

Efficiency of Maintenance Management Practices of Public Buildings in South-Western Nigeria

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ABSTRACT

The maintenance management sector within the public service sector in Nigeria has suffered from lack of funds and negligence for a period of time. The threat also affected the education sector, as significant sums of money are frequently spent on building facilities while upkeep is sometimes disregarded. Therefore, using public buildings in Nigeria as a case study, this paper assessed the efficiency and effectiveness of maintenance management practices.

Existing public buildings were the only ones included in the sampling survey. One hundred (100) questionnaires were sent to evaluate the physical and functional state of public buildings in Osun State as determined by each department's maintenance division to evaluate the efficiency of the maintenance strategies employed in preserving their structures, identifying the most common techniques for carrying out maintenance procedures, and analyzing their effectiveness.

According to the data used, it was found that improper maintenance workload phasing can result in unprofitable maintenance management practices. Other significant factors that contribute to the inefficiency and ineffectiveness of the maintenance management practices include poor contract management, a lack of material availability, and the occurrence of inadequate projection and estimate.

(Keywords: *management practices, maintenance, effectiveness, efficiency, significant factor, infrastructure*)

INTRODUCTION

Looking at the deplorable state of public buildings across the country for decades, a large chunk of the country's resources has been channeled

towards transportation infrastructure, government administrative buildings for ministries, and parastatals, colleges of education, universities, primary and secondary schools. All are geared toward repositioning the underdeveloped economy. However, one remarkable action according to needed to ensure sustainability of these varieties of infrastructure has not been given the right and sufficient attention in terms of how to carry out its maintenance operations.

Adenuga and Iyagba (2005) submitted that public buildings are in very poor and deplorable conditions of structural and decorative disrepairs. Despite millions of Naira spent to erect all these buildings, they are left, as soon as commissioned to face premature but steady and rapid deterioration, decay and dilapidation (Adenuga, 2012). Therefore, methods should be evolved to reduce maintenance costs. Due to the growth of housing with the lack of building standards, more maintenance, rehabilitation, and renovation work have become necessary to ensure the serviceability and safety of the constructed houses. In addition, the existing houses need to be sustained as long as possible.

UNDERSTANDING THE CONCEPT OF BUILDING MAINTENANCE MANAGEMENT PRACTICES

Building maintenance is an important aspect of building management that is often neglected. Maintenance assists retaining economic life of buildings. Moreover, it is an activity that requires a high level of productivity at the private and the national levels. At the private level, proper maintenance leads to lower depreciation costs (due to longer economic life) and consequently leads to higher profitability.

The Committee on Building Maintenance in Britain defined maintenance as: "Building Maintenance is the work undertaken in order to keep, restore or improve every facility, (i.e., every part of a building, its services and surroundings) to a currently acceptable standard, and to sustain the utility and value of the building" (Lee 1981). In addition, maintenance is defined in the British Standards (BS 3811:1974) as "A combination of any action carried out to retain an item in or restore it to an acceptable condition" (Lee, 1981, Brennan, 2000). A more functional definition is that "Maintenance is synonymous with controlling the condition of a building so that its pattern lies within specified regions" (Fagbenle, 1988).

The maintenance management practices in Nigeria in the public sector has suffered from lack of funds for a period of time while the requirements for good practice in maintenance of building stock have been established over a considerable period, the achievement of good practice is by no means universal maintenance of the built environment impacts on the whole nation. The conditions of surrounding in which we live and learn, reflects the nation's well-being "Maintainability of building has been identified as one of the key areas in which the construction industry must achieve significant improvements".

Building maintenance is referred to a way to preserve or keep the economic value of building. BS3811 (1984) defines maintenance as "the construction of all technical and associated administrative actions intended to retain an item in or restore it to a state in which it can perform its required function". According to Oladapo (2006) cited in Adenuga (2012) as seen in Samuel, *et. al.* (2016), buildings are required to provide a conducive and safe environment for various human activities. This, essentially, is the question of function. The extent to which the buildings provide the required environment for the required activity is measure of the functionality of the building. Buildings once constructed are expected to provide this major function of sheltering for a number of years. It is highly desirable to produce buildings that are maintenance free for the expected life span, however, this is very difficult to achieve owing to the rate at which buildings deteriorate overtime because of its initial design, construction techniques, the environmental conditions and the use or intensity of use of the building.

Maintaining public buildings in good condition through preventive measures makes sense for academia (Oladapo, 2006). However there appears to be a lack of preventive maintenance culture in general based on the various reports on the undesirable conditions of school building (Zubairu, 1999; Fielden, 1997). Maintenance could also be categorized into plans and responsive could be used to determine the works that can involve the inspection of buildings and would be used to assess the need and priority of works that would be carried out at every stage of work. Maintenance can be done in different stages. Each stage will have different characteristics.

METHODOLOGY

To arrive at the objectives of this research work, a sample survey was carried out by the researchers. Random sampling was used in this study. Sampling can be defined as the selection of a group from the population to make the task of surveying less expensive and more manageable. This could be achieved by selecting a small population to represent the overall population so that the research work will not become cumbersome by involving the whole population. The sampling survey was limited to the existing institution. A total of hundred (100) questionnaires were administered with the aim of achieving the following:

- I. assess the operational (physical-functional condition) of public schools in Kaduna state as carried out by the maintenance management department;
- II. examine the effectiveness of maintenance practices strategy used in maintaining the buildings;
- III. determine the prevailing method of executing maintenance management practices and study its efficiency either by direct labor or contract; and
- IV. ascertain the factors that militates against efficient and effective maintenance management practices of the schools.

The questionnaire was organized in the form of an importance scale (i.e., 4 = 'highly important', 3 = 'very important', 2 = 'important', 1 = 'not important'). Respondents were then asked to

indicate by ticking a column, the relative importance of each of the impacts of construction management practices on building. A total of 100 questionnaires were distributed to respondents in the selected private institution.

In total, 83 questionnaires (83%) were retrieved from the respondents for analysis. The interviews adopted an attitudinal approach which is used to subjectively evaluate the opinion of a person or a group of people towards a particular attribute, variable, factor, or a question. Kruskal-Wallis test was also used to validate the results of Kendall's coefficient of concordance. The interview data was analyzed using conceptual content analysis which considers the appearance of a concept or the numbers of times (frequency) a particular

concept appears in a text. Bordens and Abbott (2008) note that content analysis is a useful technique to help in understanding behavior adopting a purely descriptive approach.

ANALYSIS OF DATA AND RESULTS

In this section, results of data analysis that was retrieved and sorted from the groups of respondents were presented. Analysis on the staff and student view on maintenance practices and the technicians, responding to factors that militate against the effective and efficient maintenance management practices of the institutions is shown in Table 1.

Table 1: Maintenance Management Work Execution Ranking [Senior Staff Survey].

S/N	BUILT ASSETS	MOST IMPORTANT	IMPORTANT	LEAST IMPORTANT	RELATIVE INDEX	RANKING
1	WORKSHOPS	7	13	-	0.78	3 rd
2	ADMIN BLOCKS	6	14	-	0.76	4 th
3	OFFICES/ SHOPS	10	9	1	0.82	1 st
4	HEALTH UNITS	10	9	1	0.81	2 nd

Table 2: Maintenance Management Work Execution Ranking [Junior Staff Survey].

S/N	BUILT ASSETS	MOST IMPORTANT	IMPORTANT	LEAST IMPORTANT	RELATIVE INDEX	RANKING
1	WORKSHOPS	11	14	-	0.81	2 nd
2	ADMIN BLOCKS	15	9	1	0.85	1 st
3	OFFICES/SHOPS	5	18	2	0.70	4 th
4	HEALTH UNITS	10	9	6	0.72	3 rd

Table 3: Maintenance Management Work Execution Ranking [Technician Survey].

S/N	BUILT ASSETS	MOST IMPORTANT	IMPORTANT	LEAST IMPORTANT	RELATIVE INDEX	RANKING
1	WORKSHOPS	20	15	-	0.86	2 nd
2	ADMIN BLOCKS	24	9	2	0.88	1 st
3	OFFICE/SHOPS	12	19	4	0.75	3 rd
4	HEALTH UNITS	14	16	5	0.74	4 th

From Table 1 it was discovered that the office/shops was ranked 1st with the relative index of 0.82, meaning that the execution of maintenance works, has a great deal of attention from the maintenance department, followed by the health unit blocks that was ranked 2nd with index of 0.81 on the staff survey, followed by workshops which was ranked 3rd with index of 0.78, followed by the administrative blocks that was ranked 4th index of 0.76 in the execution of maintenance management practices.

From Table 2 it was discovered that the administrative blocks was ranked 1st with index of 0.85 execution of maintenance works, indicating that it also has a great deal of attention from the staff perspectives of the maintenance department, followed by the workshop that was ranked 2nd with index of 0.81 on the staff survey, followed by the health unit blocks which was ranked 3rd with index of 0.72, followed by the office/shops that was ranked 4th with index of 0.70 in the execution of maintenance management practices.

From Table 3 it was discovered that the administrative blocks was ranked 1st with index of 0.88 execution of maintenance works, indicating that it has a great deal of attention from the technicians response in the maintenance department, followed by the workshop that was ranked 2nd with index of 0.86 on the technicians survey, followed by the office/shops which was ranked 3rd with index of 0.75, followed by the health unit blocks that was ranked 4th with index of 0.74 in the execution of maintenance management practices.

Table 4: Showing Methods used in Executing Maintenance Practices.

S/N	POSITION	FREQUENCY	PERCENTAGE
1	Direct Labor	27	37.5
2	In-house Labor	27	37.5
3	Contract	22	28.9

Table 5: Showing Some Factors Influencing Quality of Material used in Maintenance Practices

S/N	Factors	Strongly Agree	Agree	Strongly Disagree	Disagree	Relative Index	Ranking
1	Poor contract management	23	32	5	-	0.86	2nd
2	Financing and payment of completed work	23	46	5	2	0.92	1st
3	Changes in site condition	29	35	11	1	0.80	5th
4	Shortage of material	16	48	12	-	0.76	7th
5	Design changes	30	37	7	2	0.81	4th
6	Subcontractors	17	42	14	3	0.74	9th
7	Weather	29	39	8	1	0.85	3rd
8	Labor and management relation	22	41	8	5	0.76	7th
9	Inspecting and testing of completed portion of the work	25	34	13	4	0.76	7th
10	Mistake during construction	26	38	8	4	0.78	6th
11	Construction Method	19	40	14	3	0.75	8th
12	Price Fluctuation	22	36	16	2	0.76	7th
13	Additional Work	21	33	18	4	0.73	11th
14	Inaccurate Estimates	22	40	10	4	0.76	7th
15	Delays	18	44	11	3	0.75	8th
16	Fraudulent Practices	25	30	15	6	0.74	10th

Approaches in Maintenance Execution

The methods of executing maintenance practice are presented in Table 4. It was discovered that 37.5% responded to direct labor, 37.5% also responded to In-house labor, where 28.9% responded to the idea of contract works. It could be deduced that direct labor and In-house labor was used in maintenance management project execution in the selected institutions while few projects are executed by contract.

Factors Influencing Quality Management in Maintenance Work

Table 5 shows the general factors that are responsible for influencing quality of material used in maintenance Practices work. Relative index and ranking of every factor are presented above. Results of analysis of factors influencing quality in building maintenance management were presented in this section.

Financing and payment of completed works with index of 0.92 was ranked the best (1st) poor contract management with relative index of 0.86 was ranked second (2nd), weather with relative index of 0.85 was ranked third (3rd) while changes in design with 0.81 index was ranked fourth (4th). Financing and payment of completed works was the most subscribed factor, poor contract management was also suggested. The issue of financing is very important if funds are not allocated to the task, the work lingers, and this could lead to further deterioration.

CONCLUSION

Assessing the effectiveness and efficiency of maintenance management practices in public institution is of paramount importance in building design, construction, and management in Southwestern Nigeria. As a result of creating awareness in the mind of people, an easier and effective means of maintenance policies has been introduced to the community. It was discovered that lack of proper phasing of maintenance workload can give rise to poor maintenance management practice, also, some major variables led to the inefficiency and ineffectiveness of the maintenance projects includes: the occurrence of poor contract management, lack of availability of quality materials and the incidence of inaccurate estimate.

This study further reveals that there is no formal organizational structure showing the distribution of responsibility in all buildings. There is therefore a need to construct a proper organizational chart showing the distribution and scheduling of responsibilities of power for proper functioning of the organization and personnel.

Moreover, maintenance work should be categorized according to their order of importance or severity as such maintenance work should be based on need "need driven" and not based on budget "budget driven". A user satisfaction survey should also be carried out regularly and maintenance work should be carried out in line with users' requirements. As a result of creating awareness in the mind of people an easier and effective means of maintenance policies have been introduced to the community. It was observed that lack of proper phasing of maintenance workload can give rise to bad and uneconomical maintenance management practice.

RECOMMENDATIONS

The following recommendations were discovered based on the results of this study.

- (i) Adequate funds should be provided for effective maintenance practices to be implemented. The policy maker should be interested in maintenance, which should not be neglected.
- (ii) Maintenance practicing personnel should acquire proper training to effectively execute the responsibilities required of them.
- (iii) Adequate funds should be provided for effective maintenance practices to be achieved regularly. The policy maker also should be interested in maintenance, which must not be neglected.
- (iv) The need for comprehensive economic analysis and workable financial plans should be prepared before contracts are awarded.
- (v) The maintenance department should ensure that there is/are a precaution to be taken to guaranty quality of materials when they are purchased for maintenance work.

(vi) The maintenance department is advised to carry out regular inspections of the existing buildings and not to wait until the structure needs repairs.

REFERENCES

1. Aladejebi, O.A., O.J. Ojo, A.O. Adepoju, and M.N. Iloyanomon. 2023. "Public-Private Partnership Regulatory Frameworks and Projects Sustainability in Lagos State, Nigeria". *European Journal of Advances in Engineering and Technology*. 10(5): 15-26.
2. Akomolafe, M.A. 2010. "Economic Sustainability in Construction Industry. A Case Study of South-Western of Nigeria". *Journal of Environmental Research and Policies*. 6(2): 21-24.
3. Akomolafe, M.A. and S.A. Ademola Sakariyau. 2019. "A Development of a Safety Performance Index for Construction Projects in Nigeria". *Researcher*. 11(3):12-20. ISSN 1553- 9865 (print); ISSN 2163-8950 (online).
4. Akomolafe, M.A., S.A. Ademola, and A.A. Atoyebi. 2017. "Causes of Variation Orders and their Effect on Building Construction Projects". *International Journal of Modern Management Science*. 6(1).
5. Akomolafe, M.A. 2023. "Significant Effect of Major Factors Performance on Public Building Projects in Osun State". *Pacific Journal of Science and Technology*. 24(1): 58-63.
6. Akomolafe, M.A., E.B. Oluwagbemi, and M.A. Mohammed. 2022. "Impact of Building Construction Activities on the Environment: A Case Study of Southwest, Nigeria". *Pacific Journal of Science and Technology*. 23(2): 145-153.
7. Brennan, B. 2000. *Repairs and Maintenance of Dwellings*. An-Taonad-Tithlochta Press: Dublin, Ireland.
8. Cambridge City Council. 2011. "A Report Submitted to the Executive-In-Council in Respect of Strategies for Maintenance of Housing Estates of the Council".
9. Fagbenle, B.J. 1998. *Provision and Maintenance of Engineering Infrastructure Technological Development in Nigeria*. Kaduna Publication. Ltd.: Lagos, Nigeria.
10. Fagbenle, O.I. and O.J. Ojo. 2004. "Manpower Planning and Development in the Nigerian Construction Industry". *Manpower Planning and Development in the Nigerian Construction Industry*. 1-21.
11. Fielden, B.M. 1997. *Conservation of Historic Buildings, 3rd Edition*. St. Edmundsbury Press: London, UK.
12. Kwong, A.K.C. 2005. "The Renaissance of Quality Maintenance". Accessed at www.docstoc.com/ on 2nd February, 2012.
13. Lawal, A.F. and O.J. Ojo. 2011. "Assessment of Thermal Performance of Residential Buildings in Ibadan Land, Nigeria". *Journal of Emerging Trends in Engineering and Applied Sciences*. (JETEAS) 2 (4): 581-586 (ISSN: 2141-7016)
14. Oladapo, A.A. 2006. "A Study of Tennant Maintenance Awareness, Responsibility and Satisfaction in Institutional Housing in Nigeria". *Int. J. Strategic Prop. Manage*. Vilnius Gediminas Technology University. 10: 217 – 231.
15. Stephen, J.H. 2002. *Building Services Maintenance, the Forgotten Discipline*. Aha Management Publication: Abuja, Nigeria.
16. Ugwo, O. and N. Mansfield. 1994. "An Appraisal of Project Planning and Management in Nigerian and United Kingdom". M.Sc. thesis. University of Strathdyde, U.K

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