Evaluation of Factors Affecting Residential Building Maintenance in Nigeria: Users' Perspective

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Abstract

The study focused on the evaluation of some selected factors affecting residential building maintenance based on the perception of users with the view to developing a strategy for effective residential building maintenance. Relevant nineteen relevant factors surveyed from related literatures were subjected to the users' scrutiny and assessment of their impacts on the maintenance of such facilities. Relative Importance Index (RII) was used to determine the significance of each factor based on the respondents' rating. From the study lack of preventive maintenance, faulty workmanship, design resolution factor and the use of substandard materials were ranked as the most significant factors with RII of 0.84, 0.80, 0.79 and 0.76 respectively. The least significant factors 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 with RII of 0.51, 0.48, 0.47 and 0.47 respectively.

Keywords: Residential Building, Maintenance, Users, Nigeria.

1. Introduction

Building maintenance is an important programme for the sustainability of infrastructural development. It plays an important role among other activities in the building operations (Zulkarnain *et al.,* 2011). Maintenance according to BS 3811(1984) is the combination of all technical and associated actions intended to retain an item or restore it to a state in which it can perform its required function. Work carried out in anticipation of failure is referred to as preventive maintenance and those carried out for restoring after failure is referred to as corrective maintenance. It is a well known fact that the primary objective of building maintenance is to preserve buildings in their initial functional, structural and aesthetic states (Adejimi, 2005). This is to ensure that such facility continue to remain in such state and retain their investment value over a long period of existence. Buildings are generally required to provide safe and conducive environment for the performance of various human activities. Odediran *et al.* (2012) stated that the ability of a building to provide the required environment for a particular activity is a measure of its functionality. Therefore as the components of a building begins to deteriorate, it becomes necessary to take measures to ensure that the desired characteristics of that facility which provides safety and convenience are retained.

Maintenance programme in Nigeria according to Ahmed (2000) and Odediran *et al.* (2012) has not received much attention in the past as the emphasis is on the development of new properties. This is also in line with the statement of Kunya *et al.* (2007) who observed that there is apparent lack of maintenance culture in Nigeria, and that emphasis is placed on the construction of new buildings for public sector and neglecting the aspect of maintenance which commences immediately the builder leaves the site. This is also corroborated by Olagunju (2012) who opined that there is lack of maintenance set up in Nigeria that can sustain the current inadequate housing provision in the country. Olagunju (2012) further stated that lack of appropriate tool for predictive maintenance of the existing buildings can have a detrimental effect on future housing development. Zubairu (1998) stated that the country does not have a maintenance policy which resulted in the persistent problems of building maintenance. Execution for maintenance work is mostly left for the maintenance department to handle on direct labour basis or contract. Jobs of higher amounts according to Kunya *et al.* 2007) are given out in form of maintenance contracts to mostly unqualified maintenance contractors. Abiodun (1996) also observed that lucrative building maintenance contracts are awarded without due process which also contributes to poor maintenance of buildings. Adejimi (2005) attributed the array of abandoned and epileptically functioning facilities in Nigeria due to poor or lack of maintenance. This therefore presents the need for studying the various factors affecting residential building maintenance with the view to proffering relevant solutions.

2.0 Factors Affecting Building Maintenance

Previous studies revealed the effects of numerous factors affecting residential building maintenance. Assaf (1996) opined that design and construction faults that affect maintenance of buildings are defects in civil design, defects in architectural design, defects due to consultants firm's administration and staff, defects due to construction

drawings, defects due to construction inspections, defects due to construction, defects due to contractual administration, defects of construction materials, defects due to construction equipment, defects arising from specifications and design defects in maintenance practicability and adequacy. Adejimi (2005) asserted that to a large extent, building maintenance problems can be attributed to problems originating from poor design. Adejimi (2005) further stated that the design process could be optimised to achieve adequate planning in choosing the right materials, good workmanship, plants and equipment and labour in order to reduce maintenance problem. Adejimi (2005) in his study identified twelve relevant factors affecting the maintenance strength of buildings 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. Kiong and Akasah (2012) analyse the maintenance factors for IBS precast structural system in Malaysia in order to produce a better quality of the IBS precast building. They identify design aspect as an important factor of the building quality. Zulkarnain *et al.* (2011) reviewed the critical success factor in building maintenance management practice for University sector under four perspectives; customer (customer satisfaction, service quality, customer complaint, reaction to customer needs), internal processes (service excellence, technology capability, customer employee, competence, process efficiency, e.t.c.), financial perspective (management expectations, financial growth, cost reduction, productivity improvement, e.t.c.) and learning and growth perspective (technology leadership, continuous service improvement, upgrading staff competence, e.t.c.). They concluded that critical success factor can help in providing a successful competitive performance for the university sector in the area of maintenance management. Olagunju (2012) identified factors that influence the level of maintenance of residential building standard. In the study eight factors were identified to be significant to physical condition of building in Niger State, Nigeria. The variables are structural components condition, roof components, toilet facilities, discharge of waste water component, exterior wall condition, condition of walkway within the building premises, electrical wire and switches conditions, interior walls surface condition.

3.0 Research Methods

The data for the research work was obtained through the use of structured questionnaires from the users of residential quarters in the university of Maiduguri staff quarters. Questionnaire survey was found effective because of the relative ease of obtaining appropriate data for achieving the study objectives. The survey presents 19 relevant building maintenance factors generated on the basis of related research works together with revision and modifications by experts. 50 structured questionnaires were distributed which comprised of two sections. Section one captures the demographic profile of the respondents and the second section consists of twenty building maintenance factors to be scored on a likert scale of 1-5 based on their significance. Descriptive statistics was used to analyse the demographic data of the respondents while Relative Importance Index (RII) was used to analyse the respondents' scores of the basic maintenance factors. In this study, an ordinal measurement scale 1 to 5 was used to determine the effect level. Respondents were asked to score factors affecting residential building according to the degree of importance; where 1 = affects with little degree; 2 = affects something; 3 = affects with average degree; 4= affects with large degree; 5 = affects with very large degree. The relative importance index (RII) is given by equation (1)

$$\text{Relative importance index} = \frac{\sum w}{AN} \qquad \text{(i)}$$

Where w is the weighting given to each factor by the respondents, ranging from 1 to 5, A is the highest weight (i.e. 5 in the study) and N is the total number of samples. The rating of all the factors for degree of significance was based on the value of their respective relative importance index (RII). The guide for the rating is given in Table 1

Table 1 Guide to degree of significance

Degree of significant	Rating
Most significant	0.76 above
Significant	0.67-0.75
Less significant	0.45-0.67
Not significant	0.44 below

Source: Vanduhe (2012)

4.0 Results and Discussions

4.1 Profile of Respondents'

The demographical profile of the respondents indicated that 44% of the respondents have PhD as their highest qualification, 32% have Master Degree while 16% and 8% have BSc. and HND respectively. The result is presented in Fig.1.
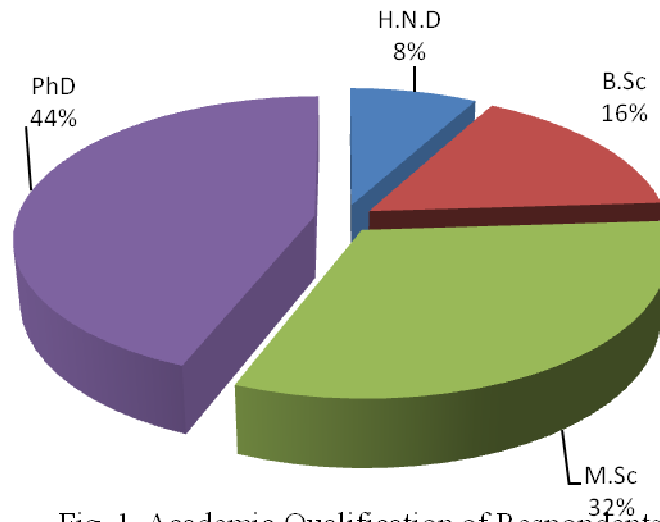

Fig. 1. Academic Qualification of Respondents

The results of the duration of occupancy of the respondents presented in Fig 2 indicates that majority (36%) of the respondents have stayed for well over 8 years in the residential quarters while 8% have stayed for 7-8 years and 28% have occupied the residential quarters for about 3-4 years. this indicates that the respondents are in a good position to comment on the maintenance of the residential facilities.
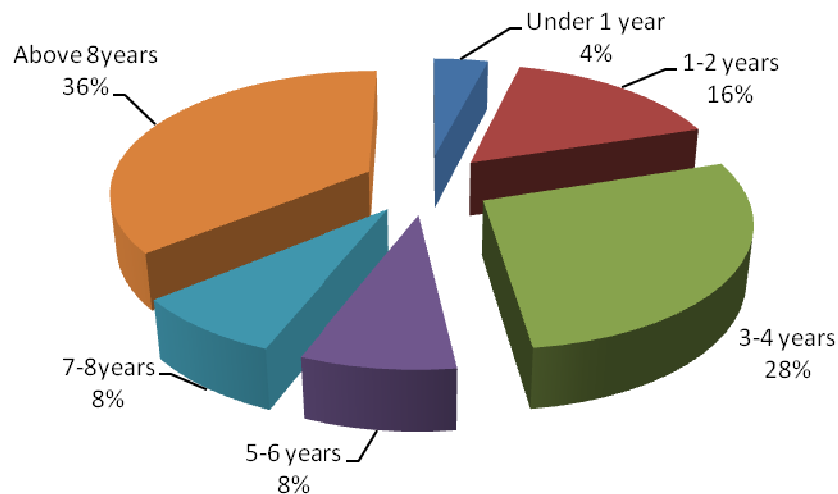

Fig. 2 Duration of Occupancy of Users

The results of the categories of residential quarters occupied by respondents revealed that majority (56%) are occupying the senior staff quatters category while 44% are occupying the junior quarters category.

Fig. 3 Category of Staff Quaters

4.2 Factors affecting building Maintenance

The study presents the analysis of the 19 factors affecting the building maintenance. These factors have been identified and ranked according to their relative importance Index (RII). The result is presented in Table 2.

Table 2 Users Response to the factor affecting residential building maintenance scored on the degree of importance

S/No	FACTORS	RII	RANK	RATING
1	Lack of preventive maintenance (maintenance culture)	0.84	1	Most Significant
2.	Faulty workmanship during construction/maintenance	0.80	2	Most significant
3.	Design deficiency affecting building resolution	0.79	3	Most significant
4.	Use of substandard of materials and building components	0.76	4	Most significant
5.	Insufficient fund to maintain the building	0.74	5	Significant
6.	Ignorance about the basic properties of building materials and components.	0.69	6	Significant
7.	Unavailability of skilled maintenance personnel.	0.69	6	Significant
8.	Lack of building maintenance standard and policy	0.63	7	Less significant
9.	Client attitude to maintenance	0.62	8	Less significant
10.	Poor management of maintenance group	0.60	9	Less Significant
11.	Use of new material and components in buildings	0.60	9	Less significant
12.	Low concern to future maintenance	0.59	10	Less significant
13.	Delay in occupancy after completion	0.57	11	Less significant
14.	Incorrect selection of building material component and system	0.56	12	Less significant
15.	Wrong behaviour of occupants	0.56	12	Less significant
16.	Lack of communication between maintenance contractors, clients and users.	0.51	13	Less significant
17.	Technological change and fashion	0.48	14	Less significant
18.	Non availability of replacement parts and components	0.47	15	Less significant
19.	Lack of understanding the importance of maintenance work	0.47	15	Less significant

The first most important factor is lack of preventive maintenance with RII of 0.84. Maintenance culture is an attitude which is lacking in Nigeria in both the private and public sectors. Poor maintenance culture has been widely recognised problem in Nigeria (Mbamali, 2003; Adejimi, 2005; Usman *et al.,* 2012). Lack of maintenance culture was also attributed to lack of maintenance policy in Nigeria by Faworaja (1996). Lack of maintenance culture reduces the life of buildings before the obsolescence state.

Faulty workmanship was ranked second with RII of 0.80 which also indicates a most significant rating. Faulty workmanship is also considered a significant factor by Assaf (1996) and Adejimi (2005) that defects due to construction inspection, defects due to inaccurate measurements among others leads to poor workmanship.

Adejimi (2005) earlier confirmed that many buildings suffer serious maintenance problems due to the incompetence of those who maintain such buildings. He further recommended that engaging qualified and skilled personnel will go a long way in reducing maintenance problems.

Design resolution is a very important factor that affects building maintenance. From the study it was ranked third with RII of 0.79. Adejimi (2005) considers this as a maintenance strength factor in his study. Adejimi (2005) asserted that a poorly resolved building design eventually results in severe maintenance problems. A poorly resolved building design does not suit the owner and are unliveable as conversions of the functional spaces go on daily in order to adjust to satisfy the user's needs. This was also corroborated by the findings of Usman *et al.* (2012) in which they rated the design resolution factor as the third most important factor out of the 22 factors investigated.

The use of substandard materials and building components was ranked fourth with an RII of 0.76 this is also considered an important factor affecting building maintenance by Usman *et al.* (2012). The use of substandard materials and components no doubts affects maintenance to a large extent because such materials have lower life and durability than standard materials and components. Therefore frequent maintenance is required in situations where substandard materials are use to preserve the building over its lifespan.

5.0 Conclusion

Building maintenance management ensures that building facilities retain their structural, functional and aesthetic conditions throughout their lifespan and reduce unnecessary expenditures. It is evident that in Nigeria both public and private sector buildings face neglect due to lack of maintenance and as a result they are subjected to rapid deterioration. The study revealed lack of preventive maintenance for public residential buildings and this presents threats to the functional, structural and aesthetic conditions of such buildings. Users of the surveyed residential buildings perceived that faulty workmanship, design resolution that suits users needs and the use of cheap and substandard materials also contribute to the maintenance problems. Another factor found to have a significant influence on the maintenance of residential buildings is the lack of fund for the maintenance of buildings.

6.0 Recommendations

From the study the following recommendations were made.

i. Preventive maintenance of buildings should be encouraged in order to avoid building failure before the designed life of such buildings.

ii. Building designs should be resolved to suite owners' requirements to avoid conversions during occupancy. As unresolved buildings are frequently converted to suit other uses through which the building face failures.

iii. Clients of residential building quarters should ensure that specified materials are used during construction and thereafter make funds available for periodic and corrective maintenance

iv. Qualified and experienced personnel should be engaged in the construction and maintenance of public buildings.

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