scope of this research work covers building construction projects executed between 2007 and 2015 by the Niger State government in the three senatorial zones, in various ministries, departments, and agencies. The project characteristics considered include (1.) complexity of the project, (2.) size of the project, and (3.) duration of the project.

Some of the difficulties experienced in the course of collecting historical cost data for this study was the lack of proper documentation of records by some of the organizations. Also in the course of administration of questionnaires, several challenges were encountered which include misplacement of questionnaires by some respondents, refusal of respondents to fill the questionnaires and cases of absenteeism of respondents in the office or site.

2. Literature Review

2a. Project Characteristics

Ojo (2012) conducted a research to investigate the influence of project characteristics on the risk associated with client's cash flow prediction. The research focused on five most significant project characteristics which include the following: (1.) client type, (2.) project type, (3.) project duration, (4.) project value, and (5.) procurement method. The result showed that there exists significant relationship between project value and individual risk factors; and between project value and reduced risk factors (nature of the project, tendering procedure related factors). Also, project type and procurement method had significant influence on valuation assessment as a risk factor when forecasting cash flow by the clients.

2a(1). Complexity of project

There is no universally accepted definition of the term project complexity in the construction industry. Wikipedia dictionary simply defines complexity as having a large number of interacting parts. According to Holland (1985), liability claims have become more common due to the increase in the complexity of building. According to Baccarini, (1996) project management activities such as planning, coordination, goals determination, organizational form, project resources evaluation, personnel management, and project cost and time are all affected by the level of complexity involved in a project. Here the problem is determining who is at fault when a failure occurs.

2a(2). The Size of Project

Diekmann and Nelson (1985) observed that there was a consistent relationship between the sum of claim settlement and contract size. Also, there was a predictable increase in the size of individuals claim with increasing project size. They further submitted that

claims on small projects averaged $5,000 each claims on medium sized projects averaged $16,000 each and claim, on large projects $26,000 each. Diekmann and Nelson (1985) opined that the bigger the project the more opportunities for modification due to shear scope of the project. In their study, the projects were divided into three categories; large projects (greater than $5,000,000), medium sized projects, ($1,000,000 - 5,000,000) and smaller projects (less than $1,000,000).

Achuenu (1997) observed that the bigger the size of projects the longer it takes to complete. As a project takes longer time to complete, effects of fluctuation become more pronounced. Bigger projects are also more complex and hence tend to have more variations and a number of other factors respectively for increase in cost of construction than smaller ones. These assertions were observed during the time analysis carried out. Achuenu (1997) research revealed for instance, that fluctuation and variation account for 35.7% and 33.9% cost increase of building projects between 1 to 5 million naira. While adjustment of prime cost and provisional sum account for 16.1% and 8.9%, respectively. However, re-measurement was 3.6% and other 1.8%.

2a(3). Project Duration

Williams (1997) observed that time constraint on projects are becoming tighter, and time-based liquidated damages heavier, exacerbating the effects cause delays. Ofoma (1990) opined that the main purpose of the extension of contract time under clause 23 is to relieve the contractor from his liability for liquidated damages for late completion. Diekmann and Nelson (1985) showed that approximately 25% of all additive claims also requested a time extension and those time extensions averaged 20 days each. As expected, strikes and weather related claim accounted for the largest proportion of time extension awards.

2b. Categories of Claims

Al Subaie (2012) categorized types of claim into four groups. The first category is the Change claims due to contractor's encounter of subsurface or hidden conditions during the construction of a project, which were not anticipated and which may have a major impact on the time and cost of performing their work.

The second category of claim is the Delay claims which are claims caused by a number of unexpected events during construction which increase the time required for completing the work or increase the work which must be completed within a specific period of time.,

The third category of claim is the Extra work claims resulting from alterations, changes and extra work claims usually involve construction changes where the client declines to acknowledge that the work has changed. According to Bramble and Callahan (2000), this is one of the more litigated issues on a construction project. A constructive change occurs where a contractor performs work above the contract requirements, without a formal order under the changes clause, either due to an informal order from, or through the fault of the client. Before it can recover, the contractor must show that the client ordered it to perform the additional work. The additional work performed by the contractor cannot be beyond the

general scope of the contract. Modifications ordered by the client beyond the scope of the contract will constitute a breach of contract.

The fourth category of claim is the Contractual claims. The client generally does not have much obligations under the contract, but required by the contract to: a.) provide the contractor with access to the site; b.) provide adequate information and instructions in order for the contractor to execute the work; and c.) pay the contractor in accordance with the terms of the contract**.** This duty to provide access to the project site is often an implied warranty, as opposed to being an express term of the contract (Bramble and Callahan, 2000). An owner may interfere with the contractor's access to the site and fail to cooperate by: (a) Denying access to the project site; (b) Imposing restricted work areas; (c) Using the site in a way that impedes the contractor's work at the site; or (d) Allowing other contractors to work on the project site in a way that interferes with the contractor's work.

3. Methodology

An exploratory research design method was used to determine the relationships among the variables. A combination of direct observation and administered survey questionnaire were determined to be the most appropriate techniques for the study. Both quantitative and qualitative data were collected.

The study population was drawn from stakeholders (clients, consultants and contractors) in the construction industry. Clients comprise of owners of projects and Chief executive officers and their representatives of the various government establishments. The consultants and contractors were randomly selected from those registered with the selected agencies and ministries that were involved in the execution of projects. The research samples were selected randomly from the list of registered consultants and contractors in the ministries and agencies.

The sample units for this study were the various projects completed in Niger state by the selected Agencies and Ministries which include Niger State Universal Education Board, Niger State Housing Corporation, Niger State Public Procurement Board, Niger state Ministry of Works and IBB University, Lapai.

Probability sampling technique was used to allow each segment of the population to have an equal chance of being selected. In this case, the samples are chosen from the larger population by a process known as simple random sampling. Probability sampling method was adopted because it utilizes some form of random selection. Samples were obtained from the three senatorial districts (zone A, B and C) from the selected ministries and agencies of the state.

The sample size for the study was drawn from the 242 registered contractors in the selected agencies and the 96 client representatives, which gave a total of 338. The sample size was calculated using a simplified formula proportion as illustrated by Glenn (2013) as follows:

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where; n = Sample size
N = Population size in the sample unit
e = Level of precision which is + 5% (0.05),
at 95% confidence level.

$$\frac{338}{1+338(0.05)^2} = 183$$

Both primary and secondary data were used to address the specific research objectives.

This study employed the use of questionnaires, oral interviews and archival documents as data collection instruments. Questionnaires were self-administered to respondents that are construction practitioners (client/owner, consultants, contractors) from selected government ministries, department and agencies to obtain primary data. Oral interview was conducted with thirty (30) individuals randomly selected among clients, contractors and consultants. The interview was conducted in the span of three (3) weeks to increase the chances of interviewing different respondents. An interview guide was designed to guide the researcher in obtaining relevant information from the respondents. The secondary data were gotten from the records of different completed projects executed by the selected government ministries, department and agencies between 2007 and 2015, in which contract documents, project reports, correspondence letters and payment certificates as well as relevant related literature were thoroughly reviewed and information about project type, initial contract sum, final completion sum, amount of claims were collected.

The close ended questions focused on assessing the perception and understanding from knowledgeable respondents, which are construction practitioners (client/owner, consultants, contractors) regarding the impact of various project characteristics on claims and its effects on construction projects in Niger state. In the study, a five degree Likert-type scale was adopted and arbitrary values of 1-5 were assigned to each of the degree of agreement to causes of claim and the various project characteristics using a five – point Likert scale of 1 – 5, where; 1 = Strongly Disagree or No Effect, 2 = Disagree or Little Effect, 3 = Neutral, 4 = Agree or High Effect, and 5 = Strongly Agree or Very High Effect as the case may be.

The following cut-off points for measurement of level of effect, awareness and risk assessment techniques introduced by Morenikeji (2006) were adopted for examining the influence of some project characteristics on claims in Niger State: (1.) No Effect = 1.0 to 1.49; (2.) Little Effect = 1.50 to 2.49; (3.) Neutral = 2.50 to 3.49; (4.) High Effect = 3.50 to 4.49; and (5.) Very high Effect = $\geq$ 4.50

Descriptive statistics (frequency and Relative Importance Index) and statistical inference (correlation analysis) were used for the analysis. The

Statistical Packages for Social Sciences (SPSS) computer software was used for data analysis. Professional judgment was used to quantify personal observations and other responses.

A pilot survey was conducted by the researcher to investigate the relationship between project characteristics and construction claims. Random and purposive sampling technique was used to survey 20 respondents which comprised of contractors, consultants, clients and professionals in the built environment in Niger State, to ascertain the major project characteristics to focus on in the study. The result of the pilot study identified the following project characteristics as the five most influential according to ranking, these are: Project Complexity, Project Size, Duration of Project, Project Funding and Project Type.

4.0 Data Presentation

Table 1 presents information about number of questionnaires administered for the study. As shown, 183 questionnaires were administered to Consultants, Contractors, and professionals in the five selected public institutions which represent clients. 121 were retrieved which represent approximately 66.12% of the questionnaires administered.

Table 1: Distribution of Questionnaires Administered and Returned

	Frequency	**Percentage (%)**
Questionnaires Administered	183	100.0
Questionnaires Retrieved	121	66.12

Source: Researcher's Field Work, 2015

Table 2 shows the ranking of project characteristics according to their importance. As shown, the complexity of a project was identified as the most important.

Table 3 shows the Impact of Project Characteristics on Claims. As shown, the complexity of a project was identified as the most significant impact with a mean score of 4.03.

Table 2: Ranking of Project Characteristics

S/N	Rank	Project Characteristic
1.	1st	Complexity of project (e.g. special ground conditions or
2.	2nd	technology requirements).
3.	3rd	Size of project (e.g. value; number of stories; floor area; km of road)
4.	4th	Effects of relevant political, legal and economic systems,
5.	5th	including market conditions
6.	6th	(project environment)
		Project duration
7.	7th	Type of project (e.g. housing estate, road, dam, office building
8.	8th	refurbishment)
9.	9th	Form of contract (functional grouping of contract: separated or
10.	10th	integrated) and the division of responsibilities and liabilities
11.	11th	Specific location, special weather and environmental concerns
12.	12th	Level of technological advancement
		Project life span / lifecycle
13.	13th	Value of a project
14.	14th	Quality of a project
15.	15th	Type of client (e.g. public/private/mixed; experienced/one-
16.	16th	off/project staff caliber and their strengths, weaknesses and management style)
17.	17th	Any other special conditions
		Project funding
18.	18th	Level of specialization
19.	19th	Availability of information at project inception and points at
20.	20th	which any remaining information will be required/be available
21.	21st	Nature and status of local construction industry, including
22.	22nd	available capacities of potential project participants, scarcity of
23.	23rd	work in particular fields, competitiveness.
24.	24th	Percent of repetitive elements
25.	25th	Availability of materials and equipment that are required for the
26.	26th	works
		Ownership of building
27.	27th	Type of specification
		Flexibility of scope of works when contractor is hired
		Project scope definition completion when bids are invited
28.	28th	Importance for project to be completed within budget
		Importance for project to be delivered
29.	29th	Selection process / methodology (bidding procedure, number of
30.	30th	bidders, selection criteria, bidding environment)
31.	31st	Performance of available contractors and consultants on previous
32.	32nd	(similar) projects in the area in terms of meeting cost, quality
33.	33rd	and time targets; safety records and client satisfaction levels: as
34.	34th	compared with the procurement modalities used.
35.	35th	Local familiarity and confidence in/disillusionment with,
36.	36th	particular types of procurement with reasons
37.	37th	Technical approval authorities
38.	38th	Contractual arrangement
39.	39th	Payment mode to the contractor
40.	40th	Presence of special issues
41.	41st	Extent to which bid documents allow additions to scope
42.	42nd	Design completion when budget is fixed
43.	43rd	Bidder's knowledge of the budget
		Time given to contractor to bid

	Time given to owners / consultants to evaluate bids
	Extent to which the contractor period is allowed to vary during bid evaluation stage
	Number of bidders
	Prequalification or short-listing
	Bid evaluation and selection criteria
	Bidding environment
	Density of a project

Source: Favie and Maas (2008)

Table 3: Impact of Project Characteristics on Claims

Key: 5 = (Very high effect), 4 = (High effect), 3= (Neutral), 2 = (Little effect), 1 = (No effect)

S/N	Project Characteristics		Mean Score
1	Complexity of Project	4.03	
2	Size of Project	3.91	
3	Duration of Project	3.86	
4.	Type of project (e.g. housing estate, road, dam, office building refurbishment)	3.74	
5.	Effects of relevant political, legal and economic systems, including market conditions (project environment)	1.98	
6.	Importance for the project to be completed on time	2.61	
7.	Form of contract (functional grouping of contract: separated or integrated) and the division of responsibilities and liabilities	2.02	
8.	Specific location, special weather and environmental concerns	2.90	
9.	Level of technological advancement	3.10	
10.	Project life span / lifecycle	2.98	
11.	Value of a project	1.93	
12.	Quality of a project	2.31	
13.	Type of client (e.g. public/private/mixed; experienced/one-off/project staff caliber and their strengths, weaknesses and management style)	2.16	
14.	Project funding	3.69	
15.	Level of specialization	2.99	
16.	Availability of materials and equipment that are required for the works	2.55	
17.	Ownership of building	2.18	
18.	Type of specification	1.73	
19.	Contractual arrangement	1.51	
20.	Payment mode to the contractor		1.63

Source: Researcher's Field Work (2015)

Figure 1 presents the academic qualifications of the respondents. As shown, 4.13% have ND qualification, 31.41% have HND qualification, 24.79% are BSc/BTech degree holders and 39.67% are holders of MSc/MTech certificates (see Figure 2). This indicates that majority of the respondents are master's degree holders which implies that they have reasonable knowledge about the subject of claims.

Figure 2 presents the professions of the respondents. As shown, the majority of the respondents are Quantity Surveyors representing 26.45%, 22.31% represents

Builders and Architects each, 19.84% are Civil Engineers and other profession represents 9.09%.

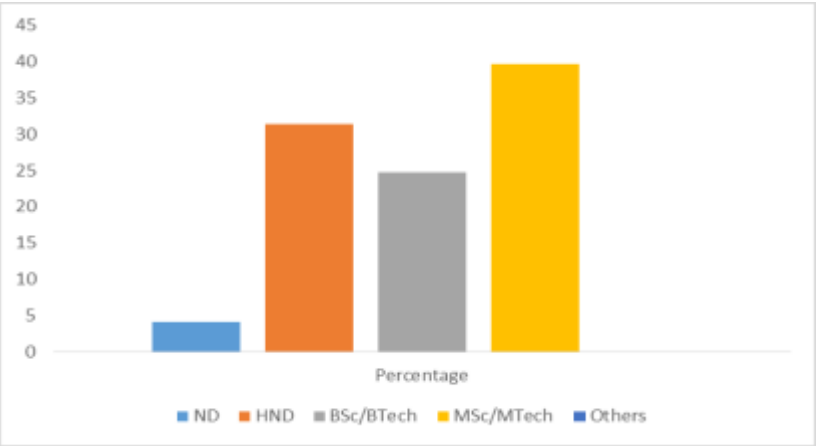

Figure 1: Academic qualification of Respondents
Source: Researcher's Field Survey (2015)

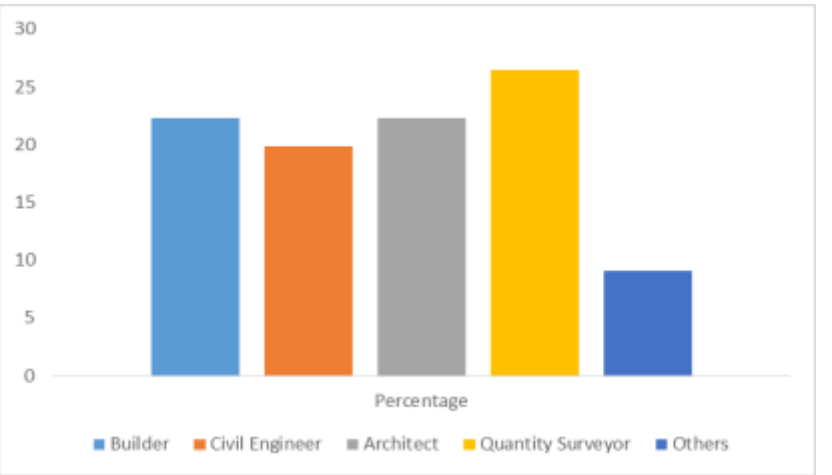

Figure 2: Profession of the Respondents
Source: Researcher's Field Survey (2015)

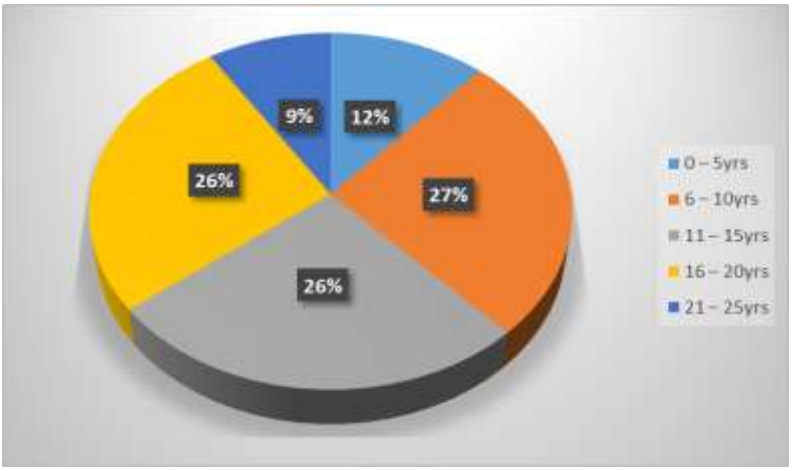

Figure 3: Years of Experience of Respondents in the Construction Industry
Source: Researcher's Field Survey (2015)

Figure 3 presents Respondents' Years of Experience in the Construction Industry. As shown, 11.56% of the respondents have 0 to 5 years of experience, 26.45% have between 6 – 10, 11 – 15 and 16 -20years of experience and those that have 21 – 25 years of experience represent 9.09% of the respondents.

Table 4: Causes of Claims in Construction Projects in Niger State

S/N	Causes of Claims	Mean Scores	Relative Importance Index (RII)	Ranking
1	Inadequate design information	3.79	0.76	4th
2	Inaccurate design information	3.86	0.75	6th
3	Inadequate site investigations	3.70	0.74	8th
4	Slow client response (decisions)	3.81	0.76	4th
5	Poor communication	3.99	0.80	2nd
6	Unrealistic time targets	4.05	0.81	1st
7	Inadequate contract administration	3.66	0.73	9th
8	Uncontrollable external events	3.65	0.73	9th
9	Incomplete tender information	3.93	0.79	3rd
10	Unclear risk allocation	3.36	0.67	13th
11	Increased complexity of building projects	3.60	0.72	11th
12	Effects of high inflation in the construction sector	3.76	0.75	6th
13	Increased competition due to decrease in the number of projects in the area	3.14	0.63	14th
14	A decrease in profits	2.98	0.60	16th
15	Decreased capital availability	3.17	0.63	14th
16	Withdrawal of governmental support hitherto extended to the contractor	2.82	0.56	17th
17	Increase in government regulations	3.43	0.69	12th

Source: Researcher's Field Work (2015)

Table 4 presents the Mean Score and the Relative Importance Index (RII) of the main causes of claims in construction projects amongst professionals in the selected public institutions, consultants and contractors on construction sites in Niger State. As shown, inadequate design information, inaccurate design information, inadequate site investigations, slow client response (decisions), poor communication, unrealistic time targets, inadequate contract administration, uncontrollable external events, and incomplete tender information were significant. The ranking for each factor was interpreted by using weighted average of the responses received. For example, Unrealistic time targets reveal a Mean Score of 4.05, which indicated that the weighted average of the responses received was close to the response option coded as '4' on the Likert scale, which represents 'Agree'. The risk variable also had an RII of 0.81, which meant it was the most important risk factor associated with cause of claims in construction projects, in the opinion of the respondents to the study. This implies that majority of the respondents agreed that unrealistic time targets is the major cause of claims in construction projects in Niger State. The five most significant causes of claims in construction projects are; unrealistic time targets, poor communication, incomplete tender information, inadequate design information and slow client response (decisions) which 1st, 2nd, 3rd, 4th and 4th respectively.

Table 5 presents the frequency of claims in construction projects. As shown a mean score of 3.29 amongst the respondents indicated that the weighted average of the responses received was close to the response option coded as '3' on the Likert scale, which represents 'Seldom'. This implies that majority of the respondents are of the opinion that claims seldom happens in construction projects in Niger State.

Table 5: Frequency of Claims in Construction Projects in Niger State

Frequency of Claims	Very Frequent (5)	Frequent (4)	Seldom (3)	Rarely (2)	Never (1)	No of Respondents	Mean Score
Consultant							
Sum	5	56	42	14	0	36	3.25
Contractor							
Sum	5	60	45	18	0	40	3.20
Clients							
Sum	30	60	45	18	0	45	3.40
Overall	40	176	132	50	0	121	3.29

Source: Researcher's Field Work (2015)

Table 6 presents the origin of claims among the three categories of respondents. As shown, the group that makes the most claims are contractors representing 84.30% of the respondents, while subcontractors are the least category that makes claims.

Table 6: Origin of claims among the three categories of respondents

Variable	Frequency	Percentage (%)
Clients	16	13.22
Contractors	102	84.30
Subcontractors	3	2.50
Total	121	100.00

Source: Researcher's Field Work (2015)

Table 7 presents the influence of selected project characteristics (complexity of project, size of project and duration of project) on claims in Niger State. Likert scale with values ranging from 5 to 1 representing very high effect, high effect, neutral, little effect and no effect is used to calculate the Mean Score which allowed responses to be categorised in terms of the response option most favoured by respondents. This is further ranked in terms of the importance accorded it by the respondents.

Table 7: Influence of Selected Project Characteristics on Claims in Niger State

S/N	Project Characteristics	Very High Effect(5)	High Effect (4)	Neutral (3)	Little Effect (2)	No Effect (1)	Mean Score
1	Complexity of Project	70	312	57	22	3	3.84
2	Size of Project	55	268	66	38	3	3.55
3	Duration of Project	160	280	33	10	3	4.02

Source: Researcher's Field Work (2015)

In Table 7, the influence of complexity, size and duration of projects on claims reveal a Mean Score of 3.84, 3.55 and 4.02 respectively by the respondents which were deemed to be of high effect because they fall between 3.5 – 4.49 based on Morenikeji (2006) cut off points. Furthermore, duration of project from the findings have the most influence which also implies that majority of the respondents among the different players on construction projects agreed that complexity, size and duration of projects have high effect on claims in construction projects in Niger State.

5.0 Data Analysis

Table 8 presents the Project Characteristics with the Most Influence on Claims. As shown, duration of project (53.72%) is the project characteristic with the most influence on claims, followed by complexity of project (33.06%) and then the size of

project (13.22%). Therefore, duration of project is the characteristic with the most influence, while size of project is the characteristic with the least influence. This is also in line with results obtained from questionnaire administration (see Tables 6 and 9).

Table 8: Project Characteristics with the Most and Least Influence on Claims

Variable	Frequency	Percentage (%)
Complexity of Project	40	33.06
Size of Project	16	13.22
Duration of Project	65	53.72
Total	121	100.00

Source: Researcher's Field Work (2015)

Tables 9 presents the analysis of the relationship between the claim value and the size and duration using Pearson Product-Moment Correlation. As shown, poor communication and unrealistic time targets ranked 1st, inadequate design information, inaccurate design information, and inadequate site investigations ranked 3rd, 4th and 4th respectively. Therefore, despite the difference of the findings obtained from questionnaire administration and interviews conducted, there is a common ground regarding the major causes of claims which are poor communication and unrealistic time targets. While, the least causes of claims are increased competition due to decrease in the number of projects in the area, decrease in profits, and withdrawal of governmental support hitherto extended to the contractor.

Tables 10 presents the information about the relationship between Claim Value and Project Size. As shown, the r-value of 0.752 at 0.05 significance level indicates a strong relationship between the claim value and the project size. This implies that the size of a project significantly influences the claim value such that both variables have the tendency of increasing or decreasing simultaneously. The r-value of 0.752 which is greater than 0.67 means the rejection of the null hypothesis (H_{01}). Therefore, the alternative hypothesis is accepted.

Table 9: Causes of Claims in Niger State

Causes of Claims	Yes	Percentage (%)	Ranking	No	Percentage (%)	Ranking
Inadequate design information	22	73.33	4th	8	26.67	12th
Inaccurate design information	22	73.33	4th	8	26.67	12th
Inadequate site investigations	23	76.67	3rd	7	23.33	15th
Slow client response (decisions)	21	70.00	6th	9	30.00	11th
Poor communication	25	83.33	1st	5	16.67	16th
Unrealistic time targets	25	83.33	1st	5	16.67	16th
Inadequate contract administration	17	56.67	11th	13	43.33	7th
Uncontrollable external events	19	63.33	9th	11	36.67	8th
Incomplete tender information	20	66.67	7th	10	33.33	9th
Unclear risk allocation	13	43.33	14th	17	56.67	4th
Increased complexity of building projects	19	63.33	9th	11	26.67	12th
Effects of high inflation in the construction sector	20	66.67	7th	10	33.33	9th
Increased competition due to decrease in the number of projects in the area	11	36.67	15th	19	63.33	1st
A decrease in profits	11	36.67	15th	19	63.33	1st
Decreased capital availability	16	53.33	12th	14	46.67	6th
Withdrawal of governmental support hitherto extended to the contractor	11	36.67	15th	19	63.33	1st
Increase in government regulations	14	46.67	13th	16	53.33	5th

Source: Researcher's Field Work (2015)

Tables 11 presents the information about the relationship between Claim Value and Project Duration. As shown, the r-value of 0.723 at 0.05 significance level indicates a strong relationship between the claim value and the project duration. This implies that the duration of a project significantly influences the claim value that might result. The r-value of 0.723 which is greater than 0.67 means the rejection of the null hypothesis (H_{01}). Therefore, the alternative hypothesis is accepted.

Table 10: Pearson Correlation of Claim Value and Project Size

		Initial cost	Final cost
Initial cost	Pearson Correlation	1	.752**
	Sig. (2-tailed)		.000
	N	33	33
Final cost	Pearson Correlation	.752**	1
	Sig. (2-tailed)	.000	
	N	33	33

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

Table 11: Pearson Correlation of Claim Value and Project Duration

		Initial time	Final time
Initialtime	Pearson Correlation	1	.723**
	Sig. (2-tailed)		.000
	N	33	33
Finaltime	Pearson Correlation	.723**	1
	Sig. (2-tailed)	.000	
	N	33	33

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

6.0 Discussion of Findings

The influence of complexity, size and duration of projects on claims revealed mean scores of 3.84, 3.55 and 4.02, respectively. Duration of project is the characteristic with the most influence on construction claims in Niger State, while size of project is the characteristic with the least influence, among these selected variables.

The size of a project significantly influences the claim value of a project such that both variables have the tendency of increasing or decreasing simultaneously. The r-value of 0.752 which is greater than 0.67 means the rejection of the null hypothesis (H_{01}). Therefore, the alternative hypothesis was accepted. The study also revealed that the duration of a project significantly influences the claim value that might result. The r-value of 0.723 which is greater than 0.67 means the rejection of the null hypothesis (H_{02}). Therefore, the alternative hypothesis is accepted.

Ibbs (1985) observed that larger projects were susceptible to more serious disputes and claims. This is not surprising, since larger projects generally had more expensive and sophisticated products, which more often cause disputes. Also, the participants had more profit at stake with these more expensive items, and they, therefore were willing to contest the matter more aggressively. Furthermore, these more expensive

items were often central and crucial to the contractors' work-plan, and denials of the nature, subsequently had more serious indirect ramifications on the project schedule.

The study established that unrealistic time targets and poor communication before and during construction are the major causes of claims in Niger State. This is probably due to lack of comprehensive communication strategy and poor project planning with tight project schedule leading to unnecessary presumes. It was also observed that there is usually no period for engagement amongst all members of the team (inclusive of the major contractor), during which key individuals could be identified and forming relationships translates to the fact that the construction phase may begin with lack of forum and channels for communication being appropriately established. Also, determination of the period for completion of a project relies profoundly on the personal experience and judgment of the public official who appraises the factors that affect the project. The competence of the public official is critical in the development of a realistic contract duration for projects. At times, designers permit the owner's usage or need for the project to establish the contract time

6.0 Conclusion

The aim of this research work is to examine the impact of project characteristics on construction claims in Niger State, Nigeria. The analysis of data obtained from the administration of questionnaires, interviews conducted and records of construction claims reviewed led to the conclusion that in terms of frequency of occurrence, claims seldom happens in constructionprojects in Niger State. The analysis also revealed that unrealistic time targets, poor communication, incomplete tender information, inadequate design information and slow client response are the five major causes of claims in construction projects in Niger State. Based on the research findings, the following recommendations are proffered to reduce the influence project characteristics on claims in public construction projects in Niger State:

1. Key players in construction projects should ensure that sufficient float is built into the schedule, to ensure that there is adequate construction time for the circumstances. When delays do occur, they are absorbed into the contract and are less likely to become critical to the overall construction schedule. In addition, adequate time should be given to the project consultants to prepare designs, specification notes, Bills of Quantities and other project details as most projects are poorly documented in a hurry, with attendant large claims tolerance during the post contract stages. Also, project participants need to evolve planning and implementation strategies that aim at minimizing the variation of project scope once cost limits have been established to address unrealistic time targets.
2. Proper coordination of design documents is extremely important. Written specifications should be reviewed to avoid ambiguities and conflicts between architectural and engineering drawings as well as client. There is need to ensure fair and complete disclosure of information at an early stage of the

construction project to establish a channel of communication.

3. Contractors should ensure the preparation of a work-plan in accordance to project schedule, since duration of project has the major influence on claim amount in construction projects in Niger State.

7.0 References

Aibinu, A. A. and Jagboro, G.O. (2002). The Effects of Construction Delays on Projects Delivery in the Nigerian Construction Industry. *International Journal of Project Management*, 20, 593 – 599.

Achuenu, E. (1997). Appraisal and Assessment of Cost Overruns of Public

Buildings Project in Nigeria. Unpublished M.Phil Thesis, Department of Building, University of Jos.

Ajanlekoko J. O. (1987). Controlling cost in the construction industry. Lagos QS Digest, Lagos; 1(1):8–12.

Akinsola, A. & Ndekugri, I. (1997). Identification and evaluation of factors influencing variations on building projects. *International Journal of Project Management*, 15(4), 67.

Ashworth, A. (2007). *Contractual Procedures in the Construction Industry*. *2nd ed.* New Zealand: UNITEC.

Al-Subaie, O. (2012). Construction claims in Residential Houses in Saudi Arabia.*Construction Engineering Management Journal Paper Representation*, 34(2), 54-56.

Baccarini, D. (1996). The Concept of Project Complexity - A Review. *International Journal of Project Management*, 14, 201-204.

Barrie, D. S., and Paulson B. C (1992). *Professional Construction Management*. New York: MCGraw Hill.

Bennett, A. (1991). *International Construction Project Management: General Theory and Practice*. Oxford: Butterworth-Heinemann.

Bramble, B. B. & Callahan, M. T. (2000). *Construction Delay Claims (3rd ed.)*. Ontario: Aspen Law & Business.

Clough, R. H., Glenn, H. C. & Keoki, S. (2007). *Construction contracting. A practical guide to company management (7th ed.)*. New York: John Wiley & Sons Press Ltd.

Diekmann, J. E. & Nelson, M. C. (1985). Construction Claims Frequency and Severity. *Journal of construction Engineering and Management*, 3, 74-81.

Dissanayaka, S. M. and Kumaraswamy, M. M, (1999*).* Comparing contributors to time and cost performance in building projects. *Building and Environment journal, 34, 31-42.*

Doloi, H., Sawhney, A., Iyer, K. C. and Rentala, S. (2012). Analysing factors affecting delays in Indian construction projects. *International Journal of Project Management*, 30(4), 479-489.

Favie, R. & Maas, G. J. (2008). Ranking Construction Project Characteristics. *Proceedings CIB Transformation Through Construction, Dubai.*

Frimpong, Y., Oluwoye, J. and Crawford, L. (2003). Causes of
Delays and Cost Overruns in Construction of Ground water Projects in Developing Countries; Ghana as a case study. *International Journal of Project Management, 21, 321 – 326.*

Glenn, D. I. (2013). "Determining Sample Size". Institute of Food and Agricultural
Science (IFAS), University of Florida, Gainsville, FL 32611. Retrieved on June 3, 2013 from edis.ifas.ufl.edu/pdffiles/PD00600 .pdf,

Glenn, H. C. & Keoki, S. (2005). *Construction contracting. A practical guide tocompany management (7th ed.).* New York: John Wiley & Sons Press Ltd.

Ho, S. P. & Liu, L. Y. (2004). Analytical model for analyzing construction claims and opportunistic bidding. *Journal of Construction Engineering and Management*, 130(1), 94-104.

Holland, J. P. (1985). Profession liability of the Architect and Engineers. *Journal Construction Engineering and Management*, 3(2), 57-65.

Ibbs, C. W. (1985). Product specification practice and problems. *Journal of construction Engineering and management*, 3(2), 157-172.

Jagboro, G. O. & Aibinu, E. (2002). The effects of construction delays on project delivery in Nigerian Construction Industry. *International Journal of Project management*, 4, 20-21.

Leibing, R. (2001) *The Construction Industry: Process, Players*. New Jersey: Pretense Hall Publishers.

Levin, P. (2008). *Construction Contract Claims, Changes & Dispute Resolution (2nd ed.).* New York: ASCE Press.

Ling, .Y.Y. (2004). Key Determinants of Performance of Design-Bid-Build Projects in Singapore, *Building Research & Information, 32(2), 128–139*

Morenikeji, W. (2006). *Research & Analytical Methods (For Scientists, Planners and Environmentalist).* Jos, Nigeria: Jos University Press Ltd. National Bureau of Statistics Report (NBS), (2015).

Nega, F. (2008). Causes and effects of cost overrun on public building construction projects in Ethiopia. Unpublished PhD Thesis, Department of Building Construction, Addis Ababa University, Ethiopia.

Naoum, S. G. (1989). An investigation into the performance of management contracts and the traditional methods of building procurement. Unpublished Masters Thesis, Brunel University.

Odeyinka, H. A. and Yusuf, A. (1997). The Causes and Effects of Construction Delays on Completion Cost of Housing Projects in Nigeria. *Journal of Financial Management of Property and Construction, 2(3), 31 – 44.*

Ojo, G. K. (2012). Project Characteristics Influence on Risk Associated with Construction Client's Cash Flow Prediction. *Journal of Research in International Business and Management 2(5), 142-150*

Onyango, D. (1993). *Reduction of Conflicts in Construction*. Loughborough, UK: MSReport, Loughborough University.

Pourrostam, T. and Ismail, A. (2011). Significant Factors Causing and Effects of Delay in Iranian Construction Projects. *IACSIT International Journal of Engineering and Technology*, 5(7), 450-456

Revay, S. G. (1990*). "Claim Seminar." 2nd ed.* British Columbia: Macmillan Bloedel Limited Revay and Associates Ltd.

Semple, C. (1994). Construction Claims and Disputes: Causes and Cost/Time Overruns. *Construction Management and Economics, 12, 785-795.*

Thomas, R (2001). *Construction contract claims. 2nd ed.* Hamsphire: Palgrave Publisher

Tukel, O. I., Rom, W. O. (1998). Analysis of the Characteristics of Projects in Diverse Industries, *Journal of Operations Management, 16, 43-61*

Vidalis, S. M. and Najafi, F. T. (2002). *Cost and time overruns in highway construction*, in Proceedings of the 4th Transportation Specification. Conference of the Canadian Society for Civil Engineering, pp. 2799–2808, Montreal, Quebec, Canada, June 2002.

Williams, T. M. (1997). Empowerment versus Risk Management. *International Journal of Project Management, 15*(4), 219-221.

Yau, N. J. and Yang, J. B. (2012). Factors causing design schedule delays in turnkey Projects in Taiwan: An empirical study of power distribution substation projects. *Project Management Journal*. 43 (3), 50 – 61.

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Crime Management on Construction Site: A Study of Ogun State, Nigeria

***Uche Emmanuel Edike and Ayeni Babatunde**

*Department of Building Technology,
Bells University of Technology, Ota, Ogun State, Nigeria
Email: edikeuche@yahoo.com

***Abstract*:** Crime impacts the success of a project and diminishes the potential profitability of a project under construction and it is a considerable problem in the construction industry. In view to improving construction site security management practices and mitigating security threats on construction site, the study assesses the crime management practices on construction site. A survey of 122 purposively sampled stakeholders resulted in 93 valid structured questionnaires comprising 52 contractors and 41 consultants. Data were analysed using mean score and Man-Whitney U test through IBM Statistical Package for Social Sciences (SPSS) version 20. The study found that the most commonly used construction site security management components are inventory of tools, materials and equipment with mean scores of 4.58, 4.53 and 4.49 respectively. The use of security tools such as CCTV and alarms systems as site security management practice is the least practice adopted with Mean Score of 1.33. The perceptions of contractors and consultants on the application of crime management components on construction site are the same. Construction site security model is proposed in the study and considered essential for setting up construction site, inspecting ongoing projects, and investigating crime on the event of any occurrence.

Keywords: construction site, security, crime, management practices, internal stakeholders, Nigeria

Introduction

Crime impacts the success of a project and diminishes the potential profitability of a project under construction. It is a considerable problem in the construction industry and will continue to be a threat (Farinloye, Matimidiwo, Adewunmi and Ajayi, 2009) as security

considerations are often ignored facet of construction projects. Contractors frequently lose materials, tools and expensive equipment to theft and vandalism; both by on-site workers and by criminals who identify easy opportunities. Total losses due to short fall on construction sites security have been increasing dramatically over the past decade. In some places, building sites are targets for thieves and vandals because valuable items are left on site over a long period, site location are easily approachable both at night and on weekends (Sakurai, Mayhew and White**,** 2008). Crime prevention on construction sites has become a major concern for many building contractors as losses from theft and vandalism can make the difference between making a profit and incurring a loss on a job (Farinloye *et al*., 2013). Berg (2003) noted that control and management of crime on site is often difficult particularly on large construction sites, where workers are often casual labour and not easy to keep track of, and where large amounts of equipment, tools and building materials are difficult to monitor. Poor security measures on construction sites can result in serious injury or even, fatalities to workers or visitors. It is crucial that children do not get onto construction sites. Many children regard sites as something of a play area without realizing the very serious dangers they present. (AVIVA, 2011).

Past studies have demonstrated that theft and vandalism on building and construction sites poses considerable risks to the building industry. Little research has focused on the nature of management practices employed in combating these crimes on construction site. The present study aims to supply information to fill this research need with particular focus on internal stakeholders. The focus on internal stakeholders is based on the observation by Olander (2006) that the internal stakeholders are directly involved in the finance and management of a project. Adeyinka *et al*. (2013) asserted that architects, builders, quantity surveyors and engineers are key internal stakeholders who are involved throughout the various stages of design and construction. The study area, Ogun state, Nigeria is well known for its industrial hub and population over flow from Lagos State and currently the most industrialized state in Nigeria (Ogun: the making industrial hub, 2013). The overhauls of industries and exponential population growth rate have influenced the sporadic sprawling of buildings in all nooks and crannies of the state. High population and increased unemployment rate causes increase in crime rate (Iwuagwu, 2014). Smith and Walmsley (1999) found that equipment was frequently reported to be stolen from building and construction sites in urban areas which are characterized with high population.

The boom in the building construction industry in the mix of rapid population growth and high unemployment rate graft the attention of misguided individuals or groups into construction site as means of quick gains. Hence, the study assess the security management practices on construction site in Ogun state in view to improving construction site security management practices and mitigating security threats on construction site.

Literature Review

Construction security system cannot properly be guaranteed without conducting all the practices (Yulia, 2008). Therefore, construction security system should implement all of the

components to achieve good security system and to accelerate the progress of a project.

Construction site security compon…

Construction site security encompasses several components. Arata, (2006) identified five security component - physical security, personnel security, investigation security, information security and security awareness. Yakuria, Mayhew and White (2008) noted target removal, identifying property, surveillance devices, natural surveillance, and cooperation between government, community and industry as five key security component. The differences between the two sets of five security components is in nomenclature but similar in elements of security practices on construction site. Springfield Missouri Police Department and San Antonio Police Department in addition to the five security components included insurance on Construction Site Crime Prevention Tips.

Physical Security

Physical security is the protection of people and things from harm by using such methods as intrusion detection, access control, and security officers (Arata, 2006). Physical security countermeasures are the measures used to safeguard personnel from harm. It also protects property from unauthorized access to equipment, installations, material, and documents and safeguards against sabotage, damage, and theft. The main objective of physical security is to harden the target and make it unattractive for thieves and vandals to enter the site for fear of being caught. Perimeter Security as an aspect of physical security which starts at the perimeter of the job site (Gardener, 2003) is a temporary construction fence used to mark the boundary of the job site. It helps differentiate where the private and public lines begin and end. The study noted that perimeter fence is not designed to completely stop intruder. The perimeter security fence is used as a delaying tactic to slow down the intruder and does serve to control vehicle and pedestrian traffic access to the property. Other physical security measures use in conjunction with perimeter fence to improve security include security lighting, clear zone, intrusion detection of job trailer, lock and key control, video surveillance, electronic assess control and tools and equipment protection.

Clear zone

According to San Antonio Police Department tips on construction site crime prevention, establishing clear zones around the perimeter fencing is essential in detecting intruders. A clear zone is defined as an open area 1.5m out from the perimeter fence on both sides and the same for around the tool cribs. In the clear zones there are not any places for an intruder to hide. This means no brush, shrubs, pallets, or storage of any kind which will provide cover for an intruder within the 1.5m zone. Also, when there is a 1.5m clear zone on both sides of the perimeter fence, the job site can be monitored by roving police patrols from the street or by the job site security officers.

Locks and key control

Locks do not keep determined well-equipped thief out of the property. They are instead a delaying device similar to perimeter fences. The better the lock, the more delay for the intruder. Thieves do not spend much time working on the lock since time is important in criminal operation. The more time is spent on defeating the lock, the lesser the time

available for the inside prc 34 building, etc.

Video surveillance

Closed Circuit Television (CCTV) means that the system is a closed system and is intended for use by a facility to monitor their premises. The idea of closed means that the system does not broadcast TV signals over the airwaves as do the commercial TV stations but transmits signals over a closed circuit. The system, in most cases, is designed and installed with the cameras wired to a central location on the site for monitoring and consists of cameras, multiplexers, monitors and recorders depending the on the size and complexity of the system. Lee (2002) recommended the use of site alarms and CCTV during construction process on site on the basis of Crime Prevention Victoria (CPV) work. CCTV systems are quite expensive but very cost effective in high risk projects and the ease of reuse in other projects could offset the initial cost implications (Barker & Bridgeman, 1994).

Tools and equipment protection

The securing of heavy equipment, portable equipment, tools, and materials are important part of security plan. Protecting equipment from theft is important as the theft of heavy and portable equipment is a growing and costly problem at job sites. According to the NER the top five most frequently stolen pieces of equipment account for 75% of all heavy construction equipment thefts within the United States. Skid-steer loaders are listed as the most common pieces stolen in 2004, accounting for 31% of all construction equipment thefts. Tractors, backhoes, generator or compressors, and excavators are shown as the other four major categories of construction

equipment thefts (National Equipment Register, 2004). The two key factors in the type of equipment most likely to be stolen are value and mobility, the higher the value of an item and the easier it is to transport, the greater the chance of theft. Protection methods for tool and equipment according to Prince William County Police Department include marking of company tools and maintaining inventory, checking in/out of tools, strategic parking of equipment, removing the battery of equipment at night and removing keys in switches. Other measures use in protecting tools and equipment as identified by Springfield Missouri Police Department and San Antonio Police Department include equipment re-key, taking photos of all units from all four sides, engraving or stamping an identifier on all tools, distinctive colour painting of equipment for easy of identification and keeping brand, model, serial, owner applied ID (OAI), location of OAI, other description of all equipment and tools.

Electronic access control

Administration and procedures of access control system like access control lists, personnel recognition, ID cards, badges, and personal escorts all contribute to effective access control system. Hardware that reads the badges and permits access to the site by unlocking the entry doors and operating the perimeter fence gates is a key component of access control system.

The basic premise of an electronic access control system is based on the concept of PIN number for a keypad or a cipher lock, an ID access card with or without a picture, or a key fob. The ID card is the size of a credit card. When

the card is inserted or read by placing it near the reader the information on the

card is read and verified in the access control system's data base, the system sends a signal to operate an electric strike or magnetic lock to release the door for entry if the person has access.

Security officers

The use of security officers to help secure a job site can be a great help or add to the problem. Trained and motivated security officers provide valuable services but if the officers are poorly trained or not properly screened and supervised, it can add to the problem.

Delivery of materials

Standards should be established and followed for checking material on and off of the job site. One person should be assigned the responsibility of maintaining tight inventory control of all materials delivered, and each should be signed for only after the invoice is carefully checked for shortages. Expensive material should not be stored on the job site any longer than necessary. Whenever possible, the delivery of high value material or those in critical supply should be timed (San Antonio Police Department).

Security inventories and markings

As part of an organization's security plan, standards for equipment inventories should be established. Routine inventories not only improve equipment accountability, they also establish work-site conditions that discourage theft. At a minimum, organization should inventory 100% of its equipment annually. To minimize work disruption, the inventories should be spread throughout the year. Periodic unannounced inventories are also a good idea to maintain accountability of high-risk items like air compressors and power tools. A supervisor should be assigned the duty of managing the

inventories. It is also good practice to sporadically change the personnel conducting the inventories (Gransberg, et al, 2006).

Personnel Security

Personnel security is mainly concerned with practices and procedures for hiring, terminations, and workplace issues and response. Screening procedures and background checks are also part of personnel security (Matthews, *et al*, 2006). Many companies issue standing instructions to site personnel covering the obvious aspects of site works, administration and procedures for discipline or dismissal in these or similar instructions. Sharma and Bausman (2010) noted that termination of employee caught stealing or committing vandalism is one of the security practices in use by contractors in South Carolina.

Investigation Security

The purpose of investigation security is to make sure that a person who applied for a job is in fact that person and there are no surprises in their background that could be a problem. Background or pre-employment investigations are conducted internally for several reasons such as pre-employment screening, theft of company property, fraud and embezzlement, policy and procedural violations.

Information Security

Information security is the protection of company and customer documents. The documents can be either hardcopy or soft copy. A hard-copy document is one that is on paper and a soft copy is on a computer disk or in the computer files. To protect hard copies, keep documents locked in a file cabinet when not in use. The hard copies can consist of anything

that is considered proprietary information and can include the

drawings of the project if they detail a special process or equipment. When using the drawings for the project, only those that have a need to know should be given access.

When the information is in soft copy in computer files it needs to be protected as well. Methods used to protect company's information could be administrative, physical or/and technical. Information security is a necessary part of the site security plan.

Security awareness

Security awareness is an important part of the job site security program. Security awareness is defined as a method for changing the attitudes of the company and personnel toward security to realize its importance. Awareness reminds company personnel of the importance of security (Arata, 2006). Security awareness takes many forms such as: formal presentations, posters, memos, web sites, security bulletins, security slogans and contests.

Insurance

According to San Antonio Police Department, insurance is the main method that construction equipment owners use to protect themselves from the risk of construction equipment theft and vandalism. The broad area of insurance that construction equipment falls within is called inland marine insurance. The term inland marine derives from the days when all materials insured were associated with the ships used to transport goods from port to port. Inland marine items were all items not associated directly with ships (American Insurance Association, 1997).

Hypothesis of the study

The null hypothesis postulated for the study states that there is no significant difference in the perceptions of

contractors and consultants on the security management strategies use in crime management on construction site. The alternative hypothesis states that there is significant difference in the perceptions of contractors and consultants on the effects of security management strategies use in crime management on construction site. The hypothesis will help to know the level of internal stakeholders' agreement on security management practices on construction site and thereby engineer efficient crime management model development for the construction industry.

Method

The study adopted exploratory survey design approach using structured questionnaires. The population consists of contractors and consultants with professional affiliations involved in the execution of building projects in Ogun State, Nigeria. The study purposively sampled 122 stakeholders who are directly involved in the management of on-going building construction works on sites and are therefore dimed highly knowledgeable in the subject matter and can provide valid information. The sample frame consists of 93 valid questionnaires comprising 52 contractors and 41 consultants. Data were collected from the internal stakeholders using structured questionnaires comprising 30 construction site security management practices drafted from literature which were designed for easy understanding. The measurements were on a five-point Likert scale, namely: not used = 1, hardly used = 2, moderately used = 3, used = 4 and always used = 5. Data

collected were processed using IBM Statistics Package for Social Sciences (SPSS) version 20, to determine the

effects of security management practices and the priority placed on the practices using the mean score (MS) of the Likert ratings. The variation of the effects and priority placed on the security management practices between the stakeholders were analysed using Man-Whitney U tests, since the data were obtained on an ordinal scale through subjective/cognitive evaluation. Likert scale data can be analysed with an interval measurement scale as this reflects meaningful relative distances between points (Trochim, 2006 and Boone and Boone, 2012). The interval between points equals to the ratio of the difference between upper and lower limits, to the number of points (in this case 4/5 = 0.8).

The decision rule is that any security management practice whose mean is equal to one (1.00) is regarded as "not used" while the ones that falls between 1.01 – 1.80 is regarded as "rarely used", 1.81 – 2.60 is "hardly used", 2.61 – 3.40 is "moderately used", 3.41 – 4.20 is "used" and 4.21 – 5.00 is regarded as "always used" based on the interval ranges or values between points.. For the Man-Whitney U test, decision to accept a null hypothesis is based on the P value and the significance (2-tailed). If the significance level or the probability value (p) is greater than or equal to 0.05, it implies there is no statistically significant difference in the result, thereby accepting the null hypothesis.

Result of Data Analysis

Characteristics of Respondents Used for the Study

The characteristics of the respondents – contractors and consultants that supplied the data used for the study were analysed for an understanding of the stakeholders whose perceptions were investigated. For this purpose, affiliation, sex, age, qualification and experience of professionals, were all evaluated and the results are presented in Table 1.

Table 1: Respondents' Characteristics

Characteristics of respondents	**Sub-characteristics**	**No**	**%**
All respondents	Contractors	52	56
	Consultants	41	44
	Total	93	100
Sex of respondents	Male	87	94
	Female	6	6
	Total	93	100
Age of respondents	1 – 17yrs	0	0
	18 -60yrs	81	87
	> 60yrs	12	13
	Total	93	100
Professional affiliation	Architects	24	26
	Builders	14	15
	Quantity surveyors	17	18
	Engineers	38	41
	Total	93	100
Experience	1 -5yrs	10	11
	6 – 10yrs	37	40
	11 – 15yrs	26	28
	16 -20yrs	16	17
	>20yrs	4	4

	Total	93	100
Qualification	ND	8	9
	HND	17	18
	BSc	25	27
	MSc	39	42
	PHD	04	4
	Total	93	100
Size of establishment	Small (1 – 49 workers)	22	24
	Medium (50 – 500 workers)	58	62
	Large (>500 workers)	13	14
	Total	93	100

Source: Author's Analysis (2017)

Table 1 shows that the majority of the respondents sampled were contractors, perhaps because the questionnaires were majorly administered at the site where contractors' presence is dominant. The result also shows that 41% of the respondents are engineers (comprising civil engineers, electrical engineers, mechanical engineers, structural engineers and other engineers in engineering field), architects 26%, quantity surveyors 18% and 15% builders. Also, the table reveals that majority of the respondents work with medium scale companies and 89% have over 5 years working experience, hence the contractors and consultants could be relied upon for information on the subject matter.

In order to evaluate the status of the construction site security management practices among internal stakeholders, 30 security management components were drafted from literature. Respondents were then requested to rank the level at which the various construction site security management practices are used on their construction site using the five-point Likert scale. The results are presented in Tables 2, 3 and 4.

Crime/Security Management Practices

This section evaluates the security management practices on construction site. The scale adopted allowed individuals to express their opinion on how frequent a particular crime management practice is been used on respondents' construction site ranging from "Not Used" to "Always Used''. Table 2 shows the results of analysis of internal stakeholders on construction site security management practices.

Table 2: Internal Stakeholders' Construction Site Security Management Practices

Security Management Practices	**N**	**Sum**	**Mean**	**Rank**
Inventory of tools	93	426	**4.58**	**1**
Inventory of materials	93	421	**4.53**	**2**
Inventory of equipment	93	418	**4.49**	**3**
Storing of goods in secured compound	93	392	**4.22**	**4**
Marking of plants and machinery (concrete mixer, trucks etc.) for identification	93	392	**4.22**	**4**
Perimeter fencing for the site.	93	383	**4.12**	**6**
Site office positioned well to minimize access to opportunist thief	93	383	**4.12**	**6**
Strategic parking for large equipment	93	372	**4.00**	**8**
Goods to be received by a trustworthy worker	93	364	**3.91**	**9**
Securing access ladders with chains	93	354	**3.81**	**10**

Marking of equipment (drilling machine etc.) for identification	93	351	**3.77**	**11**
Use of protectors for vulnerable doors and windows	93	333	**3.58**	**12**
Securing hazardous chemical	93	325	**3.49**	**13**
Computer based documentation of information on site	93	323	**3.47**	**14**
Security planning and design	93	323	**3.47**	**14**
Marking of tools (hammer, shovel etc.) for identification	93	307	**3.30**	**16**
Use lockbox for tools and small equipment.	93	297	**3.19**	**17**
Barricading hazardous areas with suitable high visible mesh barrier	93	290	**3.12**	**18**
Use of locks	93	281	**3.02**	**19**
Security awareness (use of signage)	93	277	**2.98**	**20**
Use of trained and motivated security officers to secure construction site from theft and all criminal action that can possibly occur	93	274	**2.95**	**21**
Just in time delivery of materials and tools	93	273	**2.94**	**22**
Security checks on entry and exit in the site	93	266	**2.86**	**23**
Use of pre-employment screening investigations to verify the applicants relating to their employment, education and criminal history	93	260	**2.80**	**24**
Applying tow hitch locks to trailer	93	260	**2.80**	**24**
Insurance of plants and equipment	93	255	**2.74**	**26**
Staff security awareness training	93	218	**2.34**	**27**
Exterior lighting on site	93	197	**2.12**	**28**
For high risk plants, the use of tracking devices	93	149	**1.60**	**29**
Use of security tools such as CCTV and alarm systems to protect site	93	124	**1.33**	**30**
Valid N	93			

NOTE: 1 = Not Used 2 = Hardly Used 3 = Moderately Used 4 = Used 5 = Always Used

Table 2 shows results of analysis of internal stakeholders' data on security management practices used on construction site. On the table inventory of tools, materials and equipment had mean scores of 4.58, 4.53 and 4.49 ranking first, second and third respectively. The high mean score on inventory indicates that it is always used on construction site for security purposes. The continuous use of inventory reduces occurrence of materials, tools and equipment theft on site as noted in previous study that theft of material, tools and equipment were ranked low on the occurrence of construction site security challenges. Use of security tools such as CCTV and alarms systems as site security management practice is the least practice adopted with Mean Score of 1.33 and is ranked 30th, indicating that it is rarely used on construction sites. The rare use of CCTV could be attributed to the sizes of the construction firms in the survey as majority of the firms are small and medium scale construction firms and may not be buoyant enough to afford CCTV. CCTV are quite expensive, however contractors are encouraged to adopt the crime prevention measure in all their construction sites as it alleviates risk in high risk projects and the ease of reuse in other projects could offset the initial cost implications (Barker & Bridgeman, 1994). Marking of tools, equipment and plants with Mean Score of 3.30, 3.77 and 4.21 respectively are moderately used. Perimeter fencing has Mean Score of 4.12. The table also shows that site offices are always positioned well to minimize access to opportunist thieves with mean score of 4.12 and is ranked

6th. Strategic parking of large equipment on site is ranked 8th with mean score of 4.00. Use of lockbox for tools and small equipment with mean score of 3.19 and is ranked 17th. Use of pre-employment screening investigations to verify the applicants relating to their employment, education and criminal history is ranked 24th with mean score of 2.79 which shows that it is moderately used.

Table 2 is a summary or total view of the internal stakeholders and might not completely reflect the perceptions of the contractors and consultants in the application of the crime management strategies on construction site. The different perceptions of the contractors and consultants were analysed to investigate the priority place on each crime management practices on construction site. The relative positions of the crime management practices is necessary in ensuring uniformity in the development of construction site security model. Construction site security models are proposed in the study and considered essential for setting up construction site, inspecting ongoing projects, and investigating crime on the event of any occurrence. Table 3 shows the result of contractors and consultants perceptions on crime management in construction site.

Table 3: Perceptions of contractors and consultants on crime management practices on construction site

Security Management Practices	**Contractors**				**Consultants**			
	N	**Sum**	**Mean**	**Rr**	**N**	**Sum**	**Mean**	**Rr**
Inventory of tools	52	241	**4.63**	**1**	41	**185**	**4.51**	**2**
Inventory of materials	52	233	**4.48**	**3**	41	**188**	**4.59**	**1**
Inventory of equipment	52	238	**4.57**	**2**	**41**	**180**	**4.39**	**3**
Storing of goods in secured compound	52	214	**4.11**	**7**	**41**	**178**	**4.34**	**4**
Marking of plants and machinery (concrete mixer, trucks etc.) for identification	52	216	**4.15**	**5**	**41**	**176**	**4.29**	**5**
Perimeter fencing for the site.	52	215	**4.13**	**6**	**41**	**168**	**4.10**	**8**
Site office positioned well to minimize access to opportunist thief	52	210	**4.04**	**8**	**41**	**173**	**4.22**	**6**
Strategic parking for large equipment	52	201	**3.86**	**9**	**41**	**171**	**4.17**	**7**
Goods to be received by a trustworthy worker	52	219	**4.21**	**4**	**41**	**145**	**3.54**	**11**
Securing access ladders with chains	52	202	**3.82**	**10**	**41**	**152**	**3.71**	**10**
Marking of equipment (drilling machine etc.) for identification	52	195	**3.75**	**11**	**41**	**156**	**3.80**	**9**
Use of protectors for vulnerable doors and windows	52	193	**3.71**	**12**	**41**	**140**	**3.41**	**13**
Securing hazardous chemical	52	181	**3.48**	**15**	**41**	**144**	**3.51**	**12**
Computer based documentation of information on site	52	185	**3.56**	**14**	**41**	**138**	**3.37**	**15**
Security planning and design	52	186	**3.58**	**13**	**41**	**137**	**3.34**	**16**
Marking of tools (hammer, shovel etc.) for identification	52	168	**3.23**	**16**	**41**	**139**	**3.39**	**14**

Use lockbox for tools and small equipment.	52	165	**3.17**	**17**	**41**	**132**	**3.22**	**18**
Barricading hazardous areas with suitable high visible mesh barrier	52	164	**3.15**	**18**	**41**	**126**	**3.07**	**19**
Use of locks	52	148	**2.86**	**25**	**41**	**133**	**3.24**	**17**
Security awareness (use of signage)	52	163	**3.13**	**19**	**41**	**114**	**2.78**	**22**
Use of trained and motivated security officers to secure construction site from theft and all criminal action that can possibly occur	52	161	**3.10**	**20**	**41**	**113**	**2.76**	**23**
Just in time delivery of materials and tools	52	150	**2.88**	**24**	**41**	**123**	**3.00**	**21**
Security checks on entry and exit in the site	52	142	**2.73**	**26**	**41**	**124**	**3.02**	**20**
Use of pre-employment screening investigations to verify the applicants relating to their employment, education and criminal history	52	152	**2.92**	**23**	**41**	**108**	**2.63**	**24**
Applying tow hitch locks to trailer	52	157	**3.02**	**21**	**41**	**103**	**2.51**	**25**
Insurance of plants and equipment	52	154	**2.96**	**22**	**41**	**101**	**2.46**	**27**
Staff security awareness training	52	116	**2.23**	**27**	**41**	**102**	**2.49**	**26**
Exterior lighting on site	52	102	**1.96**	**28**	**41**	**95**	**2.32**	**28**
For high risk plants, the use of tracking devices	52	87	**1.67**	**29**	**41**	**62**	**1.51**	**29**
Use of security tools such as CCTV and alarm systems to protect site	52	74	**1.42**	**30**	**41**	**50**	**1.22**	**30**
Valid N	52				41			

NOTE: 1 = Not Used 2 = Hardly Used 3 = Moderately Used 4 = Used 5 = Always Used

In Table 3 contractors ranked inventory of tools first while it is ranked second by consultants. Also consultants consider that inventory of materials being ranked first is most commonly used while contractors ranked it third. In summary, both contractors and consultants ranked 25 components of crime management on construction site differently. While five (5) components namely; marking of plants and machinery, securing access ladder with chain, exterior lighting on site, the use of tracking device, and use of CCTV and alarm systems were ranked equally.

Given the result in Table 3, it is tempting to conclude that the contractors and consultants hold different views on the application of the crime management components on construction site. The differences in the internal stakeholders' view were examined for statistical significance in line with the null hypothesis using Mann-Whitney U test. The result of the Mann-Whitney U test is shown in Table 4.

Table 4: Mann-Whitney U Test of Contractors and Consultants Perceptions on Security Management Strategies/Components in Construction Site.

S/N	Null Hypothesis	Test	Sig	Decision
1	The distribution of ranks is the	Independent Samples	1.000	Retain the null

	same across categories of group.	Mann-Whitney U Test		hypothesis.
1	The distribution of ranks is the same across categories of group.	Independent Samples Mann-Whitney U Test	1.000	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is 0.05.

The Mann-Whitney U test in Table 4 shows that the distribution of ranks on the security management practice is the same among the contractors and consultants with P value of 1.00 which is greater than 0.05. Hence the decision to retain the null hypothesis which states that the perceptions of contractors and consultants on the application of crime management components on construction site are the same. Thus the internal stakeholders agree on the order of the application of crime management strategy. The result would advance the development of construction site security management model which would help to alleviate construction site security challenges. In line with the above results a construction site security management model is proposed. The proposed construction site security management mode is shown in Table 5.

Table 5: Proposed Construction Site Security Management Model

Security Management Practices	**SSCF**	**MSCC**	**LSCC**
Inventory of tools	✓	✓	✓
Inventory of materials	✓	✓	✓
Inventory of equipment	✓	✓	✓
Storing of goods in secured compound	✓	✓	✓
Marking of plants and machinery (concrete mixer, trucks etc.) for identification	✓	✓	✓
Perimeter fencing for the site.	✓	✓	✓
Site office positioned well to minimize access to opportunist thief	✓	✓	✓
Strategic parking for large equipment	✓	✓	✓
Goods to be received by a trustworthy worker	✓	✓	✓
Securing access ladders with chains	✓	✓	✓
Marking of equipment (drilling machine etc.) for identification	✓	✓	✓
Use of protectors for vulnerable doors and windows	✓	✓	✓
Securing hazardous chemical	✓	✓	✓
Computer based documentation of information on site	✓	✓	✓
Security planning and design	✓	✓	✓
Marking of tools (hammer, shovel etc.) for identification	✓	✓	✓
Use lockbox for tools and small equipment.	✓	✓	✓
Barricading hazardous areas with suitable high visible mesh barrier	✓	✓	✓
Use of locks	✓	✓	✓
Security awareness (use of signage)	✓	✓	✓
Use of trained and motivated security officers to secure construction site from theft and all criminal action that can possibly occur	✓	✓	✓
Just in time delivery of materials and tools	✓	✓	✓
Security checks on entry and exit in the site	✓	✓	✓
Use of pre-employment screening investigations to verify the applicants relating to their employment, education and criminal history	✓	✓	✓
Applying tow hitch locks to trailer	✓	✓	✓
Insurance of plants and equipment	✓	✓	✓
Staff security awareness training	✓	✓	✓

Exterior lighting on site	✓	✓	✓
For high risk plants, the use of tracking devices		✓	✓
Use of security tools such as CCTV and alarm systems to protect site		✓	✓

NOTE: SSCF = Small Scale Construction Firms MSCC = Medium Scale Construction Companies LSCC = Large Scale Construction Companies

Table 5 shows the proposed construction site security management model for the construction industry. All construction companies are encouraged to apply all the construction site security management components though small construction firms may be excused from tracking devices, CCTV and alarm systems application due to the relatively low risk construction project such firms usually execute and the cost implication of acquiring such devices. However, in line with (Barker & Bridgeman, 1994) contractors are encouraged to adopt the crime prevention measures in all their construction sites as it alleviates risk in projects and the ease of reuse in other projects could offset the initial cost implications.

Implementation level of Site Security Management Practices on Site.

To examine the level of implementation of site security management practices on construction sites, the mean scores of the practices were compared with a test value of 3 (i.e. moderately used on the Likert scale). The test result helps to identify crime prevention measures on site that requires improvement. The result is shown in Table 4.

Table 4: Implementation level of Construction Site Security Management Practices

One-Sample Test				
Construction Site Security Management Practices	**Test Value = 3**			
	t	df	Sig. (2-tailed)	**Mean Difference**
Use of security tools such as CCTV and alarm systems to protect site	-12.305	92	.000	**-1.674**
Marking of tools (hammer, shovel etc.) for identification	2.110	92	.041	**.302**
Marking of equipment (drilling machine etc.) for identification	4.935	92	.000	**.767**
Marking of plants and machinery (concrete mixer, trucks etc.) for identification	7.487	92	.000	**1.209**
Use of trained and motivated security officers to secure construction site from theft and all criminal action that can possibly occur	-.202	92	.841	**-.047**
Inventory of materials	11.773	92	.000	**1.535**
Inventory of tools	14.179	92	.000	**1.581**
Inventory of equipment	10.731	92	.000	**1.488**
Computer based documentation of information on site	2.580	92	.013	**.465**

Use of pre-employment screening investigations to verify the applicants relating to their employment, education and criminal history	-.876	92	.386	**-.209**
Use lockbox for tools and small equipment.	1.185	92	.243	**.186**
Strategic parking for large equipment	5.783	92	.000	**1.000**
Perimeter fencing for the site.	6.207	92	.000	**1.**
Exterior lighting on site	-3.994	92	.000	**-.**
Security checks on entry and exit in the site	-.758	92	.453	**-.140**
Use of physical security device locks	.113	92	.911	**.023**
Staff security awareness training	-3.098	92	.003	**-.651**
Security awareness (use of signage)	-.105	92	.917	**-.023**
For high risk plants, the use of tracking devices	-9.845	92	.000	**-1.395**
Just in time delivery of materials and tools	-.464	92	.645	**-.070**
Goods to be received by a trustworthy worker	6.123	92	.000	**.907**
Storing of goods in secured compound	10.689	92	.000	**1.209**
Site office positioned well to minimize access to opportunist thief	6.431	92	.000	**1.116**
Use of protectors for vulnerable doors and windows	3.705	92	.001	**.581**
Applying tow hitch locks to trailer	-.932	92	.357	**-.209**
Securing hazardous chemical	1.972	92	.055	**.488**
Securing access ladders with chains	4.375	92	.000	**.814**
Barricading hazardous areas with suitable high visible mesh barrier	.462	92	.646	**.116**
Insurance of plants and equipment	-1.336	92	.189	**-.256**
Security planning and design	2.351	92	.024	**.465**

Table 4 shows that 11 construction site security management practices have negative mean differences indicating that the use of the crime prevention measures are below expectation, hence there is need for improvement to further alleviate construction site security threats. The site security management practices that requires improvement are use of CCTV and alarm system, the use of tracking devices for high risk plants, security checks on entry and exit from the site, exterior lighting on site, staff security awareness training and use of pre-employment screening investigations to verify the applicants. Others include insurance of plants and equipment, applying tow hitch locks to trailer, just in time delivery of materials and tools, security awareness (use of signage) and use of trained and motivated security officers to secure construction site,

Finding and Recommendation

The study found that the most commonly used construction site security management components are inventory of tools, materials and

equipment with mean scores of 4.58, 4.53 and 4.49 ranking first, second and third respectively. Other construction site security management practice effectively utilized on construction site include marking of plants and machinery, perimeter fencing, strategic parking of large equipment, use of trustworthy workers to receive goods and use of locks. However, the use of security tools such as CCTV and alarms systems as site security management practice is the least practice adopted with Mean Score of 1.33 and is ranked 30th.

Also the study found that 11 construction site security management practices are not effectively utilized in crime prevention on construction site. The site security management practices that are not effectively employed are use of CCTV and alarm system, the use of tracking devices for high risk plants, security checks on entry and exit from the site, exterior lighting on site, staff security awareness training and use of pre-employment screening investigations to verify the applicants, insurance of plants and equipment, timely delivery of material and tools, use of signage and use of trained security officers.

Contractors and consultants (internal stakeholders) agree on the order of application of crime management measures in combating security threats on construction site. The unison of the internal stakeholder on the methods of crime management on construction site advanced the development of construction site security management model which would help to alleviate construction site security challenges. Construction site security management model is proposed.

Internal stakeholders are encouraged to adopt all the crime prevention measures in all their construction sites as it alleviates risk in high risk projects.

Internal stakeholders in the construction industry and government agencies should apply the proposed construction site security management model in setting up construction site and inspection of on-going construction project to mitigate security threat and reduce risk in construction projects and help in investigating crime on the event of any bridge of security.

References

Abhishek Sharma and Dennis Bausman (2010). *Construction site security – The impact of company size and loss history on security measures*. Retrieved on 28 June, 2016 from: http://ascpro0.ascweb.org/archives/ cd/2010/paper/CPRT119002010.pdf

Adeyinka B.F., Jagboro O., Ojo G.K., Odediran S.J. (2013). Level of compliance of core construction professionals to ethical standards in Nigeria. *Global Journal of Management and Business Research*. 13(12):26 - 36.

Arata, M.J.Jr (2006). *Construction Site Security*. 1st Edition. New York: McGraw Hill Book Company.

AVIVA (2011). *Security on construction sites.* Retrieved from: www.aviva.co.uk

Barker M. & Bridgeman C. (1994). *Preventing vandalism: what works?* Crime detection & prevention series no. 56. London: Police Research Group

Berg, R. (2003). *Jobsite security on commercial construction projects.* Graduate School of the University of Florida. MSc theses

Boone, H. N. & Boone, D. A. (2012). Analyzing likert data. *Journal of Extension*. 50(2).

Farinloye, O., Mafimidiwo 46 Adewunmi, Y. & Ajayi O. (2009). Prevalence of theft and vandalism on building site. *Proceeding of the RICS COBRA Conference University of Cape Town, South Africa*, 150-164.

Farinloye O, Odusami K., Adewumi Y, (2013). Theft and vandalism control measures on building sites in Lagos. *Nigeria Journal of Engineering Project, and Production Management*, 3(1), 9-21.

Gardner, T. (2003). *Security in Construction and Beyond; Protecting Your Site, Even During Build-up.* Virgo Publishing, Inc. http://www.insideselfstorage.com/articles/291feat4.html.

Gransberg,D.D., Popescu, C.M., and Ryan, R.R. (2006). *Construction Equipment Management for Engineers, Estimators, and Owners.* Boca Raton, FL. Taylor & Francis Group, LLC

Matthews B., Sylvie J.R, Sang-Hoon Lee, Thomas S.R., Chapman R.E, and Gibson G.E. (2006). addressing Security in Early Stages of Project Life Cycle. *Journal of Management in Engineering*, Vol. 22, No.4, October 1. 196 - 202. ASCE

Olander S. (2006). *External stakeholder analysis in construction project management*[dissertation]. Lund University, Sweden.

Ogun: the making industrial hub. (2013). Retrieved from: https://thenationonlineng.net/ogun-making-industrial-hub.

Iwuagwu, C. E. (2014). Statistical appraisal of crime rate in Nigeria. *Journal of Physical Science and Innovation*, 6(1), 38 – 43.

Lee K. (2002). *Building site crime prevention initiative: final report August 2001 – June 2002*. Melbourne: Crime Prevention Victoria

National Equipment Register. (2004). *Equipment Theft Report*. New York: National Equipment Register Inc.

Prince William County Police Department. *Crime Prevention on the Construction Site* . Retrieved from: *www.pwcgov.org/docLibrary /PDF/002443.pdf*

Sakurai Yukau, Mayhew Pat and White Mark **(**2008). Theft and Vandalism at residential building sites in Australia. *Australian Institute of Criminology*. San Antonio Police Department. *Construction Site Crime Prevention Tips.* Retrieved from:www.sanantonio.gov/saPD/pdf/CONSTRUCTION_SITE.pdf

Smith A. & Walmsley R. (1999). *The nature and extent of construction plant theft*. Police research series no. 117. London: Home Office

Springfield Missouri Police Department. *Construction Site Crime Prevention.* Retrieved from:
http://www.ci.springfield.mo.us/spd/GeneralInfo/crimeprevtips/Work/construction site.html

Trochim, W.M.K. (2006). Levels of measurement. Research Methods Knowledge Bas. Web Centre for Social Research Methods.

Yulia Setiani (2008). Construction Site Security management and control. [Master Dissertation].Universiti Teknologi, Malaysia.

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Service Quality Delivery of Facilities in Covenant University Lecture Theatre: Assessing End Users' Satisfaction

Chukwuemeka O. Iroham[1], Adedamola O. Oluwunmi[1], Chukwuemeka Ekenta[2] & Feyisayo O. Bello[1]

[1] Department of Estate Management,
Covenant University, Ota, Ogun State Nigeria
[2] Department of Estate Management,
Rivers State University of Science and Technology,
Port-Harcourt, Nigeria
E-mail: osmond.iroham@covenantuniversity.edu.ng

Abstract: Service quality with prmary focus on Covenant University, Ota, in determining level of satisfaction amongst end users of the university's lecture theatre formed the crux of the present study. The study entailed review of literature on service quality and customers' satisfaction with emphasis on the application of SERVQUAL. Three sets of questionnaires with over 77% response rate cutting across the three focus groups - students, faculties who have offices in the lecture theatre and faculties who lecture in the lecture theatre- were administered. The SERVQUAL Model utilized ten (10) questions each for the seven (7) services peculiar to the lecture theatre. From gap analysis carried out service quality performance (perception) against the service quality needs (expectation) for each of the focus group based on the five dimensions of service quality on a five point linkert scale, indicates need for improvement in the operation of these services. Its perceptions appeared below expectations thereby placing the respective end users' in an unsatisfactory position most especially decoration and furnishing (-2.208); acoustic system (-1.946); and lavatory system (-2.167). The researchers hereby make a wakeup call for all facilities provided to integrate the feelings of end users for their satisfaction as that justifies its provision.

Keywords: Service Quality; End Users; Satisfaction; Academic Setting; Covenant University; Facilities

1. Introduction

Service quality is paramount from the stance of the customer who happens to be the target of services provided before, during and after a contractual arrangement resulting to their satisfaction (Munusamy, Chelliah & Mun, 2010). This term has become germane in today's business and workplace due to increasing market competition. Asubonteng, McCleary, and Swan (1996) affirmed that due to intense competition and the hostility of environmental factors, service quality is now a cornerstone marketing strategy for companies. Organizations are aware of the strategic competitiveness in a dynamic business environment and therefore heed to service quality to be on edge. It is becoming globalised irrespective of ownership, size, and organizational mode of operation. For instance the appearance of web presence in today's business has also been studied with respect to service delivery on such platform, all in a bid to satisfying customers (Zeithaml, Parasuraman & Malhotra, 2002). Organisations are looking up to the satisfaction of customers, as such results to higher customer loyalty in form of patronage and long term business relationship (Yi, 1991; Anderson & Sullivan, 1993; Boulding et al., 1993; Zeithami et al., 1996; McColl-Kennedy & Scheider, 2000). This in return enhances the customer base culminating to higher economic/financial returns (Fornell, 1992; Bolton, 1998; Yeung et al., 2002). Successes of businesses are also reported to be hinged on this (Iacobucci et al., 1994). The importance of service quality cannot be over-emphasized as researchers have proven that providing good service quality to customers retains them, attracts new ones, enhances corporate image, positive word-of-mouth recommendation and above all guarantees survival and profitability (Negi, 2009; Ladhari, 2009).

2. Service Quality

In a bid to avoiding prejudice, service quality which is best judged by customers' (Berry *et al* (1992; Cited in Kaunda, 2013) is not determined by just a particular customer's experience with a particular product or service, rather measurement of service quality is an amalgamation of experiences with products and services amongst customers over time (Johnson, Anderson & Fornell, 1995). Hence, organizations have to be constantly updating their understanding of customer needs and expectations (Kaunda 2013). Even though service quality should naturally be synonymous with service provided/delivered in line with determinantion of customers' satisfaction (Shahab, Arslan, Kanwal & Shujah, 2012), it has been seen in relation to satisfaction of newly invented products. This is experienced in a study carried out on the satisfaction of customers in the usage of Automated Teller Machine (ATM) in Nigeria notwithstanding its introduction for ease in banking services (Adeniran & Junaidu, 2012). The positive results gotten which were not all significant buttresses once again the import of research in service quality. In mobile telecommunication industry, Nimako (2012) empirically examined the extent to which service quality affects customer satisfaction and behaviour intention in Ghana. The study which involved a cross-sectional survey of 1000 respondents using structured questionnaire personally administered and analysed using Structural Equation Modeling (SEM) method revealed that

Tangibles, Customer Relations, Real Network Quality and Image quality aspects of service quality positively affect customer satisfaction, which in turn affects behaviour intention. More so, Best and Purdey (2012) notwithstanding the iconic status of a sustainable education building, went ahead to conduct a post-occupancy evaluation study to determine the level of satisfaction from the viewpoint of the users' of the building that houses the Mirvac School of Sustainable Development at Bond University being the first educational building to achieve a six Green Star rating from the Green Building Council of Australia amongst other notable applause. Findings from the study reveal that although users' derive satisfaction in the use of the building, intrusive noise in some part of the building was evident, a feature common with most green buildings. Hence, where service quality is upheld by organization, literature has supported a positive correlation existing amongst customers' satisfaction and financial performance, customer loyalty, and market share (Beerli *et al*., 2004; Wood, 2008). In the banking sector a study was conducted in Greece investigating the relationship between service quality and loyalty amongst banks (Kranias & Bourlessa, 2013). The study revealed that more modern approach to offering service and interior design will attract customers while convenience of proximity of banks to workplace and city centres would make customers more loyal. Shahab, Arslan, Kanwal and Shujah (2012) in a bid to examining in Pakistan the relationship among service quality, customer satisfaction and behavioral responses as a comparison between public and private sector banks discovered that the tendency for customers to recommend banks were directly related to their level of satisfaction while no significant relationship existed between level of satisfaction and change in banks patronage. Even though, earlier on Cronin, Brady and Hult (2000) had argued that a more pragmatic approach to determining customers' behaviourial responses would be a comprehensive study relating service quality, service value, and customers' satisfaction as direct influences on customers' behavioral intentions. This is not playing down on the significance of each factor rather accentuating a more holistic approach. In the health sector, Çaha (2007) based on the health reforms in turkey over the years tried to discover the level of satisfaction of patients who were enjoying social security. The study involved a survey of 100 patients in 4 private hospitals in Istanbul where there are concentrations of most private hospitals. The use of a dynamic model reveals amongst others that although private hospitals are striving in seeing to the satisfaction of their patients on a competitive manner, there is need for reduction in waiting time before patients are attended to and an increase in consultation time given to each patient.

2.1 Service Quality in Educational Setting

The educational sector is not neglected while carrying out study of service quality even though William (2002) cited in Hassan *et al.* (2008) conceive it risky to observe students as customers. However, given the current atmosphere of particularly higher education marketplace, there is envisaged consensus that students are "customers" owing to the fact that as fee payers, it is morally reasonable that their interest has

to be considered. More so, Williams (1994) opined that the working environment is related to building facilities that contribute to achieving the intended use of the business future functions. These working environments can either be offices, homes, schools or even health institutions. The service and environment aspects of the building where people spend most of their time and such period tend to affect their physical activities by way of either creating a comfortable living and working environment or even discouraging them from using such buildings. Johns (1999) also described service to mean an industry, a performance, an output, an offering or a process which could be defined differently from one service industry to another. Thus since customers are the users of services provided one can view students and lecturers in an educational setting as customers, thus the raison d'etre of their establishment. More so, Badri, Abdulla and Al-Madani (2005) underscore some services in which the SERVQUAL model can be applied, consequentially, the Higher education service were part of them. Hence, the practicable bases for this present study.

2. 2 Service Quality and Customers' Satisfaction

Customers' satisfaction is considered more as an attitudinal disposition (Yi, 1990). It is regarded as a function of service quality (Spreng & Mackoy, 1996; Cronin & Taylor, 1992; Spreng & Mackoy, 1996; Caruana, 2002; Yavas et al., 2004) and as such researchers have resulted to viewing service quality as a juxtaposition of customer's perceived quality and expected quality being provided (Oliver, 1981; Brady & Robertson, 2001; Lovelock, Patterson and Walker, 2001). This is an aftermath of Parasuraman, Zeithaml and Berry (1988) five-dimensional SERVQUAL model constructed in terms of tangibles; reliability; responsiveness; assurance; and empathy. The expectations of customers are yardsticks set for minimum service delivery (Zrithaml et al., 1993). Hence service quality is measured as the difference between expectations of customers and their perception of services provided. Shahin (2006) declares the importance of measuring service quality since it allows for comparisons before and after changes, identifies quality related problems and helps in developing clear standards for service delivery. Tucker and Smith (2008) argued that user's perception can be analysed through a twofold approach. One is through input and functionalities in the workplace, and consequent application of workplace productivity; while the other is through strategic Facility Management delivery and the achievement of customer satisfaction. An intrinsic linkage between the two was identified forming an integral overall strategic Facility Management process. Placing users' perception along side their expectations, service quality could either be judged high or low according to the service quality theory (Oliver, 1980) when perception exceeds expectation or vice versa.

Nitecki (1996) had acceded that service quality has become an interesting issue in the study of library (an educational service) literature. Subsequently in order to get relevant feedback on the performance of instituted libraries, Filiz (2007) advocated the measurement of satisfaction gotten by users'. In an ever increasing competitive academic environment, institutions of learning particularly Universities are becoming

more aware of the importance of students' satisfaction (Altbach, 1998; Arambewela & Hall, 2009; Usman, 2010). Universities most especially the private institutions have therefore device means of monitoring the actualization of meeting a benchmark in students' satisfaction (O'Neill, 2003). Hence, many Universities have used student satisfaction as an avenue for gaining competitive advantage in their day-to-day dealings so as to attract patronage (Kevin & Dooyoung, 2002). However, the concept of students' satisfaction has been viewed in varying dimensions. Petruzzellis et al. (2006) have seen that students' base their satisfaction assessment as a comparison of the perception of service delivered with their prior expectations of such services. On the other hand student see satisfaction as a subjective evaluation of the favorability of the various outcomes and experiences associated with their education (Oliver & Desarbo, 1989). Borden (1995) discovered that students' satisfaction can be attained when their priority matches the academic environment. Wiers-Jenssen et al. (2002) have considered "student satisfaction approaches as a tool for building a bridge between more traditional and academic views in a bid to improving higher education, and more market-orientated perspectives". Malik, Danish and Usman (2010) analyzed the impact of different quality services on student satisfaction in both public and private higher educational institutes of a big division of Punjab province of Pakistan. Data was collected from 240 students of business courses either enrolled in master program or graduation program in provincially chartered universities of the Gujranwala region. The results showed that students were overall satisfied with services of Tangibility, Assurance, Reliability and Empathy but not much satisfied with parking facilities, computer labs, cafeteria services and complaint handling system. Al Khattab and Fraij (2011) measured the satisfaction of the students at Al-Hussein Bin Talal University, Jordan, with the quality of e-services developed in-house known as the Student Information System (SIS). The result of the analysed questionnaire distributed reveal that the students were satisfied by the transition to e-services and the SIS has a positive impact on the students' satisfaction. Sumaedi, Bakti and Metasari (2011) examined the effects of students' perceived quality and students' perceived price on students' satisfaction through students' survey of two Indonesia public universities. From result gotten using multiple regression analysis it was observed that students' perceived quality and perceived price have positive influence on the student satisfaction with students' perceived quality more affected to student satisfaction than perceived price. From a random selection of 190 students cutting across degree, masters and PhD programs, Jalali and Jaafar (2013) were geared towards determining factors affecting students' satisfaction in a higher learning Institution. Gender, race, student status and CGPA were chosen as independent variables while results gotten revealed that the overall services offered by the university did not match standards placed side by side students' perspective. Discovering that race and status had great influence on students' satisfaction, it was believed that such satisfaction can be enhanced by delivering standard services relating to academic life. These can be classified as implicit, explicit and physical services. Coskun (2014) identified

students' satisfaction in a private university in Albania by considering six major factors. Based on classroom administration, a '77-item' survey was conducted to identify factors most prioritized by students for fruitful outcome. Most importantly it was revealed that satisfaction model of education gives a ground to student-centered learning thereby causes effective teaching/learning, improves communication skills, and supportive learning environment. The six factors under study were seen to be germane for allocation of existing resources in satisfying student expectation as well as competing with the challenging educational world. However, amongst these factors academic staff, teaching, and relationships were upheld more by respondents as determinants of their satisfaction as against technology, administration, and campus facilities. Kundi, et al. (2014) studied the impact of service quality on customer satisfaction in education sector using nearly 200 students of Gomal University DIKhan of Pakistan. The researchers adopted customers' satisfaction as dependent variable while responsiveness, reliability, assurance, Empathy and tangibility were the independent variables. The Pearson correlation and regression was applied on data, and results obtained revealed a positive and significant relationship between the variables. Amongst these the study reveals tangibility and assurance as being considered most important, hence a need for improvement in the university for maximum satisfaction.

In Nigeria, Adeniran (2011) buttressed the infusion of information Technology with the services being carried out in the Library thereby making operation of Libraries more competitive. In order to determine the satisfaction of users' of Redeemers University Library in Ogun State, the paper examined the relationship between service quality and users' satisfaction of the library by the use of questionnaires in collecting data from seven (7) academic staff and one hundred and seventy-nine (179) students of the University who form the major users of this academic facility. Based on the findings of this study, it was discovered that users of Redeemer's University library were satisfied with the library services, however, there was need for improvement in the services provided by the library as the study revealed that users' satisfaction is a function of the quality of staff and services of library.

2.3 Servqual Application in Educational Setting

The application of SERVQUAL evident for about three decades has spanned varieties of industrial service settings. These ranges from hotel hospitality (Akan, 1995); Resort Centre (Kaewkungwal, 2011); evaluation in local government council (Mokhlis, 2012); drug enforcement (Gibson, 2009); hospital/health care delivery (Babakus & Mangold, 1989; Andaleeb, 2001; Caha, 2007); banking sector (Stafford, 1996; Munusamy, Chelliah & Wai-mun, 2010); in Information Technology (IT) Centre (Badri et al., 2005; Negi, 2009); in the context of grocery stores (Daniel & Berinyuy, 2010; Magi & Julander, 2009). SERVQUAL has also been applied in educational setting. Wang and Shieh (2006) investigated the Chang Jung Christian University (CJCU) Library's degree of importance and performance from the users' stance so as to explore overall user's satisfaction. From a questionnaire response to reveal their

perspective on service quality, a test of the five dimensions of tangibles, responsiveness, reliability, assurance, and empathy reveals that the overall service quality apart from responsiveness has a significantly positive effect on overall user satisfaction. The study also revealed collections, loaning and returning service, overall atmosphere, electronic database system, and online reservation and renewal as the top five importance service quality as ranked by users. In addition perceived importance of service quality dimension showed no significant difference among institutes and status. On the contrary, Landrum, Prybutok, Zhang and Peak (2009) discovered that responsiveness and also reliability, regarded as the performance dimensions, were the most rated users' service quality dimensions while the more emotive dimensions of tangibility, assurance and empathy varied in level of importance depending on the user's state of mind and the circumstances. These were findings from service quality perceptions of professional information system users of a library information system in an engineering research environment. Somaratna, Peiris and Jayasundara (2010) measured the desired service expectations and actual service performance of the users of the University of Colombo Library System. Of the 116 different service quality attributes identified from literature 35 found to be most appropriate to the Sri Lankan University Libraries were utilized though incorporated with the SERVQUAL model and a robust instrument was developed to ascertain the views of library users about service levels. From an overall response rate of 74% achieved represented by a total of 614 duly filled and retrieved questionnaires, the adoption of Gap analysis was used to determine the service quality gap between desired service expectations and actual service performance. The result indicates that the most important expectation to users' were relevance of information received followed by access to electronic journals and adequate lighting in reading areas, whereas the highest performance area was accuracy of information received followed by the security in the library amongst others. However, Hsu, Cummings and Wang (2014) in a bid to examining the college students' perception of library services, and the extent to which the quality of library services influences students' satisfaction discovered tangibility to be the most important service quality dimension amongst college students enrolled in an accredited college of business in a university located in the Midwest region of the United States. This assessment of relationship between service quality and users' satisfaction has been advocated on a continuous basis perhaps every two years as feedbacks gotten will aid as a management tool in decision making, long term planning, budgeting, employee training and development in addition to being a mechanism for continually enhancing and improving the relationship between Library Service and its users (Kaunda, 2013). Users' perceptions and expectation studies have been regarded as one of the most popular studies in service quality in many academic libraries (Jayasundara, 2008). Hence, apart from SERVQUAL other measuring models used particularly in the developed nations most and especially in North-America where they were developed include

LibQUAL and SERVPREF (Rehman and El Hadi, 2012)

Hassan, Ilias, Rahman and AbdRazak (2008) examined the relationship between service quality dimensions and overall service quality (tangibility, responsiveness, reliability, assurance and empathy) and students' satisfaction. The study further examined the critical factors in service quality dimensions (tangibility, responsiveness, reliability, assurance and empathy) contributing most to the satisfaction of the students. A set of questionnaire was administered to Bachelor Degree students from Kuala Lumpur Infrastructure University College (KLiUC) and Kolej Universiti Teknologi dan Pengurusan Malaysia (KUTPM). A response rate of about 87% representing 200 duly filled and returned questionnaire confirms earlier researchers' (Ruyter, et al, 1997; Brady, et al. 2001; Sureshchandar, et al. 2002; Fen & Lian; 2005*)* findings that service quality has significant positive relationship with customers' satisfaction in this case that of students. The researchers also discovered that two dimensions in service quality, empathy and assurance, were the most critical factors in explaining students' satisfaction.

Oliveira (2009) adopted the SERVQUAL measuring model in higher education service sector and presenting the main results of its application in students of the production engineering program at São Paulo State University (UNESP) in Brazil. Thirty-eight questionnaires were applied to measure perception in entering students and twenty-eight used to measure expectations in graduating students. Findings reveal that all dimensions showed an overall negative average starting with promptness, empathy, reliability, security and tangibility in a decreasing order of magnitude. This invariably implies that perceptions were below expectations. Evidence does exist of faults in services engendering unsatisfactory outcome among the students.

Asaduzzaman, Hossain, and Rahman (2013) examine the relationship between service quality dimensions and overall service quality (tangibility, responsiveness, reliability, assurance and empathy) and students satisfaction. The study further examined critical factors in service quality dimensions which contribute most to students' satisfaction. From a survey of 550 distributed questionnaires to Business students from Private University institutions, Dhaka City, Bangladesh, it was discovered that a significant correlation does exist among all the constructs with student satisfaction particularly tangibility.

Notwithstanding various criticism of SERVQUAL (Buttle, 1996; Van Dyke et al., 1997, 1999; Ladhari, 2008), it is ubiquitous in application cutting across various service setting, nations and cultural background (Ladhari, 2008). While the development of industry-specific scales for measuring service quality is welcomed (Caro & Garcia, 2007; Ekiz & Bavik, 2008), the criticism of peculiarity within organisation, locational confines and cultural disparities might still need to be tackled. Hence, the application of SERVQUAL which has an extensive acceptance, adoption and modification (Seth et al. 2005; Kundi et al., 2014) is therefore utilized in measuring service delivery in Covenant University, Ota amongst concerned stakeholders of this private institution.

3. Methodology

In order to obtain information about customers' satisfaction in the Lecture Theatre of Covenant University, a cross-sectional survey was conducted involving the major stakeholders: students and faculty (lecturers). The survey questionnaire designed was distributed randomly amongst stakeholders (students and faculties) who make use of the facility. However, for faculties an initial purposive selection was considered for faculties who make use of the facility. All together three groups of respondents were identified, students, since all students at a point in time do take lectures in the lecture theatre; faculties who have offices in the lecture theatre and faculties who lecture in the lecture theatre.

In a bid to obtaining a realistic result, the questionnaire, which had to be delivered by hand for proper monitoring, was distributed to an appropriate sample calculated using Kothari (2004; 179) model after taking cognizance of difference in gender, age groups, then also marital status, level of academic qualification and designation particularly amongst faculty. Having in mind that socio-economic and cultural characteristic could influence respondents' level of expectations and needs; the mix intends to produce a more reasonable result. The sample size derived from a total student population of 7571 @ a 95% confidence level and an acceptable error magin of ±5% as stipulated by the model was 323. This number was carefully selected through stratified random sampling technique. The entire lecturers who lecture in the lecture theater at any point in time and those having offices in the facility were 42 and 31 respectively. The researchers decided to study the entire lecturers in both categories as they appeared too little for sampling. This is to conform to the suggestion of Denscombe (2003).

The primary source of data collection for this research was the administration of questionnaire to the respondents. The questionnaire was designed using the SERVQUAL format developed by Parasuraman, Zeithaml and Berry at Texas and North Carolina in 1985. The original SERVQUAL scale actually makes use of 22 questions in measuring the five dimensions of service quality: reliability, tangibility, security, empathy and responsibility on a seven point linkert scale. However, the use of a single measuring scale for all service setting has been criticised (Carman, 1990; Brown et al., 1993; Van Dyke et al., 1997; Jabnoun & Khalifa, 2005; Akbaba, 2006; Caro & Garcia, 2007). There is therefore the recommendation for an adoption of specific measures that suits various organisations (Dabholkar et al., 1996; Ladhari, 2008). On this premise, the SERVQUAL Model adopted which was considered apt for this research made provision for ten (10) questions each for the seven (7) services studied having two (2) questions each of perception and expectation for the five (5) dimensions of service quality on a 5-point linkert scale. The services considered which cuts across the three (3) response groups include: Ventilation and Air Conditioning; Information and Communication System; Decoration and Furnishing; Lighting; Lavatory System; Acoustic System and Emergency Escape Channel.

A gap analysis was done on each of the University Lecture Theatre's service quality performance (perception) against the service quality needs (expectation) for each of its customers'

(students and lecturers). There after an average gap score for each of the dimension was obtained by assessing the gap scores for each of the statements that constitute the dimension and dividing the sum by the number of statements making up the dimension.

4. Data Analysis and Discussion

A total of three hundred and twenty three (323) questionnaires were administered to the students of Covenant University. These students were stratified based on their current year of study taking into consideration the proportion of students in each level to the total students' population thereafter a random selection of students was made. Thus, seventy-six (76) questionnaires were distributed to 100 level students; sixty-four (64) questionnaires were distributed to 200 level students, sixty-two (62) questionnaires were administered to 300 level students while fifty (50) and forty-eight (48) questionnaires were administered to the 400 and 500 level students respectively. Out of the total sum administered a total of two hundred and sixty-five questionnaires (265) were retrieved representing a response rate of 82.04%. Out of the forty-two (42) questionnaires distributed to the lecturers who do at any point in time deliver lecture(s) in the facility, a total of thirty-three (33) of such questionnaires were retrieved while twenty-four (24) of the thirty-one (31) questionnaires distributed to lecturers who have offices in the facility were retrieved. This represents a response rate of 78.6% and 77.4% respectively.

One hundred and seventeen (117) representing (44.2%) of the students were male while one hundred and forty-eight (148; 55.8%) were female. This perhaps may be due to the ease in accessing and persuading the female students in filling the questionnaires as against their male counterparts. Nigerian students sampled were two hundred and thirty seven (237; 89.5%) whereas twenty-eight (28; 10.5%) were non- nationals. Seventeen (17 students; 2.6%) were below the age of 16 years, one hundred and eighty (180 of the students; 67.9%) were between the ages of 16 and 20 years while seventy-eight (78 students; 29.4%) were between the ages of 21 and 25 years. Forty-one students (41; 15.5%) were in 100 level, sixty-four students (64; 24.2%) in 200 level, sixty-two (62 students; 23.4%) in 300 level, fifty (50; 18.9%) in 400 level and forty-eight (48; 18.1%) were in 500 level. From the response of sixteen (16; 66.7%) male and eight (8; 33.7%) female lecturers, cutting across the cadre of Assistant Lecturer to Senior Lecturer, who have offices in the Lecture Theatre, two (2; 8.3%) were below 31years of age, eleven (11; 45.8%) were between 31 -35yrs, four (4; 16.7%) of the lecturers were between 36 – 40yrs, those within the age limit of 41 – 45yrs were two (2; 8.3%) while five (5; 20.8%) of the respondents were above 45yrs. Of the thirty-three (33) questionnaires retrieved from twenty-one (21, 63.6%) male and twelve (12, 36.4) female lecturers also cutting across the cadre of Assistant Lecturer to Senior Lecturer, who at any point in time lecture in lecture theatre, twelve (12, 36.4%) are below 31years; fourteen (14, 42.4%) are between 31-35 years; two (2, 6.1%) are between 36-40 years; four (4, 12.1%) are between 41-45 years while one (1, 3%) respondent is above 45 years. Twenty seven of this respondents (27, 81.8%) hold a Master's degree in their various field while Six (6, 18.2%) have obtained a doctorate degree.

4. 1 Analysis of students' response

In a bid to determining the satisfaction of students in usage of the facilities in the lecture theatre the SERVQUAL Model as adopted, which was used for the other two categories of respondents, compared the expectations and perceptions of the students in the usage of the Seven (7) facilities peculiar to the edifice.

Ventilation and air-condition facility gave the following breakdowns: Average Tangible -1.575; Average Reliable -1.575; Average Responsive -1.445; Average Assurance -1.705; Average Empathy -1.71; having an overall average of -1.602

Information and communication system gave the following breakdowns: Average Tangible -1.705; Average Reliable -1.76; Average Responsive -1.515; Average Assurance -1.745; Average Empathy -1.475; having an overall average of -1.64

Decoration and furnishing gave the following breakdowns: Average Tangible -2.185; Average Reliable -2.295; Average Responsive -2.14; Average Assurance -2.27; Average Empathy -2.15; having an overall average of -2.208

Lightening gave the following breakdowns: Average Tangible -1.27; Average Reliable -1.095; Average Responsive -1.465; Average Assurance -1.45; Average Empathy -1.39; having an overall average of -1.334

Lavatory System gave the following breakdowns: Average Tangible -1.81; Average Reliable -1.74; Average Responsive -1.635; Average Assurance -1.645; Average Empathy -1.565; having an overall average of -1.679

Acoustic System gave the following breakdowns: Average Tangible -1.475; Average Reliable -1.625; Average Responsive -1.43; Average Assurance -1.52; Average Empathy -1.35; having an overall average of -1.48

Emergency Escape Channel gave the following breakdowns: Average Tangible -1.62; Average Reliable -1.64; Average Responsive -1.665; Average Assurance -1.675; Average Empathy -1.61; having an overall average of -1.642

From analysis it is obvious that there are differences in the expectations and perceptions of students concerning the quality of the services provided in the Lecture Theatre. Most of the students either strongly agreed or agreed with all questions asked in the five dimensions of the expectations section. However the perceptions section showed a contrast response as most students either strongly disagreed or disagreed with questions asked in the five dimensions. Although all facilities, recorded poor satisfactory response, YET the decoration and furnishing facility had the least value of (-2.208) in comparison between the expectation and perception of its service quality.

4.2 Analysis of response of lecturers who have offices in the lecture theatre

Based on the SERVQUAL Model as adopted for all categories of respondents, responses of lecturers who have offices in the lecture theatre gave the following results:

Ventilation and air-condition facility gave the following breakdowns: Average Tangible -0.14; Average Reliable -1.21;

Average Responsive -1.00; Average Assurance -1.25; Average Empathy -1.40; having an overall average of -1.00

Information and communication system gave the following breakdowns: Average Tangible -1.21; Average Reliable -1.61; Average Responsive -0.93; Average Assurance -1.08; Average Empathy -1.38; having an overall average of -1.242

Decoration and furnishing gave the following breakdowns: Average Tangible -1.56; Average Reliable -1.565; Average Responsive -1.285; Average Assurance -1.31; Average Empathy -1.665; having an overall average of -1.477

Lightening gave the following breakdowns: Average Tangible -0.54; Average Reliable -0.665; Average Responsive -0.77; Average Assurance -0.665; Average Empathy -0.815; having an overall average of -0.691

Lavatory System gave the following breakdowns: Average Tangible -1.955; Average Reliable -1.77; Average Responsive -1.165; Average Assurance -1.775; Average Empathy -1.625; having an overall average of -1.658

Acoustic System gave the following breakdowns: Average Tangible -2.145; Average Reliable -2.23; Average Responsive -1.525; Average Assurance -1.955; Average Empathy -1.875; having an overall average of -1.946

Emergency Escape Channel gave the following breakdowns: Average Tangible -2.34; Average Reliable -2.02; Average Responsive -1.605; Average Assurance -1.935; Average Empathy -1.79; having an overall average of -1.938

The results from analysis as displayed reveals that there were as in the case of the students, differences in what the lecturers who have offices in the Lecture Theatre expected and perceived concerning the quality of the services provided in the Lecture Theatre. Most of the lecturers either strongly agreed or agreed with the questions asked in the five dimensions of the expectations section while the perceptions section revealed that the lecturers either strongly disagreed or disagreed with the questions asked in the five dimensions. The findings shows that lecturers who have offices in the Lecture Theatre had the least comparison of expectation and perception in the acoustic system (-1.946) and Emergency Escape Channel (-1.938) service compared to decoration and furnishing facility as attested by students. This invariably can be inferred as lack of soundproofed fortifications and emergency exit in case of emergency around the lecture theatre.

4. 3 Analysis of response of lecturers who lecture in lecture theatre

For the last group of respondents who are lecturers having any of their lectures in the lecture theatre, the following results were obtained:

Ventilation and air-condition facility gave the following breakdowns: Average Tangible -1.895; Average Reliable -1.835; Average Responsive -1.615; Average Assurance -1.79; Average Empathy -1.665; having an overall average of -1.758

Information and communication system gave the following breakdowns: Average Tangible -1.805; Average Reliable -2.165; Average Responsive -1.665;

Average Assurance -2.08; Average Empathy -1.85; having an overall average of -1.913

Decoration and furnishing gave the following breakdowns: Average Tangible -1.91; Average Reliable -1.95; Average Responsive -1.465; Average Assurance -1.815; Average Empathy -1.605; having an overall average of -1.749

Lightening gave the following breakdowns: Average Tangible -1.865; Average Reliable -1.835; Average Responsive -1.755; Average Assurance -2.08; Average Empathy -1.985; having an overall average of -1.904

Lavatory System gave the following breakdowns: Average Tangible -2.26; Average Reliable -2.23; Average Responsive -2.035; Average Assurance -2.165; Average Empathy -2.145; having an overall average of -2.167

Acoustic System gave the following breakdowns: Average Tangible -1.85; Average Reliable -1.985; Average Responsive -1.82; Average Assurance -1.685; Average Empathy -1.955; having an overall average of -1.859

Emergency Escape Channel gave the following breakdowns: Average Tangible -1.94; Average Reliable -1.955; Average Responsive -1.91; Average Assurance -1.845; Average Empathy -1.91; having an overall average of -1.912

Just like the response of the earlier two respondents it is obvious that differences exist between the expectations and perceptions on all concerned facilities by lecturers who at any time deliver lecture at the lecture theatre. However, the lavatory system had the least value (-2.167) indicating the least satisfaction of this facility amongst this group of respondents. Perhaps this might be due to the distance of this facility from the lecture halls.

4. 4 Users' Assessment of Facilities in Lecture Theatre

To get a more holistic view of responses amongst the three groups of respondents, the analysis was also done together. This is with the intent of having satisfaction indicator that can be attributed to users' generally. The following results were gotten from the analysis:

Ventilation and air-condition facility gave the following breakdowns: Average Tangible -1.27; Average Reliable -1.275; Average Responsive -1.185; Average Assurance -1.405; Average Empathy -1.405; having an overall average of -1.308

Information and communication system gave the following breakdowns: Average Tangible -0.528; Average Reliable -1.37; Average Responsive -1.20; Average Assurance -1.38; Average Empathy -1.175; having an overall average of -1.331

Decoration and furnishing gave the following breakdowns: Average Tangible -1.81; Average Reliable -1.895; Average Responsive -1.775; Average Assurance -1.865; Average Empathy -1.775; having an overall average of -1.824

Lightening gave the following breakdowns: Average Tangible -1.295; Average Reliable -1.13; Average Responsive -1.49; Average Assurance -1.445; Average Empathy -1.985; having an overall average of -1.469

Lavatory System gave the following breakdowns: Average Tangible -1.535; Average Reliable -1.465; Average Responsive -1.355; Average Assurance -1.355; Average Empathy -1.205; having an overall average of -1.383

Acoustic System gave the following breakdowns: Average Tangible -1.415; Average Reliable -1.47; Average Responsive -1.30; Average Assurance -1.05; Average Empathy -1.17; having an overall average of -1.281

Emergency Escape Channel gave the following breakdowns: Average Tangible -1.32; Average Reliable -1.33; Average Responsive -1.38; Average Assurance -1.38; Average Empathy -1.31; having an overall average of -1.344

From analysis it is shown that users of facilities in the lecture theatre had different expectations from what they perceived about the quality of services provided in the lecture theatre. Having negative values all through particularly decoration and furnishing with the least satisfactory quality for users (-1.824) indicates need for the improvement in the operation of this service.

If client satisfaction is the ultimate for delivery of services then facilities of the lecture theatre should be improved to meet clients' expectation particularly in the area of decoration and furnishing. Other areas to consider improvements particularly in meeting the needs of targeted end users such as lecturers who have offices in the lecture theatre and those who lecture in the theatre are the acoustic system together with emergency escape route and the lavatory system respectively.

5. Conclusion

This paper has looked into the service quality of facilities provided in the lecture theatre of Covenant University, Ota Ogun State Nigeria. In a nutshell findings have revealed that all dimensions showed an overall negative average; tangibles, reliability, responses, assurance and empathy. This signifies perceptions being below expectations thereby placing the end users' in an unsatisfactory position. Notwithstanding that the University has been rated tops in most categories of awards in the country and even beyond amongst which is best Maintained Institution Award by the Nigerian Chapter of the International Facility Management Association (IFMA), she still needs improvement in the operation of the services provided in the multipurpose academic structure so as to be satisfactory to users. This study has serious implications for Tertiary Institutions in Nigerian. The gap between the provision of facilities and the perception of such facilities amongst users should be bridged. This might lead to another issue where connectivity between well perceived facilities and academic performance can be established. This is a wakeup call for all providers of facility, no matter how sophisticated facilities may seem to appear it has to integrate the feelings of end users as that can only be when such facilities would have rightly fulfilled its purpose.

References

Adeniran, P. (2011) User satisfaction with academic libraries services: Academic staff and students perspectives, *International Journal of Library and Information Science 3*(10), 209-216

Akan, P. (1995) Dimensions of service quality: a study in Istanbul, *Managing Service Quality: An International Journal, 5*(6), 39 – 43

Akbaba, A. (2006) Measuring service quality in the hotel industry: A study in a business hotel in Turkey, *International Journal of Hospitality Management, 25*(2), 170–192

AL Khattab, S. and Fraij, F. (2011) Assessing Students' Satisfaction with Quality of Service of Students Information System, *Management and Marketing Journal*, *9*(1), 111-125

Altbach, P. G. (1998) Twisted roots: the Western impact on Asian higher education. In: Altbach, P.G. *Comparative Higher Education: Knowledge, the University, and Development*. Chestnut Hill, MA: Boston College Center for International Higher Education, 55–80

Andaleeb, S. S. (2001). Service quality perceptions and patient satisfaction: a study of hospitals in a developing country, *Social Science & Medicine, 52*, 1359–1370

Anderson, E. W., and Sullivan, M. W. (1993) The Antecedents and Consequences of Customer Satisfaction, *Marketing Science 12* (Spring), 125-143

Arambewela, R. and Hall, J. (2009) An empirical model of international student satisfaction, *Asia Pacific Journal of Marketing and Logistics*, *21*(4), 555-569

Asaduzzaman, Hossain, M. and Rahman, M. (2013) Service quality and student satisfaction: a case study on private universities in Bangladesh, *International Journal of Economics, Finance and Management Sciences, 1*(3): 128-135

Asubonteng, P., McCleary, K.J., and Swan, J.E. (1996) SERVQUAL revisited: A critical review of service quality, *The Journal of Services Marketing, 10*(6), 66-81

Babakus, E. and Mangold, W. G. (1989), "Adapting the SERVQUAL Scale to Health Care Environment: An Empirical Assessment," in Paul Bloom, Bart Weitz, Russ Winer, Robert E. Spekman, Harold H.

Kassarjian, Vijay Mahajan, Debra L. Scammon, and Michael Leay, (eds)., *AMA Summer Educators' Proceedings: Enhancing Knowledge Development in Marketing,* Chicago, IL: American Marketing Association, 195

Badri, MA, Abdulla, M and Al-Madani, A. (2005) Information technology center service quality assessment and application of SERVQUAL, *International Journal of Quality and Reliability Management, 22*(8), 819-848

Beerli, A., Martin, J.D., and Quintara, A. (2004) A Model of Customer Loyalty in the Retail Banking Market, *European Journal of Marketing 38*, 1/2, 253-275

Best, R. and Purdey, B. (2012) Assessng occupant comfort in an iconic

sustainable education building, *Australasian Journal of Construction Economics and Building, 12* (3), 55-65

Bolton, R. N. (1998) A Dynamic Model of the Duration of the Customer's Relationship with a Continuous Service Provider: The Role of Satisfaction, *Marketing Science, 17*(1), pages 45-65

Borden, V. M. (1995) Segmenting student markets with a student satisfaction and priorities survey, Research in Higher Education, *36*(1), 73–88

Boulding, W., Kalra, A., Staelin, R. and Zeithaml, V. (1993) A dynamic process model of service quality: form expectations to behavioral intentions" *Journal of Marketing Research, 30*, pp. 7-27

Brady, M. K., and Robertson, C. J. (2001) Searching for a consensus on the antecedent role of service quality and satisfaction: An exploratory cross-national study, *Journal of Business Research, 51*(1), 53–60

Brown, T.J., Churchill, G.A. and Peter, J.P. (1993) Research note: improving the measurement of service quality, *Journal of Retailing, 69*(1), 126-139

Buttle, F. (1996) SERVQUAL: review, critique, research agenda, *European Journal of Marketing, 30*(1), 8 - 32

Caha, H. (2007) Service Quality in Private Hospitals in Turkey, *Journal of Economic and Social Research 9*(1), 55-69

Carman, J.M. (1990), Consumer perceptions of service quality: an assessment of the SERVQUAL Dimensions, Journal *of Retailing, 66*(1), 33-5

Caro, L. M. and Garcia, J. A. M. (2007) Measuring perceived service quality in urgent transport service, *Journal of Retailing and Consumer Services, 14*(1), 60-72

Caruana, A. (2002) Service loyalty. The effects of service quality and the mediating role of customer satisfaction, *European Journal of Marketing, 36* (7/8), 811-828

Coskun, L. (2014) Investigating the Essential Factors on Student Satisfaction: A Case of Albanian Private University, *Journal of Educational and Social Research, 4*(1), 489-503

Cronin, J.J., Brady, M.K., and Hult, G.T.M. (2000) Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments, *Journal of Retailing, 76*(2), 193–218

Cronin, J.J. and Taylor, S.A. (1992) M*easuring service quality: a re-examination and extension, Journal of Marketing, 56*, 55-68.

Dabholkar, P.A., Thorpe, D.I. and Rentz, J.O. (1996) A measure of service quality for retail stories: scale development and validation, *Journal of the Academy of Marketing Science, 24*(1), 3-16

Daniel, Ch. N. and Berinyuy, L. P. (2010) *Using the SEVQUAL Model to Assess Service Quality and Customer Satisfaction: An Empirical Study of Grocery Stores in Umea*, (Unpublished Master's Thesis), Umea School of Business

Denscombe M. (2003) *The Good Research Guide for Small-Scale Social Research Projects* (2nd Ed), Maidenhead Philadelphia: Open University press

Ekiz, H. E. and Bavik, A. (2008) Scale Development Process: Service

Quality in Car Rental Services, *Electronic Jornal of Business Research Methods, 6*(2), 133-145

Fen, Y. S. and Lian K. (2005) Service quality and customer satisfaction: Antecedents of customers're-patronage intentions, *Sunway Academic Journal*, *4*(1), 60-73

Filiz, Z. (2007) Service quality of University Library: a survey amongst students at Osmangazi University and Anadolu. University. *Ekonometri ve İstatistik Say. 1*, 1-19. Retrieved October 16, 2007 from http://www.eidergisi. istanbul.edu.tr /sayi5/iueis 5m1.pdf html

Fornell C. (1992), ―A National Customer Satisfaction Barometer: The Swedish Experience, *Journal of Marketing*, *56*, 6-21

Gibson, C. (2009) *Using SERVQUAL to Assess the Customer Satisfaction Level of the Oregon HIDTA ISC Analytical Unit*, Oregon HIDTA Program, (2009), Oregon HIDTA Annual Report CY 2009, Salem, OR: Oregon HIDTA Program

Hassan, H. F. A., Ilias, A., Rahman, R. A. and AbdRazak, M. Z. (2008) Service Quality and Student Satisfaction: A Case Study at Private Higher Education Institutions. *International Business Research* (3), 163-175

Hsu, M. K., Cummings, R. G. and Wang, S. W. (2014) Business Students' Perception Of University Library Service Quality and Satisfaction, *Contemporary Issues In Education Research, 7*(2), 137-144

Iacobucci, D., Grayson, K.A. and Omstrom, A.L. (1994) *The calculus of service quality and customer satisfaction: theoretical and empirical differentiation and integration*, in Swartz, T.A., Bowen, D.E. and Brown, S.W. (Eds), Advances in Services Marketing and Management, Vol. 3, JAI Press, Greenwich, CT, 1-68

Jabnoun, N. and Khalifa, A. (2005) A customized measure of service quality in the UAE, *Managing Service Quality*, *15*(4), 374-388

Jalali, A. and Jaafar, M. (2013) Service satisfaction: The case of a higher learning institution in Malaysia, *Universal Journal of Education and General Studies*, *2*(8), 265-275

Jayasundara, C. (2008) USER Perceptions and Expectations on E-Information Literacy Development Programmes: A Gap Analysis, *ORBIS: Scientific e-journal of Human Science*, *10* (4), 81- 94

Johns, N. (1999) What is this thing called service?, *European Journal of Marketing*, *33*, (9/10), 958-973.

Johnson, M.D. Anderson, E.W. and Fornell, C. (1995) Rational and Adaptive Performance Expectations in a Customer Satisfaction Framework, *Journal of Consumer Research, 21*, 695–707

Kaewkungwal, K. (2011) *Quality improvement of kid's club activities to enhance guest satisfaction: a case study of Sheraton Krabi Beach Resort, Nakhon Pathom*, (Unpublished Master's Thesis), Department of Business Management Silpakorn University, Thailand

Kaunda, S. G. (2013) Assessing Service Expectation and Perception of Public Library Users: Towards Development of User Needs and User Satisfaction

Measurement Instruments for the National Library Service of Malawi, *Information and Knowledge Management, 3*(3), 30-40

Kevin. E. and Dooyoung, S. (2002) Student Satisfaction: an alternative approach to assessing this important concept, *Journal of Higher Education Policy and Management, 24*(2), 179-209

Kothari, C. R. (2004) *Research Methodology: Methods and Techniques*, (2nd Revised Ed.), Daryaganj, New Delhi: New Age International Ltd

Kranias, A. and Bourlessa, M. (2013) Investigating the relationship between service quality and loyalty in Greek banking sector, *Procedia Economics and Finance*, *5*, 453-458

Kumar, M., Kee, F. T., and Manshor, A. T. (2009) Determining the relative importance of critical factors in delivering service quality of banks: an application of dominance analysis in SERVQUAL model, *Managing Service Quality,19*(2), 211-228

Kundi, G. M., Khan, M. S., Qureshi, Q. A., Khan, Y. and Akhtar, R. (2014) Impact of Service Quality on Customer Satisfaction in Higher Education Institutions, A Case Study of Gomal University, DIKhan, Khyber Pakhtunkhwa Pakistan, *Industrial Engineering Letters, 4*(3), 23-28

Ladhari, R. (2008) Alternative Measure of Service Quality: A Review *Journal of Managing Service Quality, 18*(1), 65-86

Ladhari, R. (2009) A review of twenty years of SERVQUAL research, *International Journal of Quality and Service Science, 1*(2), 172-198

Landrum, H., Prybutok, v., Zhang, X. and Peak, D. (2009) Measuring IS System Service Quality with SERVQUAL: Users' Perceptions of Relative Importance of the Five SERVPERF Dimensions, *Informing Science: The International Journal of an Emerging Transdiscipline 12*, 17-35

Lovelock, C. H., Patterson, P. G. and Walker, R. H. (2001) *Services Marketing*: An Asia-Pacific Perspective, 2nd Ed. Australia: Prentice Hall

Magi, A. and Julander CR (1996) Perceived service quality and customer satisfaction in a store performance framework: An empirical study of Swedish grocery retailers, *Journal of Retailing and Consumer Services 3*(1), 33-41

Malik, M.E., Danish, R. Q. and Usman, A. (2010) Impact of Job Climate and Extrinsic Rewards on Job Satisfaction of Banking Executives; A Case of Pakistan, *Interdisciplinary Journal of ContemporaryResearch in Business, 1*(12), 125-139

McColl-Kennedy, J., and Schneider, U. (2000), Measuring customer satisfaction: why, what and How, *Total Quality Management, 11* (7), 1-14.

Mokhlis, S. (2012) The Influence of Service Quality on Satisfaction: A Gender Comparison, *Public Administration Research, 1*(1), 103-112

Munusamy, J., Chelliah, S. and Mun, H. W. (2010) Service Quality Delivery and Its Impact on Customer Satisfaction in the Banking Sector in Malaysia, *International Journal of*

Innovation, Management and Technology 1(4), 398-404

Naik, C.N.K., Gantasala, S.B. and Prabhakar, G.V. (2010) Service Quality and Its Effect on Customer Satisfaction in Retailing, *European Journal of Social Sciences, 16*(2), 239-251

Negi, R. (2009) Determining customer satisfaction through perceived service quality: A study of Ethiopian mobile users, *International Journal of Mobile Marketing 4*(1), 31-38

Nimako, *S. G. (2012)* Linking Quality, Satisfaction and Behaviour Intentions in Ghana's Mobile Telecommunication Industry, *European Journal of Business and Management, 4*(7), 1-17

Nitecki, D. A. (1996) Changing the Concept and Measure of Service Quality in Academic Libraries, *Journal of Academic Iibrarianship 22*(3), 181-191

Oliveira, O.J.D. (2009) *Adaptation and application of the SERVQUAL scale in higher education*, POMA 20th Annual Conference, Orlando Florida USA

Oliver, R. L. (1980) A Cognitive Model of the Antecedents and Consequences of Satisfaction, *Journal of Marketing Research 17*(4), 460-469

Oliver, R. L. (1981) Measurement and Evaluation of Satisfaction Processes in Retail Settings, *Journal of Retailing, 57*(Fall), 25-48

Oliver, R. L. and DeSarbo, W. S. (1989) Processing of the satisfaction response in consumption: A suggested framework and research proposition, *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior, 2*, 1-16

O'Neill, M. (2003) The influence of time on student perception of service quality: the need for longitudinal measures, *Journal of Educational Administration, 41*(3), 310-324

Parasuraman, A., Zeithaml V. A. and Berry, L. L. (1988) SERVQUAL: A Multiple-Item Scale for Measuring Customer Perceptions of Service Quality, *Journal of Retailing, 64*(1), 12-40.

Petruzzellis, L; D'Uggento, A. and Romanazze, S. (2006) Student satisfaction and quality of service in Italian universities, *Managing Service Quality, 16*(4), 349-364

Rehman, S. U. and El-Hadi, W. (2012) Perceptions of Pakistani users about library service

quality: LIBQUAL comments, *Library Philosophy and Practice*, Retrieved from http://unllib.unl.edu/LPP/rehman-elhadi.htm, on May 4 2015

Ruyter, K.D., Bloemer, J. and Peeters, P. (1997) Merging service quality and service satisfaction: an empirical test of an integrative model, *Journal of Economic Psychology, 18*, 387-406

Seth, N., Deshmukh, S. G. and Vrat, P. (2005) Service quality models: a review. *International Journal of Quality & Reliability Management, 22*(9), 913-949

Shahab, A. M., Arslan, M., Kanwal, N. and Shujah, A. M. (2012) Examining the Relationship among Service Quality, Customer Satisfaction and Behavioral Responses – Comparison between Public and Private Sector Banks of Pakistan, *International Journal for Quality research, 6*(4), 365-380

Shahin, A. (2006) *SERVQUAL and model of service quality gaps: A*

framework for determining and prioritizing critical factors in delivering quality service, in: Service quality An introduction, Partha Sarathy V. (ed), st edition, Andhra Pradesh, India: ICFAI University Press. pp. 117-131

Somaratna, S., Peiris, C. N. and Jayasundara, C. (2010) *User expectations versus user perception of service quality in University libraries: a case study*, International Conference of University Librarians Association Sri Lanka ICULA 2010–July 14–15, Colombo, 69-82

Spreng, R.A. and Mackoy, R.D. (1996) An Empirical Examination of a Model of Perceived Service Quality and Satisfaction, *Journal of Retailing, 72*(2), pp. 201-214

Stafford, M. R. (1996) Demographic discriminators of service quality in the banking industry, *The Journal of Services Marketing, 10*(4), 6-18

Sumaedi, S., Bakti, I. and Metasari, N. (2011) The Effect of Students' Perceived Service Quality and Perceived Price on Student Satisfaction, *Management Science and Engineering, 5*(1), 88-97

Sureshchandar, G.S., Rajendran, C. and Anantharaman, R.N. (2002), The relationship between service quality and customer satisfaction – a factor approach, *Journal of Services Marketing, 14*(4), 363-379

Tucker, M. and Smith, A. (2008) User Perceptions in Workplace Productivity and Strategic FM Delivery, *Facilities, 26*(5/6), 196-212

Usman, A. (2010) 'The Impact of Service Quality on Students' Satisfaction in Higher Education Institutes of Punjab, *Journal of Management Research, 2*(2), 1-11

Van Dyke, T., Kappelman, L. and Prybutok, V. (1997) Measuring Information Systems Service Quality: Concerns on the Use of the SERVQUAL Questionnaire, *MIS Quarterly*, 195-208

Van Dyke, T., Prybutok, V.R.. and Kappelman, L.A. (1999) Cautions on the Use of the SERVQUAL Measure to Assess the Quality of Information Systems Services, *Decision Sciences, 30*(3), 877-891

Wang, I. M. and Shieh, C. J. (2006) Relationship between service quality and customer satisfaction: the example of CJCU Library, *Journal of Information & Optimization services 27*(1), 193-209

Wiers-Jenssen, J.; Stensaker, B. and Grogaard, J. (2002) Student satisfaction: towards an empirical deconstruction of the concept, *Quality in Higher Education, 8*(2), 183–195

Williams, B. (1994) *Facilities Economics – "Incorporating Premises Audits*". London: Building Economics Bureau Limited

Wood, J. (2008) The effect of buyers' perceptions of environmental uncertainty of satisfaction and Loyalty, *Journal of Marketing Theory and Practice, 16* (4), 309-320

Yavas, U., Benkenstein, M. and Stuhldreier, U. (2004) Relationships between service quality and behavioral outcomes: A study of private bank customers in Germany, *International Journal of Bank Marketing, 22*(2), 144-157

Yeung, M., Ging, L., and Ennew, C. (2002) Customer satisfaction and profitability: a reappraisal of the nature of the relationship, *Journal of Targeting, Measurement and Analysis for Marketing, 11*(1), 24-33

Yi, Youjae (1991) *A Critical Review of Consumer Satisfaction*, In Valarie A. Zeithmal (ed.), Review of Marketing 1989, Chicago: American Marketing Association.

Zeithaml, V.A., Berry, L.L. and Parasuraman, A. (1993) The nature and determinants of customer expectations of service, *Journal of the Academy of Marketing Science*, *21* (1), 1-12

Zeithaml, V. A., Berry, L.L. and Parasuraman, A. (1996) The behavioural consequences of service quality, *Journal of Marketing Management, 60*(No. April), 31-46.

Zeithaml, V.A. Parasuraman, A. and Malhotra, A. (2002) Service quality delivery through web sites: a critical review of extant knowledge, *Journal of the Academy of Marketing Science, 30(4),* 362-375

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Cooperative Societies, Housing Provision and Poverty Alleviation in Nigeria

[1]C.A. Ayedun; [1]S.A. Oloyede; [2]O. A. Ikpefan, [1]A.O. Akinjare & [1]C.O. Oloke

[1]Department of Estate Management, Covenant University, Ota. Nigeria
[2]Department of Banking and Finance, Covenant University, Ota. Nigeria

Abstract: *The study is based on the need to motivate individuals in similar wage earning employments to overcome challenges militating against accessibility to basic family needs including home ownership through incremental development. The study employed qualitative research method to carry out empirical investigation through interviews with members as well as some executive members of Covenant University Staff Cooperative and Multi-purpose Society Limited, Ota, Ogun State, Nigeria to obtain primary data for the study as well as secondary data from earlier annual reports of the Co-operative Society. Data presentation was through the use of tables and percentages. Findings showed that various avenues provided for accessing credit, at short notice, with very low interest rates and generous repayment periods by the Covenant University Staff Cooperative and Multi-purpose Society Limited, significantly assisted members in embarking on massive housing construction on incremental basis in addition to access to funds for other family needs with ease within the ten years of the Cooperative Societies' establishment. The paper concludes that project funding through co-operative societies' approach has great potentials for minimising frustrations inherent in the pursuit of achievements through loans from commercial banks at variable interest rates. The paper recommends the encouragement of Staff Co-operative Societies across all segments of establishments in the country*

Key words: cooperative society, housing provision, poverty alleviation, Nigeria

1. Introduction

Throughout the human history, housing has been playing two major roles in a man's life. Economically, housing constitutes an important provision to a nation. It provides not only shelter but also security, comfort and dignity. It is also a social necessity, because good housing enhances healthy living which in return influences human labour

productivity. It also stimulates investment in other sectors of the economy. For these reasons, much attention and premium are often put in place on home ownership no matter the age, sex, income or type of job the head of a household does in any part of the globe. Despite the availability of abundant, unused and ripe land at the periphery of most towns and cities in Nigeria, accessibility to low interest rate financing constitutes the major hindrance to easy acquisition of affordable housing among low and middle-income earners in the country. Walley (2010) opined that land acquisition and building a home require incredible determination. UN Habitat (2005) recorded that affordable housing is inadequate though those that have access to what can be regarded as adequate shelter find such shelter unaffordable. In many countries, Nigeria inclusive, the socio-economic and constant political changes over time had put pressure on governments, thus constraining their involvements in meeting housing needs of the teaming and ever growing populace. With limited and dwindling resources at government disposal, it is has become impossible for the government alone to cater for the current shortage of housing and poverty being encountered by the citizenry. This reality had led the government at various times to embark on policies such as Structural Adjustment Programme (SAP), privatisation/commercialisation, Public and Private Partnerships (PPP), monetisation of public servants' benefits, etc. All these policies were geared towards shifting from public at financing, management and responsibility for basic societal needs of the common man through private initiatives. Experience, over time, has shown that non-availability of cheap and adequate finance have been the main reason why private sector developers often fail at taking up the responsibility of championing the affordable housing provision issue in the country.

Globally, the world is currently witnessing two different demographic trends. While in the industrialised countries birth rates are falling and life expectancy is steadily increasing, in the developing countries, such as Nigeria, the reverse trend holds true. In Africa, the birth rate is still at high levels, with majority of the population being below the age of twenty years. A growing population portends pressure on the ecological system, thus increasing the need for food, shelter, jobs and other basic necessities of life. The demands of the ever growing population have created further problems of developable land scarcity; conflicts over the use and ownership of land hence the ever increasing rate of urbanisation with rapidly growing slums and squatter settlements within cities in the developing countries such as Nigeria.

The resultant effect of the inability of governments across the globe, especially in developing countries such as Nigeria, to address the needs of the growing population, in such areas as housing and employment generation, has inevitably led to systematic decay of value systems. Family structures, which from time immemorial has always been a very reliable and effective system of social security has disintegrated thereby leaving the weaker and vulnerable members of the society to suffer. The gap between the rich and poor has continued to widen within many societies especially in the developing countries. Poverty, unemployment and

social disintegration often result in isolation, marginalisation and violence.

While these problems affect all countries one way or another, there is a general consensus that the situation of most developing countries, particularly of Africa, is critical and requires special attention and action. As a means of addressing the challenges facing most developing countries, this study was set out to identify the potentials of cooperative societies through which members of a community could collectively provide the needed funding for their home ownership and other necessities of life at the lowest rate of interest, friendly repayment terms and stress free co-operative loan administrative processes thereby unconsciously lifting the societal spirit and by extension reduce drastically the poverty within the society.

2. Poverty as an Albatross of the Masses in the Developing Countries

There is no single satisfactory way of defining poverty. The Longman Dictionary of Contemporary English defines 'poverty' as a state of being poor. Onibokun (1983) was of the opinion that 'poverty' can be measured in terms of income, inadequate access to basic infrastructure like water, health and educational facilities, transportation and even information will be important in defining 'poverty' in a developing country like Nigeria.

Poverty in Africa is substantially higher than in other developing regions of the world. More significant is the fact that poverty in Africa is chronic and rising. Poverty reduction attempts constitute the most difficult challenge facing most countries in the developing world where on the average majority of the citizens are considered poor. Evidences in Nigeria show that the number of those within poverty range has continued to increase. For example, the number of those within poverty bracket increased from 27% in 1980 to 46% by 1985; it declined slightly to 42% in 1992; but increased very sharply to 67% by 1996 according to National Bureau of Statistics (1999). Poverty alleviation was seen as a means through which the government can revamp the battered economy and instil self-esteem in majority of Nigerians who had been dehumanised through past military regimes (Ogunsemi, Asaju and Mordi, 2002).

Smith (2005) came up with some tentative ideas through which majority of the citizens can be freed from the bondage of poverty. One of such means is through the elimination of working cap trap. Lack of accessibility to credit facilities often prevents small-scale business men and women from expanding their businesses or procures their shelters. Being part of group-based schemes such as Co-operative societies ensures the sharing of risks and ensures that loans if given are viable and recoverable with ease. Moruf (2013) sees credit as a catalyst that activates other factors of production and makes under-used capacities functional for increased productivity. Generating new knowledge based on experience from established co-operative societies across the world is a practical way of eradicating poverty. In the opinion of Komolafe (2013), co-operative society members consist of all income groups, all ages from all walks of life joining forces together to meet common needs ranging from products, services, housing, financial services, etc. and for these reasons, organising people of like

minds together to meet common needs is a major means of freeing Nigerians from their financial incapability and by extension eradicating poverty with time.

3. The Concept of Housing

Housing has been described as a complex product of both public and private efforts and investment. It consists of the immediate physical and service environment for individuals and family living. According to Mile (1970), the concept of housing include environmental factors such as the general land use, recreation areas, shopping facilities, infrastructural services, nuisance of pollution and noise, etc. all of which have resulted in the three aspects of housing as it concern economics, social and environmental.

With regards to economic and social aspects of housing, there is very little that can be done because it is quite impossible to make people live above their incomes and social status. Freeman (1984) pointed out that the worse the property is shows the lower the income of the household tends to be hence the less the ability of the household to pay. This being the case, it is incumbent on home providers to take cognisance of the people's income as well as their social status into consideration in providing houses for them. Apart from the fact that no government in the world has been able to provide adequate housing for all its citizens, providing houses which the occupants cannot maintain properly will amount to a colossal waste of scarce resources.

The environmental aspect of housing is a more unifying factor in which people of different classes and social status can benefit. This include proper maintenance of the environment, cleanliness, accessibility, lighting, good infrastructural facilities, etc. All these needs are far more than what an individual can provide or cope with alone. It is therefore the responsibility of government to provide and maintain the common neighbourhood environment within its area of jurisdiction. More emphasis ought to be paid to the provision of these essential services and facilities instead of providing additional new houses which will only benefit a few privilege individuals.

4. Earlier Efforts at Providing Affordable Housing in Nigeria to Date

Subsequent governments in Nigeria had always been mindful of the housing challenges in the country and over the years had taken various steps aimed at reducing the burden. Some of the steps taken include the establishment, in 1928, of the Lagos Executive Development Board, establishment of Nigerian Building Society in 1956, creation of the National Site and Service Scheme in 1986, introduction of the National Prototype Housing Program by the Federal Ministry of Works and Housing, setting up of the State Housing Corporations by various state governments in the country, creation of Federal Mortgage Bank of Nigeria in 1977, promulgation of the National Housing Policy document in 1991 which culminated in the enactment National Housing Fund scheme by Decree No 3 of 1992, establishment of the Federal Mortgage Finance Limited in 2001 as well as the creation of the Ministry of Housing and Urban Development in 2003 to midwife affordable housing provision in the country.

Despite all these efforts, in 2006, the then Minister of Housing and Urban Development declared that the country needed about ten million housing units before all Nigerians could be sheltered. By the following year, the then president of the country put the national housing deficit at between eight and ten million units (Yar'adua, 2007).

5. Issues Militating Against Realisation of Affordable Housing Provision in Nigeria

Odu (1992) identified finance to be the economic power needed to mobilise materials and other resources required to actualise the goals of the various housing policies and schemes. In the same vein, Agbola (1998) and Diogu (2004) reiterated the importance of finance to housing provision and asserted that the propensity of individuals in the society to save to be the fulcrum for housing acquisition by individual households. This is attributable to the fact that investment in housing, like in any other sector, entails an opportunity cost. Such cost is the returns on the alternative form of investment and unless until the returns to housing investment are commensurate with or better than investments in other sectors, there will be no significant in-flow of investible funds to housing development especially from the private investors.

Lemo (2007) studied the production and supply of housing in Nigeria and noted that individual housing development continues to be constrained by the prevailing problematic land administration; poor infrastructural facilities such as road, electricity and water; lack of long term finance for housing construction; high inflation and interest rates; low income/poor earning power of the citizenry coupled with low savings culture of the people due to the absence of suitable home savings mechanism. Faleti (2007) found that the cumbersome legal framework, requirements for Governor's consent as well as processes involved in obtaining Certificate of Occupancy, which are some of the provision of Land Use Decree (Act) of 1978 requirements, lengthened land acquisition/perfection of title processes. In addition, the cost of stamp duties, transfer duties and various taxes and levies make transaction costs too high for both low and medium-income earners thereby exacerbating the existing problem of affordable housing accessibility. Ayedun (2011) identified problems of high cost of building materials as well as reluctance of the citizens to adopt local building materials for their homes; land tenure issues; poor housing finance system; lack of housing education, amongst others, as constituting serious bottlenecks to affordable housing provision in the country.

Ademiluyi (2010) remarked that despite numerous interventions and efforts by the successive governments in Nigeria, actual achievements in terms of providing adequate housing in the country remains essentially at minimal level as a result of first, poor plan implementation. For example, only 13.3% achievement was recorded by the Federal government out its set target for housing program in the Third National Development Plan (Mabogunje, 2003). Second, is the frequent policy changes as a result of constant changes in government, which in most cases fail to carry out proper assessment and evaluation of the existing policies and programs by the incoming administration. Third, house seekers' incomes are relatively low in

comparison with house market prices thereby resulting in an affordability problem. Four, prices of various building materials are very high and constantly increasing e.g. a 50kg bag of cement has risen from N650 in 2000 to N2, 800 presently. Five, lack of effective coordination among housing agencies within the three tiers of government (federal, state and local) in the country. Six concerns the politicization and favouritism of housing issues over the sitting of housing estates (Onibokun, 1983). Seven is the indiscriminate abuse of power through massive corruption across board in the dispensation of housing funds, award of contracts and project execution.

6. Cooperative Societies

International Cooperatives Alliance and International Labour Organization (2003) defines cooperative societies as autonomous associations of individuals who voluntarily comes together as united force in order to meet their mutual social, cultural and economic needs and wants through the help of a jointly owned and democratically managed enterprise. This type of group mostly of interested persons characterised by limited means of livelihood usually make equitable contribution to the resources required and thereby accepts fair or equal share of the benefits and risks that may come with the undertaking in which the members participate. Historically, it is worthy of note, that prior to the advent of colonisation of Africa, the indigenous Africans has been living peacefully and happily together through cooperation. Hence, cooperation is a way of people organising themselves into groups with a view of deriving mutual benefits from such cooperation dates back to human existence especially in African countries including Nigeria. Tribes and ethnic groups were organised as cooperative structures, allocating jobs and resources among each other, only trading with the external communities. A cooperative society is an autonomous association of persons who voluntary cooperate for their mutual, social, economic, and cultural benefit. Cooperative Societies are typically based on the cooperative values of "self-help, self-responsibility, democracy and equality, equity and solidarity" and the seven norms of co-operative societies which include voluntary and open membership; democratic member control; economic participation by members; autonomy and independence; education, training and information; cooperation among co-operatives and concern for community must be present. Since it is common knowledge that the government cannot meet the needs of the populace at all times, the populace must not fold their arms and suffer in perpetuity, hence the emergence of many co-operative societies in Nigeria.

Aston (2011) identified co-operative societies to be the instruments that provide a direct stake in major economies for people and communities by creating powerful incentives for local social cohesion and cooperation, as well as at regional and national levels. He noted that cooperatives have proven themselves to be potent developmental tools around the world through the employment of 20% more than corporations and with more than 800 million members internationally as well as nearly half of the world's population benefiting directly from their membership and participation. He concluded that co-operative societies are

arguably the most representative business model to the concept of Ubuntu in South Africa.

6.1 Co-operative Societies in Nigeria

Yebisi (2014) noted that the gradual denudation of the Nigerian traditional communal welfare system by colonialist and neo-colonialist to a society, where people tend to think of everything as business and essential services as being fragmented among investors, management and customers, that is, those who own, those who control and those who use, with each of the three elements looking after its own interests, are the very antithesis of co-operatives. Co-operative societies are enterprises in which owners, those who control and those who use are all the same people. Co-operative Societies like other business organisations are established to meet certain needs. They can be classified into four broad categories, according to the tasks performed. These include marketing, purchasing, service and processing associations (King, 1981).

According to Kareem, Arigbabu, Akintaro and Badmus (2012), there is hardly any workplace in Nigeria today particularly government establishments, where a cooperative society is not operational. Their operations are quite effective because transactions of money are carried out in conjunction with the employers on behalf of the staffs. For example, staff savings into cooperatives are deducted at source and repayment of loans is also done through deduction from staff salaries as instructed by the operators of the societies (Kareem, et al., 2012). The cooperative societies mobilise funds for use in the sectors where funds are needed and also create in the members' the spirit of savings. The motivation behind the formation of cooperative societies stems from the need to encourage thrift among members and to pool these savings into a fund so that members can borrow from the pool should the need to borrow arise. The depositors also constitute the borrowers most of who knows one another through some common bond and these pre-existing social connections help to circumvent problem of imperfect information and enforceability.

Cooperative societies are useful for providing easy access to "cash" in a convenient and less stringent manner. Members do not have to provide collateral for loans as required by banks. Loan processing is quick and usually available within one or two weeks. Loans from banks can take up to six months due to the demand for several documents and administrative processes to ensure that risks are minimised if not totally avoided. Cooperative societies' activities reduce considerably the level of poverty in the society by making loans more accessible to low income earners based on their saving capabilities. Cooperative members have been able to expand their businesses and by extension increase their profit margins and accumulate some savings in their accounts as a result of cooperative assistance. According to Kareem, et al., (2012) in their study concluded that co-operative societies have positive effects on members' welfare and that the role co-operative societies in poverty reduction and capital formation cannot be overlooked in the development process of any country, particularly in less developed countries like Nigeria. Studies by Akinwumi (2006) and Oladejo (2011) have shown that that cooperative society's approach provides the best

funding alternative to all other economic grouping and schemes. With 48,856 co-operative societies in South-western Nigeria as at September, 2012 according to Oladejo (2013), one can reasonably deduce that the spread of cooperative societies in the country contribute significantly to the provision of basic needs of members at low and fixed interest rates in the area of direct purchase and sale of food and household items from companies thereby eliminating middlemen, collective large scale farming, harvesting and sale of produce direct to end users, group acquisition of land for co-operative society members, housing development, provision of welfare bus services at lower transport charges, etc. each co-operative society decides its area of priority in terms of the pressing need of members.

6.2 Covenant University Staff Cooperative Society as the Case Study

Covenant University, Ota, Nigeria was established in year 2002 and by year 2006, Faculty and Staff of the University established and registered the Covenant University Staff Cooperative Multi-purpose Society as a means of relieving members from the stringent loan/overdraft conditions and bureaucratic delays of commercial banks. From 156 members in 2006/2007, the society has grown to 853 members by 2014/2015 as depicted in Figure 1. Presently members of Staff and Faculty of the University, across board, are members of the Co-operative Society.

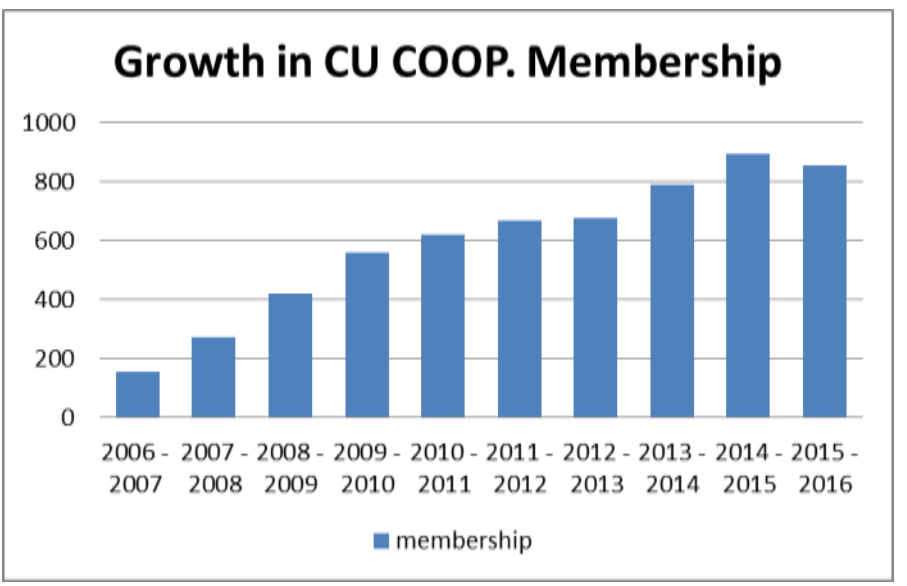

Figure 1: CU Cooperative Membership Growth Pattern (2006-2016)
Source: CUSCMSL, 2017

From Figure 1, it is also obvious that, apart from continuous growth in membership, there were steady increases in membership growth from inception up to 2014/2015 Cooperative year. One can attribute this development

to the consciousness the inherent benefits accruable to members. The drop in membership during the 2015/2016 cooperative year has been attributable to the movement of a few members of staff and faculty to greener pastures outside the establishment.

The savings culture by members was pursued with vigour as a means towards empowering them to qualify for substantial loans with the duration for repayment and interest rate chargeable fixed jointly by all members at the general meeting of the society. Each member of the co-operative society is entitled to twice what he/she has as savings as loan at any point in time. The savings spread over 7 years is contained in Table 2.

Table 2: Members' Savings from 2009/10 to 2015/16 Cooperative Years

Groups	Savings by range (₦000,000)	Years of Operation						
		2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
A	Up to1	99.23	99.52	98.62	98.65	93.86	92.77	88.43
B	>1 – 2	0.77	0.32	1.25	1.25	5.23	6.32	9.59
C	>2- 3	-	0.16	0.13	0.10	0.80	0.71	1.65
D	>3 – 4	-	-	-	-	0.11	0.10	0.11
E	Above 4m	-	-	-	-	-	0.10	0.22

Source: CUSCMSL, 2017

A closer look at Table 2 shows a gradual upward movement in members' savings' spread across the groups. Members' savings increased from two million Naira ceiling to over two to three million Naira status for the periods 2010/11 through 2012/13 cooperative years. The increases in savings in the 2013/14 and 2014/15 cooperative years are worthy of note because the progress made is an indication of members" confidence in the good management of the society accounts as ell as the hope of ready-made loans at short notice.

Obtaining any type of loan from a commercial bank is a time consuming exercise. Apart from the need to meet loan requirements, the issue of unstable loan interest rate at short notice becomes a nightmare to borrowers. As a means of assisting members of the cooperative society, flat interest rates on facilities are spread evenly based on the periods of repayment as shown in Table 3

Table 3: Loan Facilities and Applicable Interest Rates

Loan Facility Types	Repayment Period (Months)	Applicable Loan Interest Rates (Flat)	Maximum Processing Time (Days)
Asset	12	10	5
Regular	Up to 6	5	5
	7-15	7.5	5
	16-24	10	5
Overdraft	1	5	3

Source: CUSCMSL, 2017

From Covenant University Staff Cooperative Multi-purpose Society, every member has a right to apply at will for all types of loan by seeking the

backing of two members of the co-operative as guarantors of such loan on each occasion. Approvals are obtainable with cheques available for collection within three and five working days if the loan application form is satisfactorily filled.

Asset loans are approved for members who intend to acquire items such as household furniture and fittings, electronics, laptops, equipment, etc. The Cooperative Society encourages members to acquire such items, either through direct acquisition by the Cooperative Society from organisations and companies dealing with such items on behalf of members or acquire same items directly after obtaining the asset loan. Such a loan is repayable within a period of twelve calendar months at a fixed 10% interest rate.

Regular loan is of three types. Loans payable within six months attract a 5% interest rate while loans repayable between seven and fifteen months attract an interest rate of 7.5%. The third group consists of loans repayable between sixteen and twenty-four months. This group attracts a 10% interest rate.

A man is considered poor when he cannot meet either his basic needs (such as easy payment of children school fees, buying of or replacement of ageing car, building a house for the family, etc.) or sudden needs of the family (such as cater for sick immediate family members or parents and other family emergencies). To eradicate such poverty stigma, the overdraft window was created with the fastest processing time of three days maximum depending on the urgency. All loans applied for is subject to the applicant's ability to repayment through direct deduction from applicant's monthly salary.

From the in-depth interviews with members of the Cooperative Society, most regular need of members centred on payment of school fees from Nursery to the University levels. This is evidenced by the high rates of loans being applied for and granted as shown in Table 3.

Although the University provides accommodation for both Staff and Faculty, yet the urge by most faculty and staff to have their personal houses is still there. This desire motivated the cooperative society to acquire three sites that have provided land for housing development for 236 members at affordable purchase prices. The documentations needed (land survey, estate lay-out design and government approval as well as Certificate of Occupancy processing) which are often cumbersome, time consuming and costly to obtain individually, are being handled corporately by the officers of the Society, with ease. The group efforts at land acquisition had eliminated the rampant family challenges and in-fighting especially from ubiquitous "Omo Onile" and unending litigations which are common in individual land acquisition processes. Much as prices of plots of land for development varies from one zone or area to another, depending on the location and the family owning such lands, the Society has been able to acquire or secure plots of land at approximately half of the selling/purchase prices which would have been incurred had it been such plots of land had been acquired individually. Same goes for the "Omo-onile development fees. One of the major benefits of the decision of the Society to acquire land for members is the fact that the purchase of each plot of land is permitted to be paid for by all

members in instalments through deductions from members' salaries so as to carry all income groups along.

A thorough look at the loan business circle indicated a gradual loan request increase from the 2012/13 across to the 2014/15 Cooperative year from three to five million Naira demand, the spread of loans granted depict a unique pattern and increases upwards on yearly basis culminating in 0.58% of loan applicants taking loans of three million Naira and above.

Table 4: Spread of Loans Granted from 2009/2010 to 2015/2016 Co-operative Years

Loans by range (N'000,000)	Cooperative Years of Operation						
	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Up to1 m	90.03	90.18	93.94	84.03	59.02	76.68	75.54
>1m - 2 m	7.38	8.33	5.32	12.67	10.08	16.45	21.58
>2m - 3 m	1.59	1.59	0.92	2.72	4.33	3.99	2.58
>3m – 4m	-	-	-	0.58	5.60	2.24	0.30
>4m – 5m	-	-	-	-	0.72	0.64	-
>5m	-	-		-	-	0.16	-

Source: CUSCMSL, 2017

In-depth interview of members of the Cooperative Executives indicated that a reasonable number of Staff and Faculty have buildings which are at the various stages of completion outside the co-operative housing estate. The rate at which Staff and Faculty send their children to fee paying private schools (Nursery, Primary, Secondary, Polytechnics and Universities); acquiring exotic cars and investing in real estate, can be seen simply as an attempt at eliminating poverty of any type in the near future. This is another means of consciously "moving people to the next level" with ease in the face of harsh economic conditions being experienced by the generality of citizens in Nigeria.

7. Conclusion and Recommendation

The cooperative society has been a blessing in situations where Institutions and organizations where such are hosted join hands with the officers of the Society especially as it relates to savings contributions and loan repayment deductions from source. The existence of a Cooperative society relieves the host community of incessant requests for financial support in form of loans to meet staff pressing financial needs. As a society, government needs to encourage the growth and sustenance of cooperatives in Nigeria with a view to eliminating poverty amongst the citizens in the country. However, if the three arms of the Nigerian government fail to get the Cooperative movement off the ground, one of the most potent developmental tools available to those most in need may be wasted thereby rendering the masses powerless and perpetually poor.

References

Ademiluyi, I. A. (2010) Public Housing Delivery Strategies in Nigeria: A Historical Perspective of Policies and Programmes: *Journal of Sustainable Development in Africa*. 12(6) Clarion University of Pennsylvania, Clarion, Pennsylvania

Agbola, T. (1998) Housing of Nigeria: A Review of Policy Development and Implementation, Research Report, No. 14,ii

Akniwumi, J. (2006) "Road Map to Re-engineering Cooperatives in Nigeria" A Paper

Presented at the South-west Cooperative Leaders conference, Organised by Cooperative Federation of Nigeria South-west Zone at Obisesan Hall, Ibadan, 7th September

Aston, A. (2011) "Cooperative for Development" The South African Civil Society

Information Service, 25th January. E:/Co-operatives for Development SACSIS_org_za_1.mht

Ayedun, C.A. and Oluwatobi, A.O. (2011) Issues and Challenges Militating Against

Sustainability of affordable Housing Provision in Nigeria; *Business Management Dynamics*, 1(4):1-8

Diogu, J.O. (2004) "Middle Income Mass Housing: A Methodical Approach" *Journal of Association of Architectural Educators in Nigeria*, 3(1): 24-29

Ewubare, D.B. Aiie, H.A, Akekere, A. (2005). *Financial Institutional and Market*, Pearl Publishers, Port Harcourt

Faleti, A. (2007) "Commercial Banks and Mortgage Financing: Challenges, Growth and Opportunities in Mortgage Creation and Origination" A Paper Presented at the National Workshop of Association of Housing Corporation of Nigeria, Ota, October, 23-24.

Freeman, R.F. (1984) Strategic Management: A Stakeholders Approach, Boston, MA: Pinnan

Kreem,R.O., Arigbabu, Y.D., Akintaro, J.A. and Badmus, M.A. (2012) "The Impact of Co-operative Society on Capital Formation(A Case Study of Temidire Co-operative and Thrift Society, Ijebu-Ode, Ogun State, Nigeria)" *Global Journal of Science Frontier Research Agriculture and Veterinary Sciences*, 12(11):17-29

King, R. (1981) "Cooperative Policy and Village Development in Northern Nigeria" in Judith Heyer, Pepe Roberts, and Gavin Williams (eds.), *Rural Development in Tropical Africa* New York, pp. 259-280

Komolafe, B. (2013) "Cooperative Societies: Untapped Investment Opportunities", *Vanguard Newspaper, Vanguard Media Ltd.* Sunday, December, 8

Lemo, T. (2007) "Liberalisation of the Housing Market and the Fiscal Policy for an Effective Mortgage Creation and Origination" A Paper Presented at the National Workshop of Association of Housing Corporation of Nigeria, Ota. October 23-24

Mabogunje, A.L. (2003). Welcome Address at the Stakeholders

Forum on *Strategies for Enhancing Domestic Production of Building Materials for Mass Housing Development in Nigeria* held at NICON Hilton Hotel, Abuja, 24th September.

Moruf, O.M. (2013) "Does Co-operative Financing Method Influence Micro Credit Delivery? An Empirical Investigation of South-western States of Nigeria" *International Journal of Academic Research in Management (*IJARM) Vol. 2(4):109-124

Odu, N.M. (1992) Perspective on National Housing Policy *Housing Today,* Lagos 8(3): 5-8

Ogunsemi,D.R., Asaju, A.S. and Mordi, J.J. (200) "An Appraisal of Mass Housing

Development in Nigeria: A Case Study of Federal Housing Authority" *Journal of Environmental Technology,* 1(10): 16-29

Oladejo, M.O. (2011). The Nigerian Microfinance Policy: A Perspective from Cooperative Societies *International Journal of Economic Development Research and Investment,* 2(1):127-138

Onibokun, A.G. (1983) "housing Needs and Responses: A Planner's View" *Journal of the Nigerian Institute of Town Planners* 11 (1&2)

UN-Habitat (2005) "Financing Urban Shelter" Global Report on Human Settlements

United Nations (2002) A United Nations Report on Human Settlement: The Changing Shelter Policies in Nigeria. Retrieved from: www.un-habitat.org

Walley, S. (2010) Housing Finance in Africa: Are We Post Crisis Yet?" Presentation to the African Union for *Housing Finance Annual Conference,* 22 September

Yar'adua, U.M. (2007) Presidential Address at the 2nd International Seminar on Emerging Urban Africa. Held at Sheu Musa Yar'adua Conference Centre, Abuja, Wednesday, 17th October.

Yebisi, E.T. (2014) The Nigerian Cooperative Societies Act, 2004: A Bridge Still Far. *Asian Journal of Humanities and Social Sciences* (AJHSS), 2(2): 38-49. May

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Effects of Levels of Residents' Participation in House Design on Residential Satisfaction in Public Housing Estates in Akure, Nigeria

Alexander Adeyemi Fakere

Department of Architecture,
Federal University of Technology, Akure
Email: *aafakere@futa.edu.ng*

Abstract: The goal of housing projects is to provide satisfactory environments for its users, which could be regarded as an achievement on its own, if successful. Conversely, failed projects could result from unsatisfactory environments and such might lead to other problems such as abandonment. Residents' participation is a way of ensuring that housing environments are designed to suit the lifestyles of users in order to achieve residential satisfaction. This paper examined the relationship between the level of residents' participation and residential satisfaction in public housing estates in Akure, Nigeria. It also examined the relationships between their level of participation in house design and satisfaction with attributes of the house. Data were obtained through questionnaire, focus group discussions (FGD) and observations were used to elicit relevant data for this study. Data obtained were analysed using Single-Factor Descriptive Analysis, Spearman Rank Correlation and Weighted Mean. Findings showed a positive relationship (p=0.000) between residents' participation in the design of their houses and satisfaction with specific attributes of the house. The study also found that residents' participation have the most influence of satisfaction with the general plan of the house, size of bedrooms and rental/building cost. It recommends higher level of participation in house design in order to achieve higher level of satisfaction.

Keywords: design; house; public housing estates; residents' participation; satisfaction

1.0 Introduction

Lack of satisfactory housing is among the major problems bedevilling the housing sector in less developed countries like Nigeria (Amole, 2009; Ibem and Amole, 2011). Though it is

one of the aspects of the housing problems in Nigeria, it is very critical because it mostly affects the standard of living and influences the psyche of the citizens (Ibem and Amole, 2011). This makes residential satisfaction to be very crucial to designers and the users of housing. It is crucial because satisfactory housing indicates happiness, well being, and a good quality of life (Elyes and Wilson, 2005).

Hitherto, in order to achieve satisfactory housing, it is important to understand the contextual and appropriate needs of those that will make use of it. This is in order to ensure that the house is designed according to their contextual needs; because 'one size does not fit all'. This is where users' participation in housing design comes in. To assume that users' needs are sufficiently catered for, once the space dimensionally accommodates them, is wrong if their behaviour in space is misunderstood (Fakere, Arayela and Folorunso, 2017). Rapoport (2005) averred that to ensure a suitable design of spaces for people, it is imperative to understand their activities and activity systems. Activities and activity systems are embodiments of behaviours in space, which are offshoots of their beliefs and values. There is therefore, the need for the involvement of the users in the design process of a particular residential environment, so that residential satisfaction can be achieved. The users of housing in this context are the people residing in the houses; therefore, users and residents will be used interchangeably in this study.

The roles and performances of housing design professionals, especially architects, in identifying the housing problems of the nation are of paramount concern (Olotuah and Ajenifujah, 2009). One of such problems is the identification of how participation leads to satisfaction, and which aspects of satisfaction with housing attributes are mostly influenced by participation in the design process. Most studies (Carrol and Rosson, 2007; Erinsel-Onder, Koseoglu, Bilen and Der, 2010; Ammar, Ali and Yusof, 2013) that examined this subject looked at the general relationship between participation and satisfaction, but not on how residents' participation in the design process influences satisfaction with the specific attributes of the house. Hence, more research is required in this light to identify the satisfaction attributes of the house most influenced by participation, and not only in a general sense.

Though, generally, users' participation in design usually leads to satisfaction, is it actually the case with every attribute of the house? Are there some aspects of the house where participation would not necessarily lead to satisfaction? What attribute of the house are users most likely to be satisfied with when they participate in the design of the house? In other words, how will participation predict satisfaction with specific attributes of the house? This study sets out to provide answers to these questions. Such evaluations of housing provides the basis for taking decisions regarding improvements in existing housing stock and concerning the design and development of future housing (Amole, 2009).

The aim of this paper, therefore, is to examine the relationship between the levels of participation in house design and residential satisfaction in public housing estates in Akure, Nigeria. It examines how satisfied residents are with specific attributes of the house based on their level of participation in

the house design process. Therefore, the study identified the level of residents' participation in house design in the study area, as well as the level of residents' satisfaction with specific attributes of the houses in the study area. It also examined the relationship between the level of residents' participation in house design and satisfaction with the house in the study area.

2.0 Review of Related Literature

2.1 Overview of the Concepts of Participation and Residential Satisfaction

Current trend in housing research shows that, due to lower levels of residential satisfaction, there is a growing interest in the study of participation of residents in public house design. Jiboye (2012) stated that, in developing countries like Nigeria, majority of the public and private residential projects were unsuccessful mainly due to lack of consideration for residents' requirement or how their residential needs could be satisfied. For this reason, studies on residents' participation have become essential in housing studies.

According to Isa and Jusan (2012), residents' participation is the involvement of the expected benefactor of a particular project in order to make their interest and desired contribution as part of the project quality. Residents' participation is a categorical term for resident's power (Arnstein, 1969). It is the redistribution of power that enables those usually excluded from programmes that affect their lives to be deliberately included in the future (Arnstein, 1969). Residents' participation in house design is the process, which enables communication, cooperation, and collaboration between the user and architect about the form, nature and character of a residential space in order to achieve residential satisfaction.

Users' participation creates an opportunity to meet the varied and changing needs of the users (Ettouney and Kader, 2003). Isa and Jusan (2012) stated that users' participation in the housing process allows beneficiaries make amendments right from the design thoughts according to their needs of spaces. In the participatory process, the architects contribute their knowledge about the built environment, and the users contribute their personal experiences from living in different places; a participatory process is therefore an educational process, not only in terms of giving and receiving but also of sharing knowledge (Rivera, 2011). This makes the process of participation to be unique because, it brings different experiences to bear on the product (house). This has been referred to as 'collective intelligence'. Collective intelligence, as described by Atlee (2003), is a shared insight that comes to be through the process of group interactions, especially where the result is more insightful and powerful than the sum of individual perspectives. Fischer, Giaccardi, Eden, Sugimoto and Ye (2005) stated that collective intelligence have been identified as a factor partly responsible for positive outcomes in participatory design processes. By this approach, the synergy between the architect and the user would usually lead to a better outcome than when it is through individual perspectives.

Jones, Petrescu and Till (2005) observed that if people are to feel a sense of belonging to their place of abode, an involvement in design of such spaces is a good starting point. This shows that a

sense of belonging can also lead to higher level of satisfaction. Ensuring that users participate in the design process of their houses is one of the major ways of ensuring that their housing needs are met in such houses. Moreover, if the house is designed to suit their lifestyles, it would likely lead to higher level of satisfaction.

The levels of participation in house design as used in this study are in line with Wandersman (1979) who highlighted types of design participation. These include: (a) the resident designs his own house without predetermined givens from the designer; (b) the resident develops several design options from components already available and selects the one he wants; (c) the resident chooses between several design options that were generated by the designer; (d) the resident gives information or feedback to the designer describing definite and required activities or feedbacks about the design, but has no actual control over the process; and (e) the resident has no choice or feedback about the house design. The first and the last ones are the most extreme of the types because they give total control of the process to the user and the designers respectively.

Furthermore, Wulz (1986) developed a design participation continuum, which includes seven stages namely: self-decision, co-design, alternative, dialogue, regionalism, questionnaire, representation. Wulz (1986) described the three stages of design participation. Representation, questionnaire and regionalism refer to situations where the architect does not have any form of contact with the would-be users and the designs are produced with respect to the architect's reflection on his personal and subjective interpretation of the users; the perceived general characteristics of anonymous users; and the historical and cultural heritages of the specific localities based on their symbols, forms, architectural expression and spatial behaviour respectively (Wulz, 1986). These three stages conform to the last type (e) of design participation based on Wandersman (1979). Dialogue refers to informal conversations between the architect and the users and conforms to type (d) in Wandersman (1979). Alternative refers to where the architect gives users a chance to choose among alternative designs prepared by him and it conforms to type (c) in Wandersman (1979). Co-decision refers to where the users do the design along with the architect throughout the design process and conforms to type (b) in Wandersman (1979). While, self-decision refers to where the users fully control the whole design and construction process (Wulz, 1986), and conforms to type (a) in Wandersman (1979). These were used to define the levels of participation in house design for this study.

A household's satisfaction with their home is a sign of quality of life as it suits their aspirations and needs (Waziri, Yusof and Salleh). It is the feeling of gratification when one has or achieves what one needs or desires in a house (Mohit, Ibrahim and Rashid, 2010). Housing satisfaction is the degree of happiness experienced by a family with reference to the existing housing situation, and it is a non-economic and normative quality evaluation approach to assess the quality of the housing unit (Ogu, 2002). Likewise, it refers to the level to which the residents are happy with what their home offers to suit their natural lifestyles.

It has become necessary to understand the impacts of housing environments on its users in order to identify areas for improvements. In this wise, housing satisfaction is a very useful criterion in the evaluation of housing because it indicates the general levels of success, measures the users' affective and cognitive responses, points out the irksome aspects of dwelling environments and predicts user responses to future environments (Amole, 2009). Architects, planners, developers and policymakers have used housing satisfaction as a key indicator and predictor in judging the success of housing projects in several spheres (Mohit, Ibrahim and Rashid, 2010). Achieving residential satisfaction could lead to fulfilment of the cultural values of the residents, since people usually hold their cultural values in high esteem (Hadjiyanni, 2005). It could be used as a measure to assess the success or failure of public and private residential projects. Satisfaction with the living conditions indicates that there is little or no complaints about the housing units since the needs and aspirations of the residents are fulfilled in it (Abdul-Ghani, 2008). Usually, higher level of residents' participation in house design should lead to higher level of residential satisfaction, and vice versa.

The process of involving residents' in design projects can help reduce government expenses and the time wasted in ruminating about the possible users' characteristics and needs to be incorporated in housing projects (Isa and Jusan, 2012). If participation is lacking in a residential project, it manifests in creating a housing environment that is unsatisfactory to residents and hence, encourage non-occupancy because of low level of satisfaction (Isa and Jusan, 2012).

Rapoport (2005) averred that, it is necessary for housing environments to be supportive to the lifestyles of the people that will use it. Residents' participation has the potential to help building experts and housing agents to develop affordable and acceptable housing units (Isa and Jusan, 2012). One of the means to improve the overall performance of buildings is by studying and understanding users' needs, aspirations and expectations through constant performance evaluation of buildings (Fatoye and Odusami, 2009). The residents should be allowed to participate in the design of their houses through a collaborative means that seeks to identify the aspirations and needs of the homeowners (Adedayo, 2012).

3.0 The Study Area

Akure is the capital city of Ondo State in South-western Nigeria. It is an agrarian and educational centre situated in the central part of the State. Akure is a medium sized city with population of 360, 268 people according to the 2006 National Population and Housing Census (FRN Gazette, 2009). Due to the population increase, the challenges of housing have increased. It is located about 311km North-east of Lagos, about 370m above sea level. In addition, the State is an oil producing state, and has been classified as a Millennium Development City. All these factors collectively influence population growth of the city.

The three housing estates are located within the city at different areas. Ijapo Housing Estate is located within the peripheral zone of the city in close proximity to Oke Ijebu roundabout. It is a mixture of prototype-housing design and site-and-services. Alagbaka Housing Estate Extension is also located in the peripheral zone of the city in

close proximity to the Bishop's Court roundabout. It is a site-and-services estate where the residents purchased the land from the government in order to build by themselves while government provides the services. Conversely, Sunshine Gardens Housing Estate in located in a suburb of the Akure city called Oba-Ile. It is a prototype-housing estate built through Public-Private Partnership between the State government and a private developer, who built all the houses and provided the services, while the users purchased the already finished houses. Figure I shows the locations of the estates that make up the study area represented with large dots.

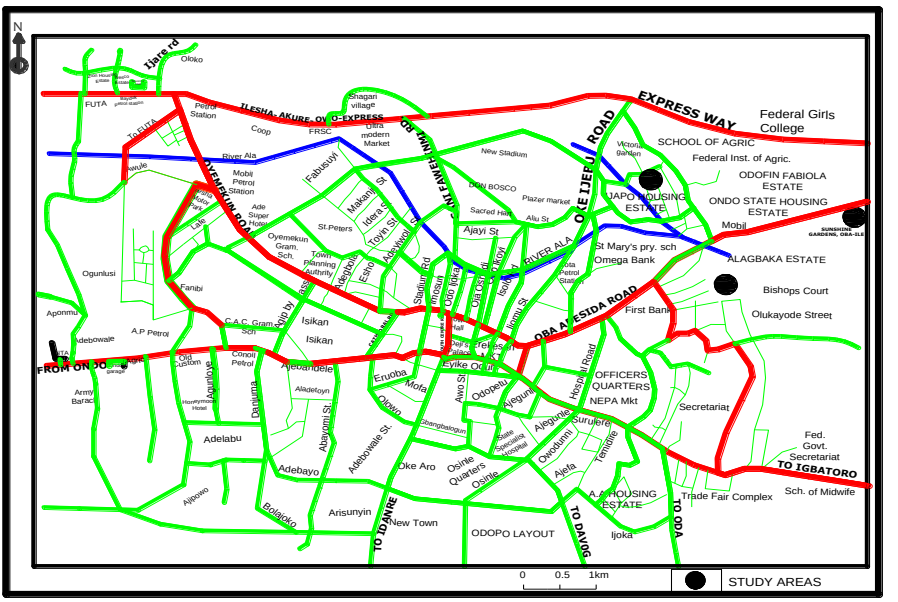

Figure I: The Street Map of Akure showing the Study Area
Source: Ministry of Housing and Urban Development Akure

4.0 Methodology

This study relied on primary data collected through structured questionnaire and focus group discussions (FGD) and observations. The questionnaire was designed and administered on the three housing estates studied namely: Ijapo (IHE), Alagbaka Extension (AHEE) and Sunshine Gardens Housing Estates (SGHE). The number of housing units in IHE is 600, while for AHEE and SGHE are 308 and 176 respectively. This brings the total housing units for the study area to 1,084 buildings. The sample size for the study was 651. This translated to sample sizes of 360, 185 and 106 for IHE, AHEE and SGHE respectively. Simple random sampling was used to select the houses that were studied and heads of households in each house were the focus of questionnaire administration and other research enquiries. The percentage return for the questionnaires across-board was 69.8%. These were used for analysis in this research and the results are presented below. Spearman Rank Correlation and Weighted Mean were used in the analysis for this research.

Spearman Rank was used to analyze the relationship between the level of participation and the level of satisfaction. The formula for calculating Spearman rank correlation is:

$$\rho = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

.....Equation 1

Where ρ is: rank coefficient
n is: the number of cases
d is: the difference in the ranks

Weighted mean is a kind of average; instead of each data point contributing equally to the final mean, some data points contribute more "weights" than others do (Theme Horse, 2016). Weighted mean was used to rank the attributes of satisfaction with the house by generating the mean satisfaction score (MSS). The attributes higher on the ranking suggest the ones that the respondents were more satisfied with, while the ones lower on the ranking suggests the ones they were less satisfaction. The formula used for calculating weighted mean is:

$$\text{Weighted mean} = \sum wx / \sum w$$ .....Equation 2

Where $\sum$ = the sum of all the points; w = the weights; x = the values

5.0 Results and Discussions

5.1 Level of Participation in House Design

It is pertinent to understand the level of residents' participation in house design in the study area. Table I reveals that, in the study area, 70.3% did not participate at all in the design of their residences, 17.1% discussed their needs with the architect who took the final decisions on the design, 6.8% chose the design from alternatives developed by the architect, 3.7% designed the plan from available components while making consultations with the architect, while 2% designed their houses without any restrictions from the architect. This means that, majority of the respondents did not participate in the design of their houses either as a result of being renters or because they bought the houses after the buildings were already completed. For IHE, the percentages are 74.6%, 14.2%, 7.5%, 2.1% and 1.7% respectively. For AHEE, the percentages are 46.3%, 31.6%, 9.6%, 8.8% and 3.7% respectively. However, in SGHE, the percentages are 98.7%, 1.3%, 0%, 0% and 0% respectively. These show that most residents in the study estates did not participate in the design of the houses of their abode. This result agrees with Jiboye (2012) which found that in majority of the housing projects in developing countries like Nigeria, residents do not participate and this usually leads to lower levels of residential satisfaction. Because, the residents' abodes were not designed according to their lifestyles, they would have to adjust themselves to the houses or relocate.

Table I: Level of residents' participation in house design in the study area

Participation in House Design	IHE Freq. (%)	AHEE Freq. (%)	SGHE Freq. (%)	Total Freq. (%)
I did not participate in the house design	179 (74.6)	63 (46.3)	78 (98.7)	320 (70.3)
I discussed my needs with the architect who made the final decisions	34 (14.2)	43 (31.6)	1 (1.3)	78 (17.1)
I chose the design from alternatives developed by the architect	18 (7.5)	13 (9.6)	0 (0)	31 (6.8)
I designed the house from available components while making consultations with the architect	5 (2.1)	12 (8.8)	0 (0)	17 (3.7)
I designed the house without any restrictions from the architect	4 (1.7)	5 (3.7)	0 (0)	9 (2)

5.2 Level of Satisfaction with Several Attributes of the House at IHE

Table II to V shows the satisfaction ratings of respondents with house design in the study area. The satisfaction levels of the respondents are measured with Likert scale: VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied. These were used to generate the mean satisfaction scores as presented in the tables.

Table II shows the respondents' responses to satisfaction with the attributes of the house for IHE. The attributes are ranked according to their positions as determined by the MSS. The highest in the ranking is satisfaction with quietness in the neighbourhood and it had the highest MSS of 4.03. The lowest ranked variable in the table is satisfaction with landscaping of the plot with MSS of 3.42. This implies that the respondents at IHE were most satisfied with quietness in the neighbourhood, and were least satisfied with landscaping of the plot.

The other satisfaction variables according to their MSS are: level of privacy (4.01), adequacy of natural ventilation (3.94), adequacy of natural day lighting (3.94), size of bedrooms (3.85), overall size of the house (3.82), size of the living room (3.81), number of bedrooms in the house (3.81), toilets (3.75), general plan of the house (3.70), size of the kitchen (3.70), building materials (3.55), and aesthetics (3.47). The reason that respondents in this estate were mostly satisfied with quietness in the neighbourhood is because most estates in Nigeria are usually where the high-income group of the society live which usually are very quiet environments. Respondents were also highly satisfied with adequacy of natural ventilation and day lighting. This is because since there is development control in the estate, there is adequate spacing between the buildings, which enhances ventilation, and day lighting.

Table II: Residents' responses to satisfaction with housing design and mean satisfaction level for IHE

Satisfaction Variables	VD	D	N	S	VS	MSS N=240	Position
Quietness in the neighbourhood	8	15	16	124	77	4.03	1
Level of privacy	12	132	72	10	14	4.01	2
Adequacy of natural ventilation	8	18	16	136	62	3.94	3
Adequacy of natural day lighting	8	23	20	134	55	3.94	3
Sizes of bedrooms	8	32	5	139	56	3.85	5
Overall size of the house	8	21	20	148	43	3.82	6
Size of the living room	8	35	5	138	54	3.81	7
Number of bedrooms in the house	6	32	9	148	45	3.81	7
Toilets	13	21	16	152	38	3.75	9
General plan / design of the house	10	31	13	154	32	3.70	10
Size of kitchen	14	32	14	133	47	3.70	10
Building materials	14	43	17	129	37	3.55	12
Beauty of the house (aesthetics)	9	53	32	108	38	3.47	13
Landscaping of the plot	13	59	24	102	42	3.42	14

VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied

5.3 Level of Satisfaction with Several Attributes of the House at AHEE

Table III shows the respondents' responses to satisfaction with the attributes of the house and infrastructure for AHEE. The attributes are arranged according to their positions as determined by the MSS. Most of the respondents were satisfied with quietness in the neighbourhood and it had the highest weighted mean rating of 4.20, and therefore was highest on the ranking (1). The lowest ranked house attribute in the table was landscaping of the plot with MSS of 3.63, and therefore was lowest in the ranking (14). This implies that the respondents at IHE were most satisfied with quietness in the neighbourhood, and were least satisfied with landscaping of their plots.

The other satisfaction variables ranked according to their MSS are: number of bedrooms in the house (4.10), level of privacy adequacy (4.03), adequacy of natural ventilation (3.95), size of bedrooms (3.93), size of the living room (3.86), toilets (3.85), overall size of the house (3.82), adequacy of natural day lighting (3.79), general plan of the house (3.78), size of the kitchen (3.73), aesthetics (3.73), and building materials (3.67). Just like for IHE, the highest ranked satisfaction variable is quietness in the neighbourhood and this is because residential estates in Nigeria are usually very quiet environments due to the category of residents. The level of privacy in this estate is also very high which means that the design of the houses allows them to have their privacy.

Table III: Residents' responses to satisfaction with housing design and mean satisfaction level for AHEE

Satisfaction Variables	VD	D	N	S	VS	MSS N=136	Position
Quietness in the neighbourhood	3	8	2	69	54	4.20	1
Number of bedroom in the house	3	9	0	84	40	4.10	2
Level of privacy	5	9	5	75	42	4.03	3
Adequacy of natural ventilation	6	7	11	76	36	3.95	4
Size of bedroom	3	19	2	73	39	3.93	5
Size of the living room	4	20	2	75	35	3.86	6
Toilets	4	17	5	80	30	3.85	7
Overall size of the house	5	17	4	81	29	3.82	8
Adequacy of natural day lighting	6	12	16	73	29	3.79	9
General plan / design of the house	7	15	3	87	24	3.78	10
Size of kitchen	6	23	3	74	30	3.73	11
Beauty of the house (aesthetics)	3	19	9	86	19	3.73	11
Building materials	9	18	1	89	19	3.67	13
Landscaping of the plot	7	23	4	81	21	3.63	14

VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied

5.4 Level of Satisfaction with Several Attributes of the House at SGHE

Table IV shows the respondents' responses to satisfaction with the attributes of the house for SGHE. Most of the respondents were satisfied with adequacy of natural ventilation and it had the highest MSS of 3.92, and therefore had the highest ranking (1). The lowest ranked house attribute was building materials with MSS of 2.19, and therefore had the lowest ranking (14). This implied that the respondents at SGHE were most satisfied with adequacy of natural ventilation, and were least satisfied with the building materials used. Generally, the respondents were not satisfied with the house attributes in this estate. This could be attributed to the very low level of participation (98.7%) in the design of their houses.

The other satisfaction variables according to their MSS are: number of bedrooms in the house (3.82), quietness in the neighbourhood (3.76), adequacy of natural day lighting (3.76), level of privacy (3.47), aesthetics (3.35), toilets (3.19), landscaping of the plot (3.15), size of the living room (3.14), general plan of the house (3.05), overall size of the house (3.03), size of bedrooms (2.67), and size of kitchen (2.52).

This conforms to information from the FGD where the respondents stated that their bedrooms and kitchen were too small for them. In addition, they stated that the cost of the houses were too expensive compared to the size of the houses, building materials used and the quality of construction. Several of them stated that they do not intend living in the estate in the long term, and that they intended to acquire land, and build to their own taste. They stated that they would move into their new houses as soon as they are completed. In addition, they expressed their displeasure in being left out of the process of developing the estate.

The situation in SGHE appears to be peculiarly different from the other two estates. In IHE and AHEE, there were higher levels of satisfaction with the specific attributes of the house, than in SGHE. Majority of the respondents in SGHE were not satisfied with building materials used in construction, size of bedrooms, overall size of the house, and size of the kitchen: four out of the

fourteen attributes of the house used in this research. The reason for low level of satisfaction with houses in this estate could be attributed to non-involvement of the residents in the design of the houses. The developers designed, constructed and sold the houses to the residents without involving them at any level in the process of its development. This is very common in government-built housing programmes in Nigeria and the reason is that there is no genuine policy framework to carry prospective users along in the housing development process.

Table IV: Residents' responses to satisfaction with housing design and mean satisfaction level for SGHE

Satisfaction Variables	VD	D	N	S	VS	MSS N=79	Position
Adequacy of natural ventilation	1	2	7	61	8	3.92	1
Number of bedrooms in the house	0	8	5	59	7	3.82	2
Quietness in the neighbourhood	3	8	7	48	13	3.76	3
Adequacy of natural day lighting	2	3	11	59	4	3.76	3
Level of privacy	6	14	10	35	14	3.47	5
Beauty of the house (aesthetics)	6	11	13	47	2	3.35	6
Toilets	8	15	15	36	5	3.19	7
Landscaping of the plot	12	14	8	40	5	3.15	8
Size of the living room	8	22	4	41	4	3.14	9
General plan / design of the house	9	21	7	41	1	3.05	10
Overall size of the house	5	21	21	31	1	3.03	11
Size of bedroom	16	27	5	29	2	2.67	12
Size of kitchen	16	32	5	26	0	2.52	13
Building materials	34	22	5	17	1	2.19	14

VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied

5.5 Level of Satisfaction with the Attributes of the House in the Study Area (Total)

Table V shows the respondents' responses to satisfaction with the attributes of the house in the study area. Most of the respondents were satisfied with quietness in the neighbourhood and it had the highest MSS of 4.03, and therefore had the highest ranking (1). The lowest ranked house attribute was building materials with MSS of 3.33, and therefore had the lowest ranking (14).

The other satisfaction variables according to their MSS were adequacy of natural ventilation (3.94), level of privacy (3.92), number of bedrooms in the house (3.90), adequacy of natural day lighting (3.82), size of the living room (3.71), overall size of the house (3.68), toilets (3.68), size of bedroom (3.67), general plan/design of the house (3.61), aesthetics (3.53), size of kitchen (3.50), and landscaping of the plot (3.44). This means that people are most satisfied with quietness in the neighbourhood in the study area; it also means that quietness is important to the residents. As shown in the table, it is one of the main attributes that ranks highly in each of the estates and as a whole, while the other highly ranked housing attribute common in each of the estates is adequacy of natural ventilation. Satisfaction with the building material is the least ranked attribute in the study area and this can be attributed to the quality of building materials in the country. It is common in Nigeria for manufacturers of several building materials to reduce the quality

of their products in order to maximize profit. Moreover, this has a negative effect of the durability of such materials.

Table V: Residents' responses to satisfaction with housing design and mean satisfaction level in the study area (Total)

Satisfaction Variables	VD	D	N	S	VS	MSS N=455	Position
Quietness in the neighbourhood	14	31	25	241	144	4.03	1
Adequacy of natural ventilation	15	27	34	273	106	3.94	2
Level of privacy	23	3	29	242	128	3.92	3
Number of bedrooms in the house	9	49	14	291	92	3.90	4
Adequacy of natural day lighting	16	38	47	266	88	3.82	5
Size of the living room	20	77	111	254	93	3.71	6
Overall size of the house	18	59	45	260	73	3.68	7
Toilets	25	53	36	268	73	3.68	7
Size of bedrooms	27	78	12	241	97	3.67	9
General plan / design of the house	26	67	23	282	57	3.61	10
Beauty of the house (Aesthetics)	18	83	54	241	59	3.53	11
Size of kitchen	36	87	22	233	77	3.50	12
Landscaping of the plot	32	96	36	223	68	3.44	13
Building materials	57	83	23	235	56	3.33	14

VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied

5.6 Relationship between Residents' Participation in House Design and Residential Satisfaction in the Study Area

The research investigated the relationship between the level of residents' participation in house design and several satisfaction attributes of the house. This was necessary in order to identify the satisfaction attributes of the house that are significantly correlated with the level of participation and those that do not. It was also necessary to identify the ones that have a higher relationship with the level of participation compared with others.

Table VI shows the result of the Spearman Rank correlation between the level of residents' participation in house design and the individual attributes of satisfaction with the houses in the study area. It shows that the correlation coefficient of participation in house design with satisfaction with general plan of the house is 0.37; satisfaction with number of bedrooms (0.34); satisfaction with aesthetics (0.318); satisfaction with building materials (0.334); satisfaction with size of living room (0.273); satisfaction with size of bedroom (0.37); satisfaction with size of kitchen (0.333); satisfaction with overall size of house (0.303); satisfaction with toilets (0.331); satisfaction with natural day-lighting (0.236); satisfaction with natural ventilation (0.266); satisfaction with privacy (0.287); satisfaction with quietness in the neighbourhood (0.222); and satisfaction with landscaping (0.267).

Satisfaction with general plan of the house and satisfaction with the size of the bedroom (0.370) recorded the highest correlation values with level of participation with house design. This means that the level of participation had the most predictive effect on these two satisfaction attributes for this study. The lowest was with satisfaction with quietness in the neighbourhood (0.222), and it means that the level of participation in house design had the least predictive effect on this satisfaction attribute. The analysis was

carried out at an alpha level of 95% confidence and 0.05-significance level, but all were also significant at 0.000; meaning that there is absolute correlation between all the satisfaction attributes of the house and the level of participation in house design. This means that participation in the design of the house correlates significantly with all the satisfaction attributes of the house in the study area, though the relationship is moderately weak. Therefore, higher levels of participation in house design would lead to higher levels of satisfaction with the house.

In addition, the highest correlation in the table (0.726) was between satisfaction with size of bedroom and satisfaction with size of living room, and the lowest correlation (0.206) was between satisfaction with adequacy of natural day lighting and satisfaction with landscaping of the plot. This means that the in the study area, residents are most likely to be satisfied with size of their living room when they are satisfied with the size of their bedrooms and vice versa.

Table VI: Matrix of Participation in House Design and Satisfaction with the Attributes of the House

	PD	GP	NB	AE	BM	SL	SB	SK	OS	TL	ND	NV	LP	QH	LS
PD	1														
GP	.370*	1													
NB	.340*	.453*	1												
AE	.318*	.483*	.401*	1											
BM	.334*	.537*	.425*	.516*	1										
SL	.273*	.407*	.433*	.440*	.514*	1									
SB	.370*	.461*	.445*	.401*	.509*	.726*	1								
SK	.333*	.438*	.402*	.416*	.519*	.587*	.659*	1							
OS	.303*	.467*	.518*	.438*	.546*	.622*	.623*	.598*	1						
TL	.331*	.462*	.446*	.412*	.465*	.433*	.508*	.482*	.554*	1					
ND	.236*	.368*	.369*	.243*	.293*	.315*	.323*	.304*	.345*	.465*	1				
NV	.266*	.320*	.298*	.245*	.242*	.284*	.325*	.257*	.309*	.384*	.623*	1			
LP	.287*	.342*	.274*	.245*	.318*	.268*	.369*	.289*	.288*	.312*	.306*	.398*	1		
QH	.222*	.285*	.358*	.263*	.247*	.227*	.296*	.307*	.262*	.295*	.243*	.339*	.560*	1	
LS	.267*	.393*	.319*	.416*	.364*	.313*	.364*	.295*	.316*	.294*	.206*	.253*	.364*	.295*	1

*: significant at 0.000

PD: Level of Participation in House Design

GP: Satisfaction with general house plan

NB: Satisfaction with number of bedrooms

AE: Satisfaction with aesthetics

BM: Satisfaction with building materials

SL: Satisfaction with size of living room

SB: Satisfaction with size of bedroom

SK: Satisfaction with size of kitchen

OS: Satisfaction with overall size of the house

TL: Satisfaction with toilets

ND: Satisfaction with natural day lighting

NV: Satisfaction with natural ventilation

LP: Satisfaction with level of privacy

QH: Satisfaction with quietness in the house

LS: Satisfaction with landscaping of plot

There was also a need to examine the relationship between the level of participation in house design and satisfaction with the house generally. The result is shown in Table VII. It tests for significant relationship between the level of residents' participation in housing design and their level of satisfaction with the house in the study area. Table VII shows the Spearman Rank Correlation results for relationship between level of participation in house design and satisfaction with the house. It indicated that the level of participation of residents in house design significantly (p = 0.000) associates with their level of satisfaction with the house in the study area and the Spearman Rank value is 0.479. Once again, it shows an absolute relationship between the level of participation in house design and the level of satisfaction. The test was carried out at an alpha level of 95% confidence and 0.05-significance level. It implies that the level of participation in house design has significant correlation with satisfaction with the house in the study area. Therefore, a significant relationship was found between the two variables. In other words, generally people living in the estates of study are likely to be more satisfied with their houses if they participate in the design of their house. This is in consonance with Isa and Jusan (2012), and Carrol and Rosson (2007), which stated that there is a relationship between residents' satisfaction and participation in house design. This also explains the very low level of residential satisfaction found in SGHE.

Table VII: Spearman Rho Correlation between level of participation in house design and satisfaction with the house in the study area

		Spearman's rho Correlation	Significance, p-value	Remark
Total	Level of participation in house design	0.479	0.000	Significant
	Satisfaction with the house			

6.0 Conclusion

This paper examined the relationship between the level of residents' participation in house design and the level of residential satisfaction in public housing estates in Akure. It took a close look at how participation of residents' in house design influences their level of satisfaction with several attributes of the house. Then, it examined the relationship between the level of residents' participation and satisfaction with the house generally. These were done to understand how the level of participation predicts the level of satisfaction in specific attributes of the house. Majority of the respondents (70.3%) did not participate in the design of the houses of their abode. In addition, quietness in the house (MSS=4.03) was the attribute of the house that respondents were most satisfied with in the study area and therefore had the highest ranking. On the other hand, rental/building cost (MSS=3.25) was the attribute of the house with that they were least satisfied with and therefore had the lowest ranking.

The study also showed that there is indeed a significant relationship between the level of participation and the level of residential satisfaction in

public housing estates in the study area. The correlation coefficient of the relationship is 0.479. In other words, a higher level of participation would to lead to higher levels of residential satisfaction. This is in consonance with the findings of previous authors but in a general sense. The study also showed that there is a significant relationship between the level of participation and the level of satisfaction with individual attributes of the house. There was little or no research in this aspect and this study has assisted in providing an answer for that. It found a significant and absolute relationship between the level of participation and satisfaction with all fifteen attributes of the house used in this study. The residential satisfaction attribute with the highest correlation coefficients (0.370) with participation were general plan of the house, size of the bedrooms and rental/building cost. This implies that participation in house design influenced these three aspects the most in this study. It also influenced other attributes; however, the strength of the relationship was found to be lower. It also found a significant relationship (p= 0.000) between the level of participation in house design and satisfaction with the house generally.

The result of this study implies that, increasing the level of participation will influence all the aspects of satisfaction used in this study especially satisfaction with general design of the house, and size of the bedrooms. Therefore, residents' participation in the house design process is crucial to enhance the level of residential satisfaction in housing estates in Akure. Such information is required because it is the kind required by designers and policy makers for future housing developments. Therefore, Policy makers should ensure that people participate in the design of houses in public housing programmes.

7.0 References

Abdul- Ghani, S. (2008). Neighbourhood Factors in Private Low-Cost Housing in Malaysia. *Habitat International,* (32), 485-493

Adebayo, O. F. (2012). User Participation in Housing Unit Provision in Kwara State, Nigeria: A Basis for Sustainable Design. *Interdisciplinary Journal of Contemporary Research in Business,* 4(2), 723-732

Ammar, S. M. S., Ali, K. H. & Yusof, N. A. (2013). The Effect of Participation in Design and Implementation of Works on User Satisfaction in Multi-Storey Housing Projects in Gaza, Palestine. *World Applied Science Journal,* 22 (8), 1050-1058, doi:10:5829/idosi.wasj.2013.22.08.2842

Amole, D. (2009). Residential Satisfaction in Students' Housing. *Journal of Environmental Psychology*, 29, 76-85

Arnstein, S. R. (1969). A Ladder of Citizen Participation. *Journal of the American Institute of Planners, 216-224*

Atlee, T. (2003). The Tao of Democracy. The Writers Collective, Cranston, RI

Carroll, J. & Rosson, M. (2007). Participatory Design in Community Informatics. *Design Studies*, 28, 243-261

Chen, L., Zhang, W., Yang, Y & Yu, J. (2013). Disparities in Residential

Environments and Satisfaction among Urban Residents in Dalian, China. *Habitat International*, 40, 100-108

Erinsel-Onder, D., Koseoglu, E., Bilen, O. & Der, V. (2010). The Effect of User Participation in Satisfaction: Beyciler after earthquake Houses in Duzce. *ITU A/Z*. 7 (1), 18-37

Ettouney, S. M. & Abdel-Kader, N. (2003). Users' Participation in Low Cost Housing Projects: Post Occupancy Evaluation. *XXXI IAHS, World Congress on Housing, Housing Process & Product*, June 23-27, Montreal, Canada

Elyes, J. & Wilson, K. (2005). Housing and Neighbourhood Satisfaction and Health in Hamilton: An Exploratory Examination of Subjective Measures of Quality of Life. Paper presented at European Network on Housing Research (ENHR) Conference, Iceland, June 29 -July 2.

Fakere, A. A., Arayela, O & Folorunso, C. O. (2017). Nexus between the Participation of Residents in House Design and Residential Satisfaction in Akure, Nigeria. *Frontiers of Architectural Research*, http://dx.doi.org/10.1016/j.foar.2017.02.003

Fatoye, E. O. & Odusami, K.T. (2009). Occupants' Satisfaction Approach to Housing Performance Evaluation: The Case of Nigeria. *In Proceedings of the RICS COBRA Research Conference, University of Cape Town*, 10-11th September, retrieved at: http://www.rics.org/cobra (Accessed 22nd May, 2014)

Federal Republic of Nigeria (FRN, 2009). The 2006 National Population and Housing Census. FRN Official Gazette, 2 (96)

Fischer, G., Giaccardi, E., Eden, H., Sugimoto, M. & Ye, Y. (2005). Beyond Binary Choices: Integrating Individual and Social Creativity. *Human-Computer Studies*, 63, 482-512

Hadjiyanni, T. (2005). Culturally Sensitive Housing: Considering Difference. *Implications*, 3(1), 1-6

Ibem, E. O. & Amole, D. (2011). Assessment of the Qualitative Adequacy of Newly Constructed Public Housing in Ogun State, Nigeria. *Property Management*, 29 (3), 285-304. DOI: http://dx.doi.org/10.1108/02637471111139437

Isa, A. A. & Jusan, M. B. M. (2012). End-User Participation Approach towards Effective Housing Occupancy in Malaysia: A Review. *British Journal of Arts and Social Sciences*, 8(2), 183-197. Retrieved at http://www.bjournals.co.uk/BJASS.aspx (Accessed August, 20, 2014)

Jiboye, A. D. (2012). Post-Occupancy Evaluation of Residential Satisfaction in Lagos, Nigeria: Feedback for Residential Improvement. *Frontiers of Architectural Research*, 1, 236-243

Jones, P. B., Petrescu, D. & Till, J. (2005). *Architecture and Participation*. Taylor and Francis, New York

Mohit, M. A., Ibrahim, M. & Rashid, Y. R. (2010). Assessment of Residential Satisfaction in Newly Designed Public Low-Cost Housing in Kuala Lumpur,

Malaysia. *Habitat International*, 34, 18-27

Ogu, V. L. (2002). Urban Residential Satisfaction and the Planning Implications in Developing World Context: The Example of Benin City, Nigeria. *International Planning Studies*, 7, 37-53

Olotuah, A. O. & Ajenifujah, A. O. (2009). Architectural Education and Housing Provision in Nigeria. *CEBE Transactions*, 6(1), 86-102

Rapoport, A. (2005). *Culture, Architecture and Design.* Architecture and Planning Research Book Series, Locke Science Publishing Company, Inc. Illinois, USA

Rivera, O. (2011). *Participatory Process*. OIKODOMOS Housing Concepts. Education and Culture DG. Retrieved at: www.oikodomos.org/oikopedia

Theme Horse (2016). Weighted Mean: Formula: How to Find Weighted Mean. Retrieved at: www.statisticshowto.com/weighted-mean/ (Accessed March, 12, 2016)

Wandersman, A. (1979). User Participation: A Study of the Types of Participation, Effects, Mediators and Individual Differences. *Environment and Behaviour*, 11(2), 185-208. DOI: 10.1177/0013916579112003. Retrieved at: http://eab.sagepub.com/content/11/2/185

Waziri, A. G., Yusof, N. & Salleh, A. G. (2013). Residential Satisfaction with Private Estate Development in Abuja, Nigeria. *Alam Cipta*, 6(2), Universiti Putra Malaysia

Wulz, F. (1986). The Concept of Participation. In Sanoff, H. (Eds.). *Participatory Design*, Theory and Techniques Book Masters, Raleigh, North Carolina, 39-48

Covenant Journal of Research in the Built Environment (CJRBE) Vol. 5, No. 1, June 2017

An Open Access Journal available online

Effect of Industrial Pollution on Residential Neighbourhood: Amuwo Odofin Industrial Layout Lagos as Case Study

Ogedengbe Peter Shakede & Onyuanyi Ndubisi

Department of Estate Management
University of Benin, Benin City
Peter.ogedengbe@uniben.edu

***Abstract*:** Industrial activities are responses to the need to better the lots of man but these are not without attendant consequences on the environment. This paper examined the effect of industrial pollution on residential neighbourhood using Amuwo Odofin industrial layout as case study. A total number of 350 questionnaires were administered on the residents who were selected using stratified random sampling technique on one hand and 100 questionnaires on the industrial workers on the other hand to elicit information on the impact the industrial activities have on the neighbourhood. The workers were selected using systematic random sampling technique where the 1st and every 10th item were selected. Descriptive statistical techniques were used in analysing the data collected. The result showed that various forms of environmental pollution emanating from industrial activities are prevalent in Amuwo Odofin. The paper concluded that the industrial activities have negative effects on the neighbourhood and recommended amongst others that, there is the need for organizing seminars on environmental protection awareness for both entrepreneurs and individuals to create an awareness of the effect of the activities on the environment.

***Key Words*: industrialization, Environmental pollution, and Neighbourhood.**

Introduction and Problem

The environment is the complex of physical, chemical, and biological factors or processes which sustained life. Man is part of these components, which make up the planetary ecosystem. Science and history both agreed that environment existed before the advent of man. Thus, the environment proceeded man and by deduction it preceded human, technological and scientific development activities. It may be rightly said that this environment before the advent of man was ‘’unspoiled’’, the earth ‘s natural resources were not therefore given to man to ‘’destroy’’ , ‘’pollute’’ or degrade ‘’ (fubara, 1999).

Human activities however have contravened this natural and divine plan for the environment. The major alarming activity is production, which encompasses diverse industrial activities from petroleum refining to chemical processing, textile, food, biosynthetic production of these activities are useful to man; they however emit bye-products that constitute major pollution to the environment.

Industrial activities release major pollutants into the environment thereby causing air, water and land pollution, as well as noise. Industrial pollution is thus a threat to both human, animal and plant life and it affects the aesthetic quality of the environment. Noise, which could stress, related illness and diseases such as cancer, kidney failure nervous disorders, leukemia, mental retardation, hearing failure or total deafness is a fallout of industrial pollution.

The idea of development was considered by the government with the aim of putting a rise in the standard of living of every Nigerian by a growing output of goods and services. There was also a quest for civilization and modern life style without having a regard on the impact of these activities on the environment. Industrialization came into play and was seen initially as a sign of development but bore with it more complicated problems. Major activities during production process involve the use of chemical whose bye-products constitute industrial waste that are sometimes discharged carelessly into the environment through pipes, drains, air and land and find their way into water used for drinking , fishing and other purposes.

Literature suggests that industrial pollution in Amuwo Odofin has not been empirically linked with the neighbourhood.

This paper tries to examine the effect of industrial waste on residential neighbourhoods with particular reference to Amuwo Odofin industrial layout and it covers major aspects of human activity (Industrialization in particular) that can constitute pollution and environmental degradation and the effect of these on neighbourhoods around those activities.

Study Area

The paper focuses on the Amuwo Odofin industrial layout which situates in the western part of Lagos metropolis. It is about 40km from the capital of the state (ikeja) and the area is presently under the jurisdiction of Amuwo Odofin local Government. This area was initially manage by the old Badagry local Government before being divested into Amuwo Odofin local Government. Amuwo Odofin is bounded on the north by the major ojo town, on the south by Orile iganmi\coker, on the east by Oshodi/ llasamaja /mushin and on the west by Apapa seaport / kirikiri. It is one major town that has good accessible roads with a fedral government road named Ojo/Badagry express way that is plied by more than 50,000 automobiles per day (sofoluwe, 1997). Three major residential layouts are embedded in this local government (mile 2 low –cost housing estate, Amuwo Odofin GRA and festac town).

Relevant Literature

Ewekoro Cement Factory was used as a case study by Soleye (1963) documenting the effect of cement production, which builds dust on the immediate neighbourhood. The current study expanded on the scope of this study by going beyond cement industrial activities to cover other

industrial processes. The study of Hutohpull (1996) focused on pollution in the oil, gas and energy industries and pollution abatement technologies and its defects, but this paper covers a broader spectrum of industrial production processes and its side effect on the environment

Gross smoke pollution resulting into gross massacre of wildlife and the widespread development of deprived savannas resulting in the severe drought which occurred in many states in Nigeria was projected in the research work of Sofoluwe (1997) in other words, the study focused mainly on the effect of gross smoke pollution on the natural ecosystem. The author focused on pollution arising from locomotive workshops and yards (for example in Ebute metta in Lagos), electrification of railway locomotive engine and smoke from industrial machines and consideration was not given to other forms of pollution for example, from industrial activities.

Uduehi (1999) had a focus on oil sector pollution with its resultant effect on the degradation of natural resources , this current paper covers other industrial production processes because that was not extensively discussed. Fubra (1999) researched on industrial activities and the efficiency of environmental protection laws and statutes, suggesting recommendations for better implementation and enforcement of the laws to curb future industrial waste discharge on the environment. However the study did not consider the effect of these industrial activities on neighbourhood residents, which is the focus of this paper.

In the works of Henderson (2002) focus was put on the analysis of environmental pollution resulting from domestic activities such as household pollution, discharge of sewage into water courses, and open disposal of municipal waste from households. However the author did not delve into industrial activities that can bring pollution, which this paper focused on. John (2002) focused on industrial pollution and its negative effect on property value without considering industrial pollution vis a vis its effects on residential neighbourhood.

Methodology

The research is centered on the effect of industrial waste on neighbouring residents. A sample of two different groups were selected using both stratified random sampling technique systematic random sampling technique, the groups are the industrial workers and the residents in the neighbourhood (mile2 low cost housing Estate, Amuwo Odofin GRA and festac town).

A sample of 100 workers were selected using systematic random sampling where the first and every 10^{th} worker were chosen, with at least 5 workers selected from each of the 20 industries based on the records of the Amuwo Odofin local Government council.

The selection of residents from mile 2 Jakande Estate was subjected to the systematic random selection procedure where the first and the tenth residents were selected, where 200 family heads were chosen; from Amuwo Odofin GRA, 100 family heads were chosen and 50 family heads were selected from households in festac town making a total of 350 family heads..

The selection of residents in festac town was restricted to ‘’1^{st} – 3^{rd} Avenue ‘’ since these occupiers are the ones likely to be affected by industrial activities because of their proximity. Descriptive

statistical techniques were used for analysis and presentation of data.

Data Analysis and Discussion

Three hundred and fifty questionnaires were distributed to the occupants in the neighbourhood to measure the effect the activities of the industrial layout on them. One hundred questionnaires were administered on the workers in the industry to indentify the ways by which production by-products are disposed. The statistical table below shows the response of the respondents.

Level of Environmental Pollution in the area

The views of the residents were sought on the prevalence of the various forms of the pollution in the area and their responses are shown in table 1 below.

Table 1: Response of residents on the prevalence of land, water and air pollution in the area.

Response	Frequency	Percent
Very prevalent	152	43.4
Not prevalent	128	36.6
Indifferent	70	20
Total	350	100

Source: Author's Field survey

Out of the total respondents, 43.4 percent were of the view that pollution ranging from land, water and air are very prevalent in Amuwo Odofin while 36.6 percent of them feel otherwise and 20 percent of the respondents were indifferent. It can be seen that the various forms of pollution are common in the area as shown in table 1 above.

Sources of Pollution in the area

The residents were asked to comment on the various sources of pollution in the area with a view to determining the level of pollution that can be attributed to industrial processes and their responses are shown in table 2 below:

Table 2: **Causal factors of pollution in Amuwo Odofin**

Activities	Frequency	Percent
Household /domestic waste	78	22
Industrial process	109	31.1
Windstorm/ traffic congestion	65	18.6
Chemicas/ Drug	53	15.1
Open dumps	45	13
Total	350	100

Source: Author's field survey

Out of the various sources of pollution in the area as identified by the respondents 31.1 percent of these sources were attributed to industrial activities while domestic waste and traffic congestion take 22 percent and

18.6 percent respectively. Other source of pollution in the area such as open dumps takes 13 percent. From this, it can be inferred that there are various sources of pollution in the area with industrial having the largest percentage rating.

Effects of pollution on the residents' health

The opinions of the residents were sought on the effect of pollution on their health and they identified the following diseases shown in table 3 as fallout of the pollution in the area.

Table 3: **Effect of industrial activities on the health of residents**

Health Defect	Frequency	Percent
Deafness/Ear defects	90	25.7
Cardiovascular diseases	131	37.4
High Blood Pressure	66	18.9
Cancerous diseases	63	18.1
Total	350	100

Source: Author's field survey.

The respondents were of the opinion that only 25.7 percent of ear defect in the area can be attributed to industrial activities, 37.4 percent of cardiovascular diseases in the area is caused by the industries, high blood pressure carries 18.9 percent and cancerous disease with 18.1 percent.

Effects of industrial activities on the environment

The residents' views were sought on the effect industrial activities have on their environment and table 4 shows their responses.

Table 4: **The effect of Industrial activities on the Neighbouring Building/Environment**

Effects on Buildings/Environment	Frequency	Percent
Eroding of buildings	70	20
Fading of house paint	106	30.3
Corroding roofs	49	14
Falls in property values	56	16
Poor land productivity	69	19.7
Total	350	100

Source: Author's field survey.

The respondents' answers to the questions below show that the activities of the industry have negative effect on the neighbouring environment. The parts of the environment affected negatively by these industrial activities include the various components of their buildings and land. Fading of paints of buildings takes 30.3 percent of the total effect while reduction in the productivity of land takes 19.7 percent. Others such as fall in the property values and corroding of roofs take 16 percent and 14 percent respectively. It is obvious from table 4 that the various aspects of their environment are negatively being affected by industrial activities in Amuwo Odofin.

Effects of pollution on property values

The residents were asked to comment on their level of agreement with the view that industrial pollution has negative effects on the values of properties in the area and table 5 shows their responses:

Table 5: **There is a negative effect of industrial pollution on property values.**

	Frequency	Percent
Strongly Agree	166	47
Agree	56	16
Disagree	65	18.6
Strongly Disagree	63	18
Total	350	100

Source: Author's field survey.

The survey pointed out that 47 percent of the respondents strongly agreed that industrial pollution has negative effect on property values, while 18 percent strongly disagree. Those that agree take 16 percent while 18.6 disagree. The proportion that strongly agrees however supersedes other levels of agreement hence it can be inferred that industrial activities have negative effect on property values in Amuwo Odofin.

Effects of industrial waste on the neighbourhood

The industrial workers were asked their industrial waste has negative effect on the neighbourhood or not and their responses are shown in table 6 below:

Table 6: **Whether the Waste Generated by the Industry has Impact on the Neighbourhood**

Response	Frequency	Percent
It has negative impact	21	21
Does not have negative impact	66	66
Indifferent	13	13
Total	100	100

Source: Author's field survey

From table 6 above, 66 percent of the industrial workers believe that the waste generated by their industries does not have negative effect on the environment while 21 percent believe it has negative effect. Others are indifferent. This shows that the industrial workers are not conscious of the environment on which they operate.

Rating of the methods of waste discharge by the industries

The industrial workers were asked to rate the adequacy of the waste discharge methods currently being adopted by their industries and their responses are shown below:

Table 7: **Adequacy of the pattern of waste discharge adopted by the industry**

Response	Frequency	Percent
Adequate	38	38
Inadequate	26	26
Indifferent	36	36
Total	100	100

Source: Author's field survey

Table 7 shows the adequacy of the pattern of discharge adopted by these industries, 38 percent of the workers feel its adequate while 26 percent feel otherwise, others are indifferent. This goes a long way to show the level of environmental awareness of the workers.

Findings and Discussion

1. It was discovered that all forms of pollution such as air, water, land, and noise pollution such as air, water, land and noise pollution exist in the area with 41`percent of this pollution being attributed to the industrial activities.
2. Industrial activities in the layout affect the health of resident causing the deafness, ear defect, cardiovascular disease, high blood pressure, cancer and skin problems.
3. Industrial activities cause the residence to erode, fade house paints, and corrode roofs.
4. Industrial pollution cause a fall in property value.
5. The industrial workers are not really aware of the consequences of their industrial activities on the environment.

Conclusion and Recommendation

Government should ensure strict enforcement of zoning policies. The concept of zoning is aimed at separating nonconforming uses spatially from other land uses. Industrial layout should be sited far away from city centres to minimize their effect on the citizens and the environment.

There is need for organizing seminars on environmental protection awareness for both entrepreneurs and individuals; this will create an awareness of the effects of their activities on the environment.

In the formulation of environmental policies, our cultural background and level of technology should be considered so as to make environmental policies implementable, there is problem in the effective implementation of imported policies.

Enforcement of penalty, fines, and restriction on individuals or firms who contravene environmental policies. Other technologies of waste disposal such as recycling and composting of waste could be adopted when necessary.

Ensuring the creation of corporative association and fellowships for a purpose of enforcing environmental standard on erring bodies. This helps the interest of all interest of all residents in the community to be adequately represented at the highest level.

Conclusively, environmental pollution emanating from industrial activities in Amuwo Odofin has negative consequences on the environment. There is need therefore to balance industrial development with

environmental protection. Conservation policies to ensure continual renewability of the natural endowments such as Air, Land, Water, and other natural resources should be encouraged.

References

Adamson V.A (1999) Pollution: An ecological Approach, Bellhaven house Ltd, Ontario

Akujuru V.A (1999) The professional duty of the valuer in oil pollution compensation valuations. Journal of Nigeria Affairs (4) 1 Pp 10-17

Fubara M.T. (1999) Guildlines and standards for environmental pollution control in Nigeria. Eguavoen Printers

Henderson V. (2002) Issues and problems of the environment "The World Bank Research observer (17) 1 (spring)

Hutchpull G. (1996) 'Pollution, Problems and Abatement in oil and gas sector' Journal of Nigeria (4) 1.pp29-37

John E. (2002) The effect of Environmental Pollution on property values. Unpublished B.Sc Thesis submitted to the department of Estate Management O.A.U Ile-Ife.

Ogunowo C.O (1998) 'Urban wastes management in Nigeria' Trends and issues' Journal of Arts and Social Sciences (JASS) (4) 1

Ratcliff C.S (1978) Town and Country Planning and environmental laws in Nigeria 2nd edition, University Press Ltd Ibadan

Sofoluwe T. (1997) Principles and Pictures of Public Health in Africa. The World Bank AF 41E and Carl Bro. International

Soleye A.C. (1968) Air Pollution and its effect, Academic Press, New York

Uduehi, G.O. (1999) Environmental pollution in the oil industry: The role of the Chartered Surveyor. The Estate Surveyor and Valuer, Journal of the Nigerian Institution of Estate Surveyors and Valuers. Journal of the Nigerian Institution of Estate Surveyors and Valuers (24) 1.pp 7-13.