

**EVALUATION OF MAINTENANCE WORKS IN PUBLIC
RESIDENTIAL HOUSING AT MANDATE 3 ESTATE, KWARA
STATE, NIGERIA.**

BY

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Abstract

Maintenance is a very important aspect of facilities management that requires serious planning since building maintenance involves preserving a building so that it can retain its economic value and durability to avoid economic loss. Despite the pivotal roles of housing in the socio-economic development of Nigeria and the life of the people, majority of the public residential houses are in deplorable condition and state of disrepair, due to long period of neglected maintenance. This paper identified and examined the factors contributing to rising maintenance works and the level of participation of government agency concerning the various strategies adopted for the maintenance of mandate 3 housing estate, Ilorin. Data was obtained through a questionnaire conducted on a sample of 88 buildings and building owners. Findings revealed that expectation of the building owners from the government had become the most influential factor that affected the maintenance of residential buildings as the demand towards a better living environment is rapidly increasing. Also, the community maintenance strategy initiated by building owners is most effective, sustainable and therefore conclude that, it is a suitable strategy for the estate in particular and public residential estates in Nigeria.

Keywords: Building maintenance, housing, public, residential estate, strategy.

1.0 Introduction

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. Building maintenance is an important programme for the sustainability of infrastructural development, as it plays an important role among other activities in building operations (Zulkarnain, Zawani, Rahman and Mustafa, 2011). Adejimi (2005) averred that the primary objective of maintenance is to preserve buildings in their initial functional, structural and aesthetic states. This is to ensure that such facilities continue to remain in such state and retain their investment value over a long period of existence. Odediran, Oladele and Eghenure (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 begin to deteriorate, it becomes necessary to take measures to ensure that the desired characteristics of that facility, which provide safety and convenience, are retained.

British Standard (1993) defines maintenance as "a combination of any actions carried out to retain an item in, or restore it to, an acceptable condition". It thus refers to the work undertaken to keep, restore or improve every facility to an agreed standard; the extent of maintenance is determined by the balance between need and available resources (Chanter and Swallow, 1996). The physical building and infrastructure stock form a very significant component of every nation's total saving. For the well-being and upkeep of this vast building stock, it is well understood that buildings require continual maintenance throughout their lives to a) enable them to continue to perform satisfactorily the functions for which they were built, and b) maintain their value and utility by preventing and/or delaying their progressive deterioration due to age and usage (School of Building and Estate Management, 1991).

Building maintenance management can be seen as a complex and intricate sphere of operations, involving the interaction between technical, fiscal, legal and social determinants, which govern the use of buildings (Lee and Wordsworth, 2001). Since maintenance is a diffuse operation, taking place incrementally through time, in many locations, and by different organizations, the scale and importance of building maintenance work is frequently undervalued in comparison with a higher profile and more visible new construction.

The main purpose of maintenance is to retain its property values for investment, aesthetic, safety and durability, to ensure that the property is continually in good condition for habitation, and to the satisfaction of the owners/users and communal prestige (Brennan, 2000). Odediran, Oladele and Eghenure (2012) posited that to prolong the economic life of the property, it is necessary to have a programme of action that would be effectively implemented to keep the property in top form to enable optimum returns to be received continuously. This implies that there is need to look at the maintenance of existing public residential estates to restore them into acceptable conditions for habitation or at least to prolong the life-span of the buildings and other complementary services through regular maintenance activities. This is very important as the intensity of building maintenance becomes higher with its age, especially in the face of climatic change and its attendant effects on the building materials, elements and physical environment for sustainable development.

2.0 Literature Review

2.1 Maintenance in the Nigerian Public Housing Sector

The choice of optimal maintenance strategy should be based on analysis of different maintenance policies such as reactive, corrective, preventive, time-based maintenance, condition-based maintenance and re-design (Flores-Colen and Brito, 2010; Rikey and Cotgrave, 2005; El-Haram and Horner, 2003). This is necessary to distinguish the maintenance concept from other terms normally used in building renovation, such as refurbishment, retrofit and modernization. Maintainability is the ability of a functional unit, under given conditions of use, to be kept in, or restored to a state in which it can perform a required function when maintenance is performed under given conditions and using stated procedures and resources (ISO/IEC 2382-14, 1997; Chew, Tan and Kang, 2004). The reliability of the prediction of a building's service life strongly influences the effectiveness of a maintenance policy (Shohet and Paciuk, 2006). Users' perceptions, needs, expectations and budget are relevant issues to the real implementation of maintenance models (Lowry, 2002).

Provision of an adequate, affordable, high standard and quality housing that meets the social, economic and political aspirations of the citizenry remains the primary and major focus of all governments the world over. This is because the fulfilment of this desirable social objective is a key component of sustainable developments (Ibem and Amole, 2010) and a measure of the well-being of the people. According to Leong (2009), housing is a major factor impacting the health, safety, socio-economic and political life of the occupants. It impacts all aspects of human endeavour. Thus, the state of housing and its environment are indicators of the level of development, condition and state of the citizenry. Despite the pivotal roles of housing in the socio-economic development of a nation and the life of the people, most of the public housing is in deplorable condition and state of disrepair, due to long period of neglected maintenance.

According to Olatubora and Fatoye (2006), public residential estates, when compared with existing private housing estates, are known to lack basic infrastructural facilities and services, and maintenance which should enhance the liveability of such estates. To address this intractable housing problem and ensure sustainable housing in Nigeria, all the three tiers of government had been investing heavily in the construction of new housing estates and maintenance of the existing ones as far back as 1928 when the Lagos Executive Development Board (now, Lagos State Development and Property Corporation) was established, under the 1928 Town Planning Ordinance Law, Cap 95 of the Federation of Nigeria.

It is in this connection that the National Housing Policy of 1991 charged various tiers of government and their housing corporations with the responsibilities of facilitating the design and construction of new housing units for low-income group, improving the existing housing conditions, reducing the production cost of housing units, encouraging the manufacture and use of local building materials, providing the scientifically-based physical plan, etc., inclusive of essential amenities and infrastructure to support habitable environment, which shall be revised from time to time.

Due to dwindling budgetary allocation to the housing sector, and resources becoming more limited in the face of the growing population, governments are increasingly shifting their attention away from new housing development towards the maintenance of existing ones (Leong, 2009). Olu-Sule (1990) and Akeju (2007) affirmed that government investments in housing in the third world is limited and wasted on expensive projects designed to woo electorates rather than directed to meet real housing needs. This scenario has resulted in the deplorable situation in most existing public housing schemes, Nigeria being no exception.

The tropical climate in Nigeria presents unique and major challenges to effective building maintenance. The climate in Nigeria can be characterised by:

- a) high temperatures with a relatively small difference between maximum and minimum levels;
- b) abundant sunshine and high intensity of ultra-violet radiation;
- c) high relative humidity and
- d) frequent and heavy rain.

Such climatic conditions place significant demand on the lifetime performance and durability of all building materials and components, and in particular the external wall surfaces which are continuously exposed to the vagaries of the physical environment.

2.2 Study Area

Mandate 3 housing estate, Ilorin: Kwara State Housing Corporation

Kwara State Housing Corporation was established and tasked with facilitating partnerships with private sector companies to deliver mass housing units throughout Kwara communities. The corporation was taken over by the Harmony Holdings Limited, which commenced business by acquiring the assets and liabilities of the existing 20 government-owned functional commercial entities including former Kwara Investment and Property Development Company Limited.

On the number of building professionals working in the corporations, there were qualified professionals and were involved in the specification of the materials at the design stage of the housing project. The professionals were also involved in the construction and supervision of the buildings. Harmony Holdings Limited had no commitment to maintain the estate, as the maintenance was left in the hands of the residents.

3.0 Material and Methods

The study employed a quantitative approach to which a survey was recognised as the most suitable method for data collection. Two sets of structured questionnaires were employed. The first set of questionnaires was addressed to the house owners/occupiers/tenants to solicit for information on their expectation from the government in terms of the level of maintenance and what was obtained, the rating was based on a Likert scale ranging from 1-very low, 2- low, 3-average, 4- high to 5-very high. The building owners/occupiers and the professionals managing the housing estates were also asked to rate the factors affecting the level of building maintenance in terms of the fifteen variables (Expectation of tenants, age of building, lack of maintenance officers, lack of maintenance action/policy, poor maintenance culture by residents, budgetary constraints, population growth, corruption, change of government, delay and failure in reporting, white elephant projects, poor workmanship, poor designs by Architects and Engineers, poor quality construction materials used and climatic conditions)using a Likert scale of 1-very low impact, 2- low impact, 3-average impact 4- high impact to 5- very high impact), the definite and effective maintenance strategies put in place by government/housing corporations.

The second set of questionnaires was targeted at professionals managing the estate and this includes information on their level of involvement in the maintenance of the estate, strategies employed and the rating of the fifteen variables affecting building maintenance. Simple random sampling technique was adopted in the selection of buildings and head of households/building owners that were of interest to the study. Total enumeration technique was used in choosing the professionals managing the housing estate. In the study, a total of 120 questionnaires was distributed to the household heads, 96 were returned out of which 88 were found to be useful and valid for analysis. The remaining 8 questionnaires were incomplete and invalid. Therefore, a response rate of 73 per cent was achieved. 8 copies of questionnaires were also distributed to the professionals managing the estate and all the 8 copies were retrieved and found useful for the analysis. The analysis was done through SPSS version 20 using Wilcoxon-signed-rank test at 95% confidence level.

4.0 Findings and Discussions

The results of building owners /occupiers and professionals' rating of factors affecting level of maintenance are shown in table 1.

The results indicated that the demand of the owners and occupiers of the buildings have become the most significant factor that affects the maintenance of residential buildings. Their demand towards a better lifestyle or living environment is rapidly increasing. Yip (2001) stated that the rising demand from tenants and residents for a better living environment has led to the need for building maintenance. This disagrees with the position of the professionals managing the estate as poor maintenance culture by the residents was rated as the major requirement for maintenance.

Building age was ranked second by the building owners and occupiers. The age of the buildings in mandate 3 housing estate indicated that 41.32% had been constructed between 20 and 30 years. This confirms that the buildings fell among the first set of the buildings constructed in the state capital, and had witnessed a series of maintenance works. Lateef (2008) described that one of the essential elements that needs to be measured in the allocation of maintenance budgets is the building's age. This is probably due to the need for additional maintenance works to be carried out in the older building. For example, major refurbishment and retrofitting of building equipment or elements need to be implemented when the building has reached its economic life span (Ali, 2009). This is in tandem with the position of Evelyn, Chew and Harikrishna (2005); Chai, De Brito, Gaspa and Silver (2014) that the age of buildings has a natural tendency on materials to undergo deterioration with time.

Poor maintenance culture ranked fifth by the building owners/occupiers. This is in sharp contrast with professionals managing the estate who ranked poor maintenance culture as the most influencing factor of maintenance with a mean of 3.88 and 3.60 respectively. This shows that both admitted that the state government did not have a well-drafted maintenance policy that will drive the maintenance culture in residents. One of the most important factors which affect maintenance as identified by Aluko (2018) is the attitude at both private and public sectors of the national life which has remained discouraging, uncoordinated and dismal to the aggravation of the already critical cities vistas, values and sustainability. Assaf (1996) posited that design and construction faults that affect the maintenance of buildings are defects in both civil and architectural design, workmanship, materials, finishes and lack of a maintenance culture. Whatever that may be identified as factors affecting building maintenance, the overarching single-most problem is the lack of a maintenance culture, as evidenced by the lack of upkeep and repair. Tijani, Adeyemi and Omotehinshe (2016) averred that the lackadaisical attitude of Nigerians on maintenance culture has negatively affected infrastructural development which is critical and essential to a nation's development.

Lack of maintenance officers and lack of maintenance policy was rated third and fourth by the building owners and occupiers whereas professionals in charge of the estate rated the same fifth and fourth. The rating implied that there was the absence of any definite and effective maintenance policy put in place by government/housing corporation which led to their poor performance at carrying out the required maintenance of works on the buildings.

Change of government was ranked sixth by building owners and seventh by the professionals. The respective mean scores are 3.86 and 3.82. Both respondents ranked population growth, corruption and budgetary constraints in the same pedestal as factors that contributed to the need for building maintenance in the housing estate. It was agreed that successive governments have not paid adequate attention to the issue of maintenance and that each comes up with different projects that portray government and tenure in good light to the general public. Apart from the fact that there has been a consistent rise in the population which has given rise to demands for housing, the existing facilities have reached the elastic limits and therefore are being overstretched.

From the building owner's perspective, corruption was rated eight with a mean of 3.68. The result as indicated by the building professional response revealed that corruption was also ranked ninth with a mean of 3.75. The building owners and the building professionals working with Mandate 3 Housing Corporation agreed that corruption fell within the average among the factors affecting building maintenance. According to Ugwu, Okafor and Nwoji (2018), most maintenance works are not carried out in public institutions in Nigeria as a result of corruption, thus, funds meant for maintenance work are misappropriated by the authorities in-charge.

There is a noticeable disparity in the ranking by the two groups of respondents on the delay and failure in reporting to the appropriate authority managing the estate as shown in table 1. While the building owners ranked it tenth with a mean of 3.49, the professionals ranked it sixth with a mean of 3.62. The professionals believed that whenever faults were detected, most building owners must have engaged the services of inexperienced and incompetent artisans to handle such repairs and that cases were reported only after much damage must have been done.

Poor designs by Architects and Engineers, poor quality construction materials and poor workmanship were rated low by both building owners and the professionals. This is probably because there were qualified professionals in the housing corporation who were involved in the specification of the materials at the design stage of the housing project and also involved in the construction and supervision of the buildings.

Climatic conditions ranked the least (fifteenth) in building owner's response whereas the professionals managing the estate ranked climatic conditions the twelfth with the mean score of 2.73 and 3.11 respectively. The opinion of the building owners and the professionals was at variance with Stewart, Wang and Nguyen (2011) who opined that buildings nowadays are deteriorating at an alarming rate due to changing climate with its attendant consequences. Although there is an interaction between the climate and the performance of exterior finishes that may consequently determine the rate of maintenance as identified by Smith, McCabe, McAllister, Adamson, Viles, and Curran (2011), the low percentage of architects that paid attention to the issues of climate suggests that other parameters apart from climate influenced their specification (Folorunso and Ahmad, 2014). This reflects that an important factor that determines the need for maintenance works in public residential buildings is not given a serious consideration by the professionals managing the housing estate and the building owners.

4.1 Government Participation in Maintenance Activities

The building owners/occupiers were asked to rate their expectation from government in terms of maintenance activities and what was obtained from the government in terms of maintenance works. The rating was based on a Likert scale of 1-5, where: 1-very low, 2- low, 3- average, 4- high to 5-very high. Thus, factors that fall between first and five are deemed to be most influential, those within sixth and tenth are deemed average and factors within eleventh and fifteenth are deemed to be poor.

The frequency result in table 2 reveals that 79(90%) building owners and occupiers in mandate 3 housing estate had expected so much from the government in terms of executing maintenance activities. However, what was provided by the government was grossly short of their expectations as 77 (88%) of the building owners affirmed that what was obtained from the government was very low compared with their high rate of expectations. This is buttressed by the fact that 75% of the building occupiers as shown in table 3 below agreed to a great extent that the level of government participation in maintenance activities was very low compared with their level of participation.

In other to validate the frequency result of the expectations and what was obtained, the significance of the difference observed between the expected and the obtained with the level of personal and government participation was tested using Wilcoxon-signed rank test at 95% confidence level. The result in table 4 revealed that there was a significant difference between their expectations and what was obtained from the government ($\rho = 0.071 > 0.000$). Also, the result in table 5 showed that there was significant difference between the level of personal participation and government participation ($\rho = 1.000 > 0.000$). The findings implied that the more the expectations of the building owners in terms of maintenance works, the lower they got in return from government. Also, the more the level of personal participation of the building owners, the less government participation in the maintenance activities in Mandate 3 housing estate.

4.2 Level of Involvement of the Agencies Managing the Estates.

Questions were asked about the level of the participation of the agencies managing the estate in Ilorin.

The identified maintenance strategies are government agency maintenance, self/ tenant's maintenance, private agent's maintenance and community maintenance. All these strategies had been put into use at one point or the other within Mandate 3 housing estate but have not yielded any positive benefit to the residents. The result implied that there was absence of any definite and effective maintenance strategy put in place by government/housing corporations which led to their poor performance at carrying out the required maintenance works on the buildings. However, a self-maintained and community-based maintenance strategy by building owners/occupiers was predominantly adopted in the estate.

The result agrees with the position of Adejimi (1998) that theories and hypotheses are postulated and propounded daily, but maintenance problems remain adamantly unyielding in public residential buildings. According to Olatubara and Fatoye (2006) and Musa (2002), public residential estates, when compared with existing private housing estates, are known to lack basic infrastructure and services and their respective maintenances which could enhance the liveability of such estates. These deplorable housing standards and deteriorated physical environmental conditions in the opinion of Blome (2010) are responsible for social problems, poverty, poor academic performance, poor health, riots, and high arsons and crime rates prevalent in our societies.

5.0 Conclusion

The literature review identified 15 variables of factors affecting housing maintenance cost. After the data was analysed, it was found that five of the most influential variables were: expectation of tenants, age of buildings, lack of maintenance officers, lack of maintenance policy and poor maintenance culture by the building owners. It was also discovered that those poorly rated ranged from white elephant projects, poor workmanship, poor designs by Architects and Engineers, poor quality construction materials used and climatic conditions.

The results obtained from the building owners on expectation from government and what was obtained on the level of maintenance from government residential estate revealed that at 95% confidence level, there was a significant difference between the expectation from the building owners/occupiers and what was obtained from the state government. It further revealed that the community maintenance strategy initiated by building owners/occupiers was most effective, sustainable and therefore concluded that, it is a suitable maintenance strategy for Mandate 3 Housing estate in particular and public residential estates in Nigeria.

6.0 References

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APPENDIX**Table I: Ranking of variables affecting housing maintenance by the building owners/ occupiers and building professionals**

Rank	Variables	USERS RESPONSE		BUILDING PROFESSIONALS RESPONSE	
		Mean	Rank	Mean	Rank
1	Expectation of tenants	4.13	1	3.82	3
2	Age of building	4.10	2	3.41	2
3	Lack of maintenance officers	4.07	3	3.93	5
4	Lack of maintenance action/policy	3.91	4	3.76	4
5	Poor maintenance culture by residents	3.88	5	3.60	1
6	Budgetary constraints	3.86	6	3.82	7
7	Population growth	3.81	7	3.84	10
8	Corruption	3.68	8	3.75	9
9	Change of government	3.57	9	3.77	8
10	Delay and failure in reporting	3.49	10	3.62	6
11	White elephant projects	3.41	11	3.62	11
12	Poor workmanship	3.36	12	3.51	13
13	Poor designs by Architects and Engineers	3.12	13	3.47	14
14	Poor quality construction materials used	2.89	14	3.41	15
15	Climatic conditions	2.73	15	3.11	12

Table 2: Frequency distribution for expectation from and what was obtained from government

	Expectation from Govt		Obtained from Govt	
	Frequency	Percentage	Frequency	Percentage
Very Low	1	0.54	77	87.6
Low	1	0.80	8	9.8
Average	2	2.37	1	1.6
High	5	6	1	.5
Very High	79	90	1	.5

Table 3: Frequency distribution for the level of personal participation and government participation

	Level of Personal participation		Level of Government Participation	
	Frequency	Percentage	Frequency	Percentage
Very Low	4	5	86	98
Low	9	10	2	2
Average	25	28	0	0
High	20	23	0	0
Very High	30	34	0	0

Table 4: Result of the Wilcoxon signed Rank Test on the Expected and Obtained level of maintenance from government

	Group	N	Mean Rank	Sum of Ranks	Z	P
Exp. Obtain	Expectation	88	41.00	3321		
	Obtained		.00	.00	-1.807	.071
	Total	88				

Table 5: Result of the Wilcoxon signed Rank Test on the personal and government level of participation

	Group	N	Mean Rank	Sum of Ranks	Z	P
Pers. Govt	Personal Participation	88	42.50	3570		
	Govt Participation		.00	.00	-8.042	.000
	Total	88				