



## **Assessment of Building Maintenance and Infrastructural Facilities in Akoko Edo, Edo State**

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### **Abstract**

The rapid pace of urbanization experienced in most Nigeria cities has contributed immensely to the quantitative and qualitative problem of housing. The sustainability of infrastructure demands an attention. One of the ways to achieve this is the adoption of maintenance as essential practice. This study aims at assessing building maintenance and infrastructural facilities in Akoko-Edo, Edo State. The study identifies various classifications of building maintenance and infrastructural facilities, the current building and infrastructural maintenance practices used in Akoko-Edo and factors that leads to the deterioration and dilapidation of buildings and infrastructural facilities. The data for the study were collected through questionnaires administered to users of residential buildings and the buildings' owners within Akoko-Edo and construction professionals. One hundred and seventy one (171) questionnaires were distributed using random sampling technique; one hundred and thirty (130) questionnaires were returned and considered suitable for analysis. Descriptive statistical tools of relative importance index and mean item score were employed for the analysis. Findings reveal that all the respondents carry out one form of maintenance activity or the other. Majority of them prefer condition - based maintenance as the most frequently used maintenance class, they also agreed that direct labour organization and in-house labour are the most frequently adopted maintenance practices. It showed that obsolescence of the building is the most important factor that leads to the deterioration and dilapidation of buildings. The study recommends a need for more advocacy, policy and awareness on the essence of maintenance as a practice for natural sustainability.

## **1. INTRODUCTION**

The construction section is an essential part of any economy because of its size and the potential role its can play in the development efforts of the economy [1]. Construction is often used as an indicator of socio-economic development of a nation and therefore, it is apparent that construction cannot be elicited in the process of socio-economic development [1].

Most infrastructures in developing countries are in states of decay, disrepair and/or abandonment. Over the years, there has been increasing abandonment of construction projects and Infrastructural facilities which has led to the dilapidation, degradation and deterioration of these facilities/structures within Nigeria contemporary urban metropolis [2]. [3] opined that the remote cause of lack of maintenance such as five major, cultural problems, state of economy, the reducing global economic meltdown, lack of time and general illiteracy of the occupants of the building structures and users of the facilities and without a strong maintenance culture, efforts at infrastructural development will amount to nothing. However, there has also been growth in the significance of the building maintenance as a proportion of the output of the construction industry which takes place against a backdrop of mounting pressure on a new building activities and a growing awareness of the need to manage the condition of the nation's building and infrastructures more effectively [4].





Though, it is still the case that such maintenance activities take place in a context that does not create a fully integrated approach to managing buildings performance and thus the potential of the buildings and infrastructures are never wholly realized [2]. Basically, in virtually all the cities and town centres within Nigeria, buildings and infrastructural facilities are gradually and systematically decaying, dilapidating and deteriorating with reduced or no degree of maintenance programme and activity [5]. From a normal visual perception in the urban metropolis, it can be noted that majority of the constructed buildings both private and public, road network, water supply system, sanitary and drainage system, transmission poles and electricity lines, government owned telephone networks, sign post and routine location posts are deteriorated and badly in need of maintenance. The lack of maintenance of these buildings and infrastructures negatively affects the populace which thus affects the output of the working class capacity of the populace is thus lost, time value for achievement of goals and objectives minimized, it also causes all forms of ill-health and psychological effects thereby reducing the economic growth of the nation [2]. In addition, the existing houses need to be sustained as long as possible, therefore, method should be evolved to reduce maintenance cost. Maintenance of buildings and infrastructural facilities can be classified under the following headings which include: planned and unplanned maintenance [6]. Planned Maintenance: under planned maintenance, there are several strategic possibilities available to management and many alternative decisions to be considered [7]. Planned maintenance specifically is a type of maintenance organized and carried out with forethought, control and the use of records to a schedule. It may be for instance necessary to decide whether to repair or replace a component or carry out periodic maintenance at fixed intervals or simply to respond to the requests of the users [7]. The four most predominant maintenance types under planned maintenance are: preventive, corrective, scheduled and condition based maintenance. Unplanned Maintenance can be defined as work resulting from unforeseen breakdown or damage due to extended causes such works are accidental and may include power failure, broken water pipes or vandalized building facilities [8]. This maintenance is carried out to no predetermined plan. This is to restore defective facility to its functional state [9]. Other forms of maintenance includes: emergency maintenance, unpredictable maintenance, corrosive maintenance, recurring and non-recurring maintenance, routine maintenance, infrequent maintenance, cyclic and non-cyclic maintenance [8].

Maintenance work may be carried out through the following ways according to [10,8] by direct labour organization, by contracting out and a combination of the two that is, affecting general routine work using direct labour organization and contracting out large or replacement jobs. Direct labour Organisation: This method of executing maintenance work is much more popular among establishments. Although in some cases, the maintenance manager may not have an alternative than to use the contract system if the maintenance work is fairly sophisticated or a specialized job [10]. Contracting-out system: This system is a system whereby the maintenance work is given to a contractor to execute due to consideration under a specific contractual agreement [8]. The cost of employing a contractor consist of the contractor's charges, administrative overheads such as inviting and comparing tenders, drawing up contractors, work supervision and checking involves [10]. This method could be chosen under two conditions, which are: if the job involves a specialist who the maintenance division may not have equipment to execute and if the establishment does not have a maintenance division [10].

Maintenance work in building and infrastructural facilities is generated by a whole range or number of factors such as obsolescence of building, aging stock of building, advent of new technology, rising social expectation and aspiration, faulty design, design complexity, not using preventive maintenance, users does not understand the importance of maintenance work, poor financial support, not using building after completion and unavailability of skilled labour [13, 8]. Hence the need for proper understanding of the causes and agents of building deterioration in order to curtail the occurrence of these defects in buildings, 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 [5]. It is on this background that this research work assesses maintenance of buildings and infrastructural facilities in Akoko Edo, Edo State.

## 2. MATERIALS AND METHOD

### 2.1 Data

As a result of the quantitative nature of the study, data was collected through opinion-based questionnaire survey. Both primary and secondary data were used for the study. This study adopted the use of questionnaire as a survey tool. Primary data were collected with the aid of questionnaire. A close questionnaire method was used for the study, because close questionnaire has a set number of responses as determined by researchers. A large number of questionnaires were self-administered to the selected respondents. Secondary data relevant to the study were obtained from books, journals, newspapers, articles, reports, the internet, and thesis as well as from conference and workshop papers.

### 2.2 Study Areas

Edo State is located between longitudes 5 0 E and 6 0 42" and latitudes 5 0 45" N and 35" N. It is bounded by Kogi State to the North, to the South by Delta State and by Ondo State to the West. Akoko Edo has a total population about 261,567 occupy the Norther most part and are very diverse linguistically. Akoko Edo represents more of an administrative region than an ethnic sub-group. This area is the most diverse in terms of ethnic, tribal and linguistic groupings which include but not limited to Okulosho, Okpameri, Igarra, Ososo.



### 2.3 Methods

The questionnaires were used in this research to gather information. Several steps were taken to complete the questionnaires for this research including finding objectives of the survey, determining sampling group, designing the questionnaire, administering the questionnaire and interpreting the result. The questionnaires were administered directly by the researcher with the assistant of professional colleagues in the study area. However, a total population of three

hundred (300) was obtained from the study area, out of which one hundred and seventy one (171) were chosen using [12] formula to determine the sample size. Random sampling of the described population was used for the study because every member stands an equal chance of being selected and it minimises bias. The questionnaire was drawn on a 5-points likert scale and it was chosen for ease and uniformity of response and the questionnaire comprised only closed ended questions. Questions were asked on the background information of the respondents, classification of maintenance of building and infrastructural facilities, current buildings and infrastructures maintenance practice and factors that leads to deterioration and dilapidation of buildings and infrastructural facilities. One hundred and seventy one (171) questionnaires were distributed; one hundred and thirty (130) questionnaires were returned and considered suitable for analysis which represented a healthy return rate of seventy six percent (76%). The relative importance index was used to rank the classifications of maintenance and current building and infrastructural maintenance practice while mean item score was used to rank factors that lead to the deterioration and factors influencing the decision to take up maintenance work.

#### 2.4 Data Analysis

The analysis was aided by the use of statistic package for social science (SPSS) application. Based on the content of the questionnaires, the analysis was divided in to two sections: demographic and main objectives. The background information of respondents was analysed by means of frequency distribution and percentage. The relative importance index (RII) was used to rank the classifications of maintenance and current building and infrastructural maintenance practice because it best fits the purpose of this study. The following formula was used to determine relative importance index.

$$RII = \frac{\sum W}{A \cdot N} \quad (0 \leq RII \leq 1) \quad (1)$$

Where W is the weight given to each classification by the respondents

A is the highest weight (that is 5 in this case)

N is the total number of respondents

Mean item score was used to rank the factors that lead to the deterioration and factors influencing the decision to take up maintenance work. The premise of decision for the ranking is that the factors with the highest mean item score is ranked 1<sup>st</sup> and others in such subsequent descending order. The following formula was used to determine mean:

$$\text{Mean} = \frac{\sum FX}{N} \quad (2)$$

Where X is the rating used per column

F is the sample size for each rating and

N is the total sample size.

Since a Likert of 5-point scale was employed for the collection of data, the formula can thus be

Written as;

$$\text{Mean Score} = \frac{5F5+4F4+3F3+2F2+F1}{N} \quad (3)$$

### 3. RESULTS AND DISCUSSIONS

Table 1 presents summary of background information of respondents. Analysis in Table 1 shows the age range of the respondents, where 26.2% falls within 18-27 years, 21.5% falls within 38-47 years and 15.4% falls within 58 years and above. The average age of the respondents is 39 years. Table 1 reveals the profession of the respondents where 13.8% are farming, 11.5% are trading while each of estate management, hair dressing, barbing and architecture has 2.3% of the respondents.

Analysis in Table 1 reveals the working experience of the respondents in their various professions. The respondents possessed the average years of working experience of 13 years. It



shows that they are capable of providing vital information on the objectives of this research. Table 1 also reveals the academic qualification of the respondents where 29.3% are HND

holders, 20.7% have S.S.C.E and 1.2% have M.Sc. The respondents are considered adequate and reliable for this research.

**Table 1: Summary of Background Information of Respondents**

Category	Classification	Frequency	Percent
<b>Age of Respondents</b>	58 and Above	20	15.4
	48-57	22	16.9
	38-47	28	21.5
	28-37	26	20.0
	18-27	34	26.2
	<b>Total</b>	<b>130</b>	<b>100.0</b>
	<b>Average Age</b>	<b>39 Years</b>	
<b>Profession of Respondent</b>	Estate Management	3	2.3
	Accountancy	4	3.1
	Banking and Finance	4	3.1
	Public Administration	4	3.1
	Architecture	3	2.3
	Hair Dressing	3	2.3
	Barbing	3	2.3
	Military	4	3.1
	Nursing	4	3.1
	Tailoring	5	3.8
	Urban and Regional Planning	4	3.1
	Student	12	9.2
	Geography and Regional planning	4	3.1
	Civil Servant	7	5.4
	Teaching	6	4.6
	Lecturing	7	5.4
	Building	11	8.5
	Quantity Surveying	9	6.9
	Trading	15	11.5
	Farming	18	13.8
<b>Total</b>	<b>130</b>	<b>100.0</b>	
<b>Years of Experience</b>	21 and Above	20	15.4
	16-20	40	30.8
	11-15	20	15.4
	6-10	29	22.3
	1-5	21	16.1
	<b>Total</b>	<b>130</b>	<b>100.0</b>
<b>Average Years</b>	<b>13 Years</b>		
<b>Academic Qualification</b>	MSc/M.Tech	8	6.2
	BSc/Tech	24	21.5
	PGD	8	6.2
	HND	17	13.0
	NCE	6	4.6
	ND	20	15.4
	S.S.C.E	33	25.4
	Primary School Certificate	14	10.8
<b>Total</b>	<b>130</b>	<b>100.0</b>	



The table 2 shows the various classification of maintenance of buildings and infrastructural facilities. As shown in the table above, all the respondents agreed that planned, condition-based and routine maintenance are the most frequently used class of maintenance by ranking 1st, 2nd and 3rd respectively. The result equally shows that all the respondents ranked unplanned, unpredictable and infrequent maintenance as the less frequently used class of maintenance by ranking 8th, 9th and 10th respectively. The first three classes of maintenance of buildings and infrastructural facilities have an overall Relative Importance Index RII of 0.859, 0.805 and 0.749 respectively. Closely following is corrective maintenance with a RII of 0.783.

The implication from the findings is that all the classes of maintenance are moderately used by buildings owners and residents but some classes like planned, condition-based and routine maintenance are frequently used in the maintenance of buildings and infrastructural facilities. This is in line with [7] which opined that planned maintenance and condition based maintenance are the most commonly used class in his research on establishing factors influencing building maintenance practices. Relatively, the findings of this study have been more reaffirmation of what was reviewed in the literature though from different environment. Most responses revealed that most houses owners consider maintenance work at the maintenance stage instead of the design construction stage, hence condition based type of maintenance have been prevailing and dominant including planned.

**Table 2:** Classification of maintenance of building and infrastructural facilities

Classes of maintenance	RII	Rank
Planned	0.859	<b>1</b>
condition based	0.805	<b>2</b>
Routine	0.749	<b>3</b>
Corrective	0.783	<b>4</b>
Emergency	0.759	<b>5</b>
Schedule	0.749	<b>6</b>
Preventive	0.741	<b>7</b>
Unplanned	0.698	<b>8</b>
Unpredictable	0.637	<b>9</b>
Infrequent	0.573	<b>10</b>

As shown in table 3 above, all the respondents agreed that direct labour organization, in-house labour and contract system are the most frequently used maintenance practices by ranking 1st, 2nd and 3rd respectively. The result equally shows that all the respondents ranked the use of maintenance department and the combination of DLO and contract system as the less frequently used maintenance practices by ranking 5th and 4th respectively. The first three maintenance practices have an overall relative importance index RII of 0.840, 0.829 and 0.763 respectively. Closely following is the combination of DLO and contract system with a RII of 0.659. The implication from the findings is that all the maintenance practices are moderately used but some like direct labour organization, in-house labour and contract system are the frequently used maintenance practices. This affirms the work of [10] saying that direct labour organizations are more rigid in structure and absence of profit motive requires the substitution of other forms of motivation and objectives. These findings further confirms the assertion by [8] that direct labour forces are particularly well placed to cope with emergency repairs to large commercial and public buildings. Many of the respondents practice in-house labour like regular sweeping of the house, regular cleaning of machines, tools and equipment, environmental sanitation activities.



**Table 3:** Current buildings and infrastructural maintenance practice used in Edo state

Maintenance practices	RII	Rank
Direct labour organization (DLO)	0.840	1
In-house labour	0.829	2
Contracting system	0.763	3
The combination of DLO and contracting system	0.659	4
The use of maintenance department	0.639	5

It can be seen from the below analysis that obsolescence of building, ageing stock of building and advent of new building technology have been established by the respondents as major causes or common factors affecting building deterioration with mean scores 4.06, 4.00 and 3.80 hence ranked 1st, 2nd and 3rd. Conversely, respondents disagree that rising social expectation and aspiration is an important common deterioration factors with mean score 3.57 and eventually ranked 4th. This is in line with [7] who opined that obsolescence, ageing stock of building and environmental issues is the common cause of building maintenance.

**Table 4:** Factors that leads to the deterioration and dilapidation of buildings and infrastructural facilities

Deterioration factors	Mean	Rank
obsolescence of building	4.06	1
aging stock of building	4.00	2
advent of new technology	3.80	3
rising social expectation and aspiration	3.57	4

From the analysis in Table 5, majority of the respondent remarked the following items as most Important factors influencing the decision to carry out maintenance work and therefore ranked accordingly; misuse of building after completion of the structure, faulty design, and design complexity, not using preventive maintenance work, basic physical and chemical properties of Materials, lack of building maintenance manuals, poor financial support and lack of local Productivity standard and specification support with their mean scores; 4.15, 4.04, 3.95, 3.77, 3.71, 3.70, 3.65, 3.61 and 3.54 and ranked 1st to 9th respectively.

Other items that were ranked important includes; not using building after completion, the use of unqualified maintenance contractor and unavailability of skilled labour with their mean scores 3.49, 3.44 and 3.27 and eventually ranked 10th to 12th respectively. Misuse of components result in their damage and need for repair which will be costly [11]. Faulty design will lead to easy deterioration of the structure, complex design will have difficult, maintenance plan and high maintenance cost. Neglecting of preventive maintenance such as checking the efficacy of the rain water gutters and servicing electrical and mechanical installation causes more expensive periodical maintenance and in the long run, major repairs or restoration which could have been avoided or postponed [13]. The management body should come out with more effective solution for these in order to improve the level of satisfaction of residents towards the building maintenance.



**Table 5:** Factors influencing the decision to take up maintenance work

<b>Identified factors</b>	<b>Mean</b>	<b>Rank</b>
Misuse of building after completion of the structure	4.15	1
Faulty design	4.04	2
Design complexity	3.95	3
Not using preventive maintenance	3.77	4
Users does not understand the importance of maintenance work	3.71	5
Basic physical and chemical properties of materials	3.70	6
Lack of building maintenance manuals	3.65	7
Poor financial support	3.61	8
Lack of local productivity standard and specification	3.54	9
Not using building after completion	3.49	10
Unqualified maintenance by contractors	3.44	11
Unavailability of skilled labour	3.27	12

#### 4. CONCLUSIONS

The maintenance of buildings and infrastructural facilities in Edo state requires attention at the highest level. This attention is of basic importance of which the objective must be to keep buildings and infrastructural facilities to acceptable standard in order to make them functional and reliable. Financing by both government and property owners which could have helped to increase buildings and infrastructural maintenance has not been properly implemented. Certain government legislature and policies including taxation and property levies imposed on property owners have certainly affected the efficacy of maintenance activities.

The issue of every contractor been involved in project production with few engaged in maintenance has been a major set-back because there few maintenance professionals as against maintenance work requirement thus, most facilities are not optimally utilized. The un-involvement of these few and far between maintenance professionals in the design stage of the project is another factor that negatively affect the efficiency of building/project production, thus, leading to recurrent maintenance work draining the pocket of both the property owner and government-owned infrastructural facilities managers. Cutting cost in order to maximize profit by contractors through the use of substandard materials causes defect in the long run and subsequent maintenance requirement with its re-current maintenance cost affecting the economic output of the citizens.

Carelessness and recklessness of the users of the property are also a direct effect of defects and subsequent maintenance work which will affect the economic life of the owner, the user and even the environment. Ever busy attitude of property owners and residents due to bustling and hustling of everyday life is also a cause of neglect especially house-keeping aspect of maintenance and this has tend to low maintenance attitude and subsequent rundown appearance of buildings and infrastructural facilities. We must imbibe maintenance culture in order to enjoy the best of our assets with a view to enjoying the best of life. How well we use and enjoy our facilities as building, machines, cars, household equipment, furniture or public physical assets or our bodies depend largely on how well we imbibe maintenance culture (Ajibola, 2009). Based on the results of this study, the following recommendations are put forward: People should be sensitized and encouraged to embrace maintenance culture for the betterment of our nation, maintenance practices personnel should acquire proper training in order to effectively execute the responsibility required of them.

The need for comprehensive economic analysis and workable financial plans to be prepared before contracts are awarded, adequate funds should be provided for effective maintenance





practice to be achieved, the policy makers should be interested in maintenance which should not be neglected, each state should as a matter of duty, formulate maintenance policies that will guide its operation activities to enhance effectiveness and efficiency, facility manager or officer should be appointed to continuously keep assets or facilities in good working condition and the maintenance department is advised to carry out regular inspections of the existing buildings and not to wait until structure needs repairs.

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#### CONFLICTS OF INTEREST

No conflict of interest was declared by the authors.

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