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Appraisal Of Habitability And Maintenance Of Public Residential Houses In Nigeria: A Case Of Crutech Staff Quarters, Calabar

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Abstract: ***This paper examined the maintainability of Cross River University of Technology (CRUTECH) staff quarters in order to determine the habitability of the buildings. The paper also determined factors that influence the level of maintenance of residential buildings. The study employs direct physical observation schedule and photographs supplemented with and use the questionnaire. Fifty residential housing units were investigated by graduate Architects of CRUTECH, Calabar-Nigeria. Observation schedule were used by the architects to identify the level of defects observed in the building structure and infrastructure services within the housing units in order to determine the maintainability and habitability of the houses. In addition, structured questionnaires were administered to occupants of the houses to get useful information. The data collected were analyzed using SPSS version 22 statistical tool to obtain percentages, rankings and relative significance index (RSI) respectively. Findings revealed that among the nine building structure component investigated for defects, roof leakage was the most significant with RSI value of 0.636 thus implying that it contributed most to the overall defects in the housing units. Similarly, among the seven services infrastructure investigated, drainage ranked first with RSI value of 0.660. Thus, the results indicated that poor drainage system and roof leakage accounts for the highest causes of defects on the housing units thus making the houses not habitable. The paper suggested that routine checks should be carried out periodically in order to determine the conditions of the buildings and carry out the required maintenance promptly in order to enhance habitability.***

Keywords: Habitability, maintenance, public building, repairs, Calabar

I. INTRODUCTION

The provision of habitable and affordable housing for citizens of a nation is core social responsibility of governments all over the world. This is because housing does not only affect occupants directly but all aspects of human endeavour including occupants health, social, economic, political and productivity of its occupants (Olotuah, 2016). This is why the conditions of housing and the environment in which people live in a particular country determines to a large extent the level of growth and development of that country.

For any building or buildings to attain sustainable standard within the built environment, such buildings must be constantly maintained. Building maintenance is a vital aspect of construction project management which cannot be neglected if the future of the present stock of inadequate available residential buildings in Nigeria can be guaranteed. Building maintenance system is what ensures that the building infrastructure in any built environment remains in their healthy conditions structurally, functionally and aesthetically throughout the expected lifespan of the buildings.

In Most developing countries especially in Nigeria, building maintenance which is described as a major aspect of construction management is often ignored which accounts for the vast number of dilapidated buildings around Nigerian cities and towns. Thus the urban centres which showcases deplorable housing conditions and the deteriorated environment people live in accounts for the poor health, poverty, poor academic performance, high crime rate which

has negative consequences on a country's economy and development (Olanrewaju, and Anifowose, 2015).

Housing sustainability is a function of the habitability level of such buildings in any sustainable built environment. Habitability connotes liveability which is a core characteristic of the building to be fit for human habitation. It is pertinent to state here that not all residential buildings are habitable even with the least minimum standard. There is a relationship between building maintenance and habitable housing; this is because building maintenance helps to keep buildings in constant state of habitability.

II. LITERATURE REVIEW

Building maintenance according to Kiong and Akasah (2012) means activity action(s) carried out in order to preserve or restore a building to an acceptable condition but excluding any enhancement other than those necessitated by failure to replace outdated materials or components. Also, Adejimi (2005) described building maintenance as the activity carried out to preserve buildings in their initial functional, structural and aesthetic states. Buildings are usually expected to provide healthy, safe and conducive environment for the occupants' performance of daily activities and comfort. Hence the ability of a building to provide the required environment for a particular activity is a measure of its functionality and accordingly, when the components of a building begins to deteriorate, urgent measure has to be taken to ensure that such building retains its usefulness and investment over a long period of time (Waziri & Vanduhe, 2013).

Previous Studies have revealed the apparent lack of maintenance culture in Nigeria and that maintenance programme has not received the desired attention in Nigeria over the past years but rather emphasis has been on the construction of new facilities or buildings (Ahmed, 2000; Odediran *et al.* 2012; Kunya *et al.* 2007).

Also, it is the view of some scholars (Adejimi, 2005; Zubairu, 2001; Olagunju, 2012) that the persistent building maintenance problems, abandoned and epileptically functioning facilities in Nigeria is a result of lack of maintenance culture and lack of appropriate tool for maintenance of the existing housing stock in Nigeria stressing that this could lead to inability of the government to sustain housing development in Nigeria. This brings to mind the question of what factors could be affecting maintenance of public residential buildings in Nigeria.

A. FACTORS AFFECTING AND INFLUENCING BUILDING MAINTENANCE IN NIGERIA

There are several factors that affect the maintenance of residential buildings in Nigeria. These factors have been identified by different authors in their separate studies. Accordingly, studies by Adejimi (2005); Assaf, 1996) agreed that among other factors affecting building maintenance in Nigeria are design process, construction problem, workmanship, plants and equipment as well as materials usage. While Assaf, (1996) listed the factors as drawing defects(architectural, civil/structural), construction defects, defects due to inspection/supervision of construction, construction equipment defects, construction materials defect, contractual administration defects, specifications defects and design defects in maintenance practicability and adequacy. Adejimi, (2005); Usman, *et al* (2012) on the other hand identified twelve factors such as design resolution, structural strength, specified material strength, maintenance manual, safety measures, skill maintenance personnel, maintenance plants, environmental factors, usage factors, quality control factors and post construction prevention strength. Waziri & Vanduhe (2013) listed nineteen factors affecting building maintenance in Nigeria. These include among others lack of preventive maintenance, faulty workmanship, design resolution, use of sub-standard materials. Others are lack of communication between maintenance contractors and clients, lack of understanding the benefits of maintenance, non availability of replacement parts and components, technological change. In this study some of these factors are adapted.

On factors that influence the maintenance of residential building standards, eight prevailing building condition variables as identified by Olagunju (2012) are structural components condition, roof components, interior walls surface condition, toilet facilities, discharge of waste water component, electrical wire and switches conditions, exterior wall condition, condition of walkway within the building premises.

Usman *et al*. (2012)

B. INDICATORS OF HABITABILITY

Habitability refers to a dwelling being fit for human habitation, possessing basic amenities in working order and not being in substantial disrepair. The concept of habitability is one that emphasis on housing being in a habitable state which means; safe, comfortable and fit for humans to live in. Habitability depicts that a housing unit or dwelling conform to the inferred guarantee of liveability (New York City Housing Authority (NYCHA), 2011).

Accordingly, NYCHA specify that a habitable dwelling should have among other features the following:

- ✓ The housing must not be infested with vermin such as termites, mould, mice
- ✓ Such dwelling must have working locks on main entry doors and working locks or security devices on windows
- ✓ The dwelling must not be extremely cold, that is, it should be kept warm especially in winter season
- ✓ The dwelling must have constant source of potable water.
- ✓ All plumbing fixtures must be in good functional condition free from defects, leaks and obstructions.
- ✓ The dwelling must have a working toilet, washbasin and a bathtub or shower to allow for privacy.
- ✓ The bathrooms must have a window that opens.
- ✓ The dwelling must have a kitchen with operational sink and sanitary sewer system.
- ✓ Every bedroom must have at least one window or door that opens to the outdoors.
- ✓ Such dwellings must have natural lighting and ventilation in all liveable spaces through windows that can open complemented with artificial lighting/ventilation

- ✓ All exterior doors, windows skylights and basement hatchways must be reasonably weather proof, water-tight, secure and rodent proof.
- ✓ Such dwellings must have smoke detector and alarm installed in it.
- ✓ An electrical system including lighting, wiring and equipment in good working conditions.
- ✓ The roof, walls, floors, stairways and railings in good repair.

III. RESEARCH METHODOLOGY

The study employs direct physical observation schedule and photographs supplemented with the use of questionnaires. Fifty residential housing units were investigated by graduate Architects who are also post graduate students of Cross River University of Technology, Calabar-Nigeria. Observation schedule were used by the architects to identify and specify the level of defects observed in the building structure and infrastructure services within the housing units in order to determine the maintainability and habitability of the houses. In addition, structured questionnaires were administered to occupants of the houses to get useful information. The respondents are both teaching and non-teaching staff of various ranks in the University who have been residing in the staff quarters for at least two years. This means the occupants would have experienced both weather conditions (dry and wet seasons) in Nigeria and would have required one form of maintenance or the other in their respective quarters. The data collected were analyzed using SPSS version statistical tool to obtain percentages, rankings and relative significance index (RSI) respectively. To be able to obtain the RSI, the use of 5-point Linkert scale was employed. The scale ranges from 1-5 representing least serious defects, serious defects, fairly serious defects, very serious defects and most serious defects respectively.

A. THE STUDY AREA

The study area is Cross River University of Technology (CRUTECH) staff quarters, Calabar Cross River State, Nigeria. Calabar lies between Latitude 4.9◦ N and Longitude 8.32◦ E in the coastal South-Eastern part of Nigeria with a 12m height above sea level..The Staff Quarters was built upon the establishment of the then Polytechnic Calabar, by the Cross River Government in 1982 to accommodate the staffers of the school. The staff quarters was expected to be maintained and managed by the physical planning division of the School which handles all forms of maintenance in the school.

IV. DISCUSSIONS/ FINDINGS

The findings on the gender of the occupants show that 35 are male representing 70% of the occupants while the remaining 30% are female. The percentage of categories of staff occupant shows that 28 of the tenants are academic staff representing 56% while the remaining 22 (44%) are non-academic staff. On the tenure of tenancy, the results reveals that a higher proportion (38%) of the tenants have stayed above 15 years. .this is followed by tenants that have spent 6-10 years representing 24%. Tenants who have spent less than 5 years account for 20% while the remaining 18% are those whose tenure ranges from 11-15 years. This goes to indicate that almost 50% of the tenants have lived in the quarters for over 10 years.

On the other hand, the data on the housing features, the results on the building type shows that28 (56%) of the houses were 3bedroom detached apartment as shown in Plates I and II respectively while 22 houses (44%) are 2-bedroom detached bungalow.

The wall finish indicate that 42 houses representing 84% were painted with various kinds of colour while 8 houses (16%) were unpainted.


Source: Authors field survey, 2017

Plates I and II: Exterior view of two of the buildings in the study area

Window types indicate that higher proportion of 82% of the houses had glazed louver distantly followed by 10% glazed aluminium and 8% timber windows respectively. The types of doors in the houses were 31 panelled glass doors (62%), 17 panelled timber (34%) and only 2 panelled steel doors (4%). The data on floor finish indicate that 33 houses representing 66% had terrazzo, while 15 houses (30%) had cement screed floor and only 2 houses (4%) were finished with PVC tiles. On ceiling materials, 43 of the houses (86%) were of asbestos ceilings, while 4 houses (8%) and the last 3 houses (6%) were finished with mineral fibre and acoustic ceilings respectively. Similarly, the roof finishes show that most of the houses 68% were of long span aluminium sheets followed by asbestos (24%) and galvanized iron (8%).

On the state of repairs of the houses studied, Table 1 reveals that 15 houses (30%) were dilapidated, 18 houses (36%) required major repairs and 14 houses (28%) required minor repairs while only 3 houses (6%) were in good condition. This indicates that 94% of the houses examined were dilapidated and requiring serious maintenance and therefore unfit for human habitation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	dilapidated	15	30.0	30.0	30.0
	Minor repairs	14	28.0	28.0	58.0
	major repairs	18	36.0	36.0	94.0
	Good condition	3	6.0	6.0	100.0
	Total	**50**	**100.0**	100.**0**	

Source: Authors field survey, 2017

Table 1: State of Repair

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Source: Authors' field survey, 2017.

Plates I-II: Exterior view of state of repairs of the buildings

Source: Authors field survey, 2017

Plates III-1V: Interior view of state of repairs of the buildings

The relative significance index (RSI) shown in Table 2a on the degree of defects observed in the housing units indicates that among the building structure components listed, roof leakage with RSI value of 0.636 ranked first. This is followed by floor slab failure with 0.632 RSI value. The component ranking third is peeling of wall surface with 0.508 RSI value while the least ranked (9th) with RSI value of 0.428 is doors and window defects. The result indicate that among the nine building structure component investigated in terms of the degree of defects, roof leakage is the most significant, thus implying that it contribute most to the overall defects in the housing units.

Similarly, among the seven services infrastructure investigated in Table 2b, drainage ranked first with RSI value of 0.660. The second ranked service decay goes to sewage disposal with RSI value of 0.584. This is closely followed by toilet (WC) defects with RSI value of 0.552 ranking third. The least ranked among the service infrastructure with RSI value of 0.428 is electrical installation. On the whole, a combination of both the building structure components and the services infrastructure defects in the housing units shows that drainage system is the most significant defect. This is followed by roof leakage. Thus, the results indicate that poor drainage system accounts for the highest causes of defects on the housing units. This also indicate the reason for other defects namely foundation, sub-structure dampness, floor slab failure and sewage disposal; as the survey affirmed that the housing units investigated were often submerged in water due to flooding during the raining season. Similarly, the second overall significant defect is the roof leakages which also contribute to other defects such as ceiling damage, peeling of wall surface, sagging of beam and floor dampness. Thus the houses are said to be uninhabitable.

The investigation as revealed by the study could possibly affirm the causes of the defects. This include absence of drainage in some areas, poor drainage system,, roof leakages due to old age, lack of preventive maintenance by the authority of CRUTECH and lack of corrective maintenance by the occupants. The study observed that the quality of the building materials used in the housing construction were of high standard which accounts for the over thirty long life span of the houses despite the lack of maintenance and years of flooding due to poor drainage system.

A. BUILDING STRUCTURE

DEFECT	1	2	3	4	5	TOTAL	TWV	RSI	RANK
Foundation	14	15	15	2	4	50	117	0.468	8
	7	27	10	3	3	50	118	0.472	7
Sub-structure dampness									
Crack on walls	11	13	17	8	1	50	125	0.500	6
Sagging of beam	3	14	26	7	0	50	137	0.548	3
Leaking roof	1	11	18	18	2	50	159	0.636	1
Floor slab failure	4	13	12	13	8	50	158	0.632	2
Ceiling damage	8	24	7	6	5	50	126	0.504	5
Door and window	13	24	8	3	2	50	107	0.428	9
Peeling of wall surface	12	16	12	3	7	50	127	0.508	4
B: Services infrastructure									
Sanitary (Water)	9	24	9	6	2	50	118	0.472	6
Electrical installation	16	17	12	4	1	50	107	0.428	7
Bath facility	3	14	26	7	0	50	137	0.548	4
Toilet (WC)	6	15	19	5	5	50	138	0.552	3
Kitchen facilities	7	18	14	7	4	50	133	0.532	5
Sewage disposal	5	9	25	7	4	50	146	0.584	2
Drainage	3	6	19	17	5	50	165	0.660	1

Source: Authors field survey, 2017

Table 2: Relative Significant Index of Defects in the Housing Units

V. CONCLUSION/RECOMMENDATIONS

The study has shown that the durability and liveability of residential buildings can only be guaranteed by regular maintenance. Thus building maintenance is not optional or negotiable and its absence in the study area has caused a deterioration and dilapidation of the existing houses in the area. For houses that are over 30 years old without significant maintenance shows the level of neglect and low or zero maintenance culture in the study area. The study also revealed that high quality materials for building construction alone cannot guarantee habitability of housing units without preventive and corrective maintenances. His is why maintenance unit is required in any public housing estates and such units should be equipped with the necessary well wither to carry out its mandate while also emphasizing the need for maintenance culture among uses and occupants of houses.

From the study the following recommendations were made.

- ✓ Periodic (preventive) and corrective maintenance of buildings should be carried out in order to enhance the lifespan of buildings and prevent building failure.
- ✓ Construction of a well designed drainage system and constant cleaning of same to facilitate water runoff during wet seasons to prevent building decay.
- ✓ Qualified and experienced personnel should be engaged in the construction and maintenance of University Staff quarters and other public housing estates.
- ✓ Routine Checks should be carried out periodically in order to determine the conditions of the buildings for prompt maintenance to enhance liveability.

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