Evaluation of the Practice of Building Survey for Maintenance of Public Building in South-East Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors OAC designed the study. Author NEI performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ATN and IGC managed the analyses of the study. Author NOP managed the literature searches. All authors read and approved the final manuscript.

Case Study

ABSTRACT

The maintenance of public building is evasive without a conscious practice of building surveying as it avails the maintenance personal insight that informs the building maintenance this The research evaluates the practice of building \surveying in South-East Nigeria and its impact in the maintenance of public buildings. It was pursuit through the use of a structured questionnaire. Public buildings within Abia, Enugu and Imo state of study were studied with the respondent drawn from the users and officials in charge of the maintenance of the building. A total of 390 questionnaires were administered with 314 returned giving a response rate of 80.5%. A random sampling technique was adopted and the data was analyzed using a computer based Software SPSS version 21. Result were presented using statistical tools Mean, Relative Importance Index (RII).The result revealed among others that there is no significant development in the condition of

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public buildings in South East states. In addition, the problems associates with building maintenance have significantly affected the building conditions in the study area. Proactive and well planned maintenance are recommended as against corrective measure commonly used. Prompt replacement of nonfunctional, aged or malfunctioning building parts. Government should ensure that most of the public buildings have a maintenance policy and there is an effective communication between the maintenance department and the building occupants. Government should ensure that there is a condition survey for the public building adopting the approach of the framework developed in this study.

1. INTRODUCTION

Urbanization and its consequent pressure on the existing building Stock is widely experienced in most areas in Nigeria. This account for the increasing challenge for the demand for housing in most urban areas [1-4]. Despite the challenge of housing shortage, the built environment is also faced with deteriorating quality buildings particularly for the low income residents and public residential units, characterized by a poor state of maintenance. Waziri and Vanduhe [5] identified with evidence that generally, public buildings are under-maintained and that a substantial part of the building stock is in danger of deteriorating below the point of economic repair. Amobi [6] confirms that public buildings in Nigeria are deficient of maintenance with the building fabrics being unattractive and unacceptable standards to the users. It is common to find poorly maintained public building in Nigeria [7-9].

A planned, regular maintenance work promises to one of the measure to sustain and ensure the functional requirement of the building ranging from: strength and stability, weather tightness, internal comfort level and the optimum use of the building [10].

According to Aluga [11] defines maintenance is defined as any work carried out s as to retain or restore the functionality of the building element at and acceptable standard. Furthermore, he suggested that management of any organization should always perceive building maintenance as an operating strategy to preserve the organizations property towards achieving the general objective of the organization.

Similarly, Siyanbola. Ogunmakinde and Akinola (2013) concurred to the fact that proper maintenance is only realistic when a condition survey is carried out.in view of this, Watt [12] defined building condition survey as any survey, recording or/and documentation of any damage done by a structural engineer is a survey of the building structure. This may include; superficial damage and is done to track the occurrence or exacerbation of building damage over time to provide objective proof in the event of any damage claims [13,14].

Attempts have been made by government in some developed countries to ensure adequate and quality building for the citizens considering the soci0economic relevance of housing. For example in countries like the United Kingdom (UK) the government undertake every five (5) years and English House Condition Survey since the year 1967 [15-17]. This is t establish the housing stck and la,s monitor its changing condition in an attempt to provide the basic for government policied on hme improvement and renewal. The essence of the survey is to carry out a physical examination of some of the housing stock, determine its histories of repairs and maintenance and with the intention to improve as well as finance necessary work on such buildings [18-20]. It is also geared towards determining the institutional contribution by local authorities in housing renewal and a survey f the housing value.

Some residential and office buildings of public institutions have been poorly maintained since construction irrespective of the obvious signs of ageing on the properties [21-25]. This poor maintenance culture have contributed immersely to the deteriorate state of some of this buildings. The attitude of unplanned maintenance of both occupants and authorities according to Eziyi, Akunnay, Albert, & Dolapo, [26], often tantamount to the reduction of the buildings lifespan, thereby defeating the purpose of the building .

Also one of the challenges of the maintenance of these public building is the issue of ownership of these buildings; occupants orientation that state as the owner of the building have the sole

responsibility to handle the maintenance. In rear occasion do occupants regard the building as their property and as such have evasive approach to the maintenance of the buildings [27-30].

Sequel to this, the research seek to evaluate the practice of building surveying as a measure for the maintenance of public buildings in South East Nigeria with particular reference to Imo, Abia and Enugu states. The essence is to identify the factors contributing to the current state of building in the public buildings, there is need to evaluate the practice of building survey and its resultant effect in the public buildings in South East Nigeria.

2. LITERATURE REVIEW

2.1 Building Survey

Building Survey travails with an undertaking of an inspection on the building, this is the reason why. A Building Condition Survey (BCS) is an essential tool to that can promote the understanding of the condition of a building or estate and equally assist in ensuring a well planned maintenance [12].

Thus, building surveying is referred to as an investigation and assessment of the construction and condition of a building which may not include advice on value. The Surveying ought to include the structure, fabric, finishes and grounds; even though the exposure and testing of services are not usually covered (Che-Ani 2008). Alternatively, a building survey is a detail building physical health check from roof to foundation examination of the building, normally conducted by a qualified building surveyor. [31].

Kerns [32] explained that depending on the clients need, building survey can provide ab assessment of the physical properties of the building via methods like visual observation, periodic monitoring and testing of building and site system. The result of a building survey can be presented as a single page summary in a report containing the test results, narrations, calculations and evn plates as may be required [33].

Mustafa, Roslan, Zakariah, Tawil and Hashim [34] explained that a detailed survey is required if the target of the surveying tackle tie rate of deterioration and decay of building and to resolve the problems, risk associated or incurred in the construction and as a check for subsequent

construction. As mentioned by Che-Ani (2008), the purpose of having building inspection data are outlined below:

a) To get the actual state of the fabric and structure of the building
b) To determine the extent defects and damage and prioritizing the preventive maintenance planning
c) To estimate and project the strength of aging building elements or structures and provide data to identify and define the extent of repairs required for existing structure.
d) To provide an estimate cost for the maintenance work (especially corrective maintenance) and projecting the value of the building after maintenance ; and
e) Providing basic and design information for the future.

2.1.1 Problems associated with building maintenance process

Osagie [35] noted that there are certain problems that have been militating against an effective building survey for the maintenance of public buildings in Nigeria. These problems were categorized into three grouped, management issues, human resource problems and technical problems. Some of these problems include.

2.2 The Top Management Problems

These are challenges associated with management of building maintenance projects. They can be classified as follows: unqualified maintenance contractors, poor management of maintenance team, procurement management, government regulations and rules, stakeholder's communications and financial issues.

2.2.1 Poor management of maintenance team

In the absence of a proactive maintenance management team, it leads to time consuming and most likely failed maintenance works. The top management in maintenance departments are very much influenced by the organization president. Hence, it is expedient that the management maintenance team leader is of a good academic background and   as this will definitely influence his/her management style. This is also important as most maintenance and seriously from the management to carry out maintenance must be driven by a proactive maintenance team leader.

2.2.2 Procurement management

Depending n the government procurement system, it is often required that the contractor provides a quotation and the offer is given to the one with with the lowest price and conforms to specification. However, according to Osagie [35] contractors have two different strategies depending on the type of contract. If the contract is a lump sum, the contractor surveys the market for the best price.

2.2.3 Unqualified maintenance contractors

In Nigeria, maintenance contracts are often awarded to the lowest price out of the number of contractors that bided for the job. This idea of awarding to the contractor with the lowest price are often done in order to generate profit [36]. Usually, it is the maintenance department of the client that monitors the flow of work and reports on the progress of work. Consequently, most of maintenance contractors operate and maintain the public building through foreign worker ranged from the highly skilled to unskilled. However, the unskilled worker represented the majority.

2.2.4 Government regulations and rules

There are so many demerits of government policy and paraster awarding contract on the basis of the lowest bidder on the assumption that new contract should not exceed that of the previous contract on the maintenance of public buildings because it does not take into consideration fluctuations of prices and ageing of buildings. The price of spare parts and labor will rise along with rises in the standard of living and inflation.

Often times the method adopted in Nigeria in classifying the maintenance contractors depend on the total amount of project capital. Therefore, the classification method adopted is to look into the capital only.

2.2.5 Stakeholders communications

Maintenance departments have poor communication. Workers and even engineers are not informed about the department's goals, objectives and plans. One of the reasons for not keeping the contractor's engineers informed about the company is that the relationship between them is temporary.

2.2.6 Financial issues

The practice of drawing up maintenance budget is frequently based on the previous year's allocation plus a percentage often times possess technical difficulties in assessing the quantity, as well as problems in execution of accurate cost of maintenance work. This accounts for the reoccurring cost overruns and underestimates. It is also noted that many building client consider the maintenance cost a minor portion of the total cost, which they will not allocate enough money for. Thus, budgeting for maintaining a building is considered a secondary obligation and not enough allocation is considered.

2.3 The Human Resource Problem

These refers to the problems t maintenance emanating from human activities such an understang of maintenance work, experience of manpwern and it can be classified into the following: lack of specialist, training and motivation, lack of proper supervision of maintenance team and unclear Job description and department structure and lack of awareness.

2.3.1 Lack of supervision from maintenance team

With the intrinsic nature of supervision, the success of any maintenance work is largely dependent on the supervision. Thus it is ethically not balanced to for supervisors to be appointed one day and are expected to perform all the complex tasks of management the next day without any form of training or preparation. This approach isn't fair to the individual nor is it an effective strategy for management. Unfortunately, the common practice is that the client maintenance team depends on the contractor for all maintenance duties. The client maintenance team in the public sector are working as supervisors only and do not know anything technical and they just receive the maintenance report from the contractor for signature only. The government sector does not have efficient maintenance staff.

2.3.2 Lack of engineers and specialist

Certain maintenance process require some specialized expertise and shortage or absence of such expertise jeopardies the entire process of maintenance. Tus it is expedient to establish work that the correct expertise needed will be readily available as when need.

Table 1. Summary of survey and assessment conducted for building

No	Task	Description
1	Preliminary site visit	Provide details f building occupant, familiarization of building layout, nature and extent of services and ensure availability for safe access of work.
2	Background research	Provide information on the issues concerning location, site, construction, use and occupation of the building. It includes background and historical information of the building, documentation oral and anecdotal information
3	Detailed on-site survey	Provide information on which to assess its condition and fitness for the purpose as prescribed by relevant documents or individual need. Identification of all defects and typically include commentary on specific items.
4	Preparation of a written report	Compilation of all relevant information derived from the preliminary site visit, background research, detailed on-site survey and communicate to the client on the implication of the building condition by assessing the defects and their significance from simple palliative measures to complex repair or replacement and cost of remedial work.

Sources: Che-Ani (2008)

2.3.3 Training and motivation

There is a need to increase the number of institutions and training course that related to the maintenance in general. There is a lack of encouragement for the engineers to enter into maintenance and operation field. The employees can be divided into professionals, administrators and labors. Professionals are engineers, accountants etc., who are assumed to be experts in their fields, since they are hired with in-depth experience and higher level qualifications. Furthermore, the uncertainty and instability of the operation and maintenance industry created more difficulty in investing in training employees. It is rare to find a maintenance department manager who allocates a reasonable training budget.

2.3.4 Unclear job description and department structure

According to Osagie [35] maintenance departments do not have structured approaches for improving processes. The Structures of maintenance departments are unclear in the government sector. They have different names, such as service management and support services and facilities. It should be organized under one name and should have a clear supported structure in every public organization.

2.3.5 Lack of awareness

Understanding the important of maintenance to facility clients and to the public in general is vital. Facility clients must be aware of the necessity of maintenance works, so they can plan, budget and finance the work of maintenance in order to keep their building in acceptable condition and to avoid future break down and failures in which will result to loss of money and time. Building clients should realize that they should maintain their facilities periodically and not leave their equipment at the stage of emergency of break down maintenance which will cost them much more than if they use planned maintenance.

2.4 The Technical Problem

There are problems related to the technical aspects of maintenance. These problems can be divided as follows: Lack of maintenance software tool, shortage of spear parts and Failure of preventive maintenance. Some of the technical problems are as listed below:

i. Lack of Maintenance Software tools
ii. Shortage of spear Parts

2.4.1 Failure of preventive maintenance

It is a general believe that most believe that most of the maintenance department in Nigeria parastatal carry out preventive maintenance this is because the corrective maintenance is due every day and the client team are busy with action maintenance.

Chanter and Swallow [37] stated that it is important to understand organizational culture for effective facilities management. Organizational structure, bureaucracy, procedures and culture determines effectiveness in undertaking public buildings maintenance works. For instance Lee (2008) describes systems adopted by large local authorities and Government departments as being complex and hierarchical, consisting of formal routines, rules and procedures as well as detailed job descriptions, resulting in lack of flexibility and inability to deal with unforeseen and exceptional conditions not foreseen by the set rules and regulations.

Waithanji (2011) identifies main causes of defects of public building to include improper activities of users, poor workmanship and vandalism with improper activities taking a bigger percentage, as well as lack of regular inspections to determine at what point repair work begins. Lee [38] in reference to an extract from a conference paper identified the scarcity of information relating to public building maintenance as a challenge. The paper indicates that scientific collection, assessment and analysis of information and data relating to problems of public building maintenance and repair are rarely carried out. He also states that when it is undertaken, in most cases it is prejudiced and does not add value to maintenance works required. He recommends the storage, retrieval and processing of relevant information as a tool for decision making for successful maintenance works.

Maxwell [39] confirmed that lack of information, data and record keeping on various project components such as number of units, authority maintenance expenses and accounts was an impediment to housing maintenance. The study concluded that public housing projects are significantly affected by time and scale factors. The bottom line for these factors is determined by the governance culture and priority accorded

to public housing maintenance function by governments and other actors. In other instances, regular housing inspections are not undertaken to establish the need for maintenance. Syagga and Aligulla (2006) confirmed that little or no inspections are carried out to determine public building maintenance requirements in Kenya. This also reflects the poor governance culture by all stakeholders in Kenya.

In reference to a study by the Department of Environment (2000) on value for money on housing maintenance of 1999, the author identifies over concentration of resources on response maintenance rather than preventive maintenance as one of the major challenges facing the local authorities. It also pointed out the lack of coherent planned maintenance strategy as the most serious problem in current public building maintenance practice, a reflection of lack of systematic and consistent governance culture by Governments.

Ali, Syahrul-Nizam Kamaruzzaman, Sulaiman and Peng (2010) in their research established that the most dominant factors that affected public building maintenance costs include expectations of tenants, building materials, building services, building age and failure to execute maintenance at the right time. The study recommended participation of tenants and residents in public housing management works. This could be instrumental in sensitizing them to accept lower but acceptable standards. Sensitization of all stakeholders including occupants and tenants enhances an understanding and appreciation of the maintenance concept thus entrenching the appropriate maintenance culture upon all citizens who are agents of housing maintenance.

2.4.2 Factors affecting building survey in public building maintenance

According to Karago (2009), the need for building maintenance is necessitated by many factors that include climatic conditions, age of building, damages by users, poor workmanship, faulty design, poor choice of materials, as well as socio-economic, political, legal and prestigious reasons. Planned preventive maintenance is essential for proper conservation of buildings. In the long run such practice is more economical than breakdown maintenance. Even so, preventive maintenance is grossly neglected in most public maintenance agencies and "maintenance by crisis" remains the prevailing norm (Shake, 2003). Irungu [40] identifies five

major factors that affect housing maintenance as institutional constraints; maintenance management problems; design, construction and use generated problems, general personnel, staffing and equipment problems; and financial problems.

Previous studies revealed the effects of numerous factors affecting maintenance and defects of public buildings. Adejimi (2005) in his study identified twelve relevant factors affecting the maintenance strength of building as design resolution, structural strength, specified materials strength, maintenance manual, safety measures, skill maintenance personnel, maintenance plants, environmental factors, usage factors, quality control factors and post construction prevention strength. While Olagunju [41] identified factors that influence the level of maintenance of public building standard. In the study eight factors were identified to be significant to physical condition of public building. The variables are structural components condition, roof components, toilet facilities, discharge of waste water component, exterior wall condition, condition of walkways within the building premises, electrical wire and switches conditions interior wall surface condition.

To evaluate the factors affecting building survey and defects, Addleson (2005) concluded that natural factors can be summarized into three group of dampness, movement and chemical and biological change. Errors, oversights, lack of care and fallibility of people that initiate, design, construct and maintain buildings, accentuated by their educational, practice and commercial environment are the main factors affecting survey and defects of building. Roslan and Ghafar (2014) reveal the following as factor of as factors affecting building survey in public building maintenance. Their study presents the analysis of the 10 factors affecting defects of public buildings. These factors have been identified and ranked according to their descriptive analyse: lack of preventive maintenance method; insufficient funds to maintain the buildings; lack of building maintenance standard procedures; poor work rectification done on buildings; non response to maintenance request; unavailability of skilled appointed maintenance personnel. low concern of future maintenance of existing maintenance team (on behalf of building owner); lack of communication between maintenance contractor, clients (owners) and users. Non-availability to replacement parts, components, and lack of understanding the importance of maintenance work.

2.5 Research Methodology

The type of research design applied for this study is descriptive survey design. According to Ezejelue, Ogwo, and Nkamele [42], descriptive survey research design describes a method of gathering data from usually a large number of respondents, who themselves constitute the sample. According to Mugenda and Mugenda (2003), descriptive survey describes the characteristics of existing phenomenon, and provides insights into the research problem by describing the variables of interest. The study used the descriptive survey to define and examine associative differences and relationships. This method provides useful and accurate information that answers questions regarding who, what, when and how (Kombo & Tromp, 2006). For purposes of this study, it was used to describe who undertakes maintenance, how it is conducted and how the maintenance policies influence building maintenance.

2.5.1 Population

A population can be defined as the complete set of subjects that can be studied: people, objects, animals, plants, organizations from which a sample may be obtained (Shao, 1999). Shao, (1999) describe population as the entire group or set of cases that a researcher is interested in generalizing. For the purpose of this research, the population consists of users of the selected public buildings in Aba in Abia State, Enugu in Enugu and Owerri in Imo state. As of 2006 census, Aba had a population of 534,265, Owerri is 127,213 and Enugu is 722,664.

Also included in the study are one hundred and one (101) respondents from the two study areas who are technical officers from the Government Estate Department (GED) of the Ministry of Housing that is mandated to undertake housing maintenance. This is the department mandated to undertake and oversee management and maintenance of public housing. The technical officers were drawn from three categories of staff

namely estate management officers who were in the top management, estate management assistants who were middle level managers and Artisans who were at the operational level. The technical officer's population details are captured in Table 2.

2.5.2 Sampling size and techniques

Sampling is defined as the selection of a part of a whole population for a study; unlike a census, which is the study of the whole population (O'Leary 2004). In this particular research, the targeted population that were studied were drawn from users of the selected public buildings, Estate Management Officers, Estate Assistants and Artisans that are in charge of managing and overseeing government properties of the selected study area as stated in the population of the study area because of their constant interface with the public buildings under study.

This research employed both random sampling techniques and stratified sampling technique for the respondents and the building under study respectively. In the selection of the district for the research, convenience sampling was the main method considering the time and financial implications involved.

The random sampling technique was used to determine the users of the selected public buildings to be sampled. The users of the selected public buildings in Aba metropolis and owerri metropolis and Enugu is estimated to be over 100 buildings obtained from South East States Housing Authority (FHA) (2018).

Thus, Cochran's sample size calculation procedure was employed to determine the appropriate sample size in this study. To do this, Cochran's return sample size formula is first determined using the formula presented in equation 1 (Cochran, 1977)

Table 2. Target population

Institution	Strata	Population size		
		Abia	**Enugu**	**Imo**
Government Buildings and	Estate management Officers	17	23	22
Estate Department	Estate Assistants	5	6	5
	Artisans	6	10	7
Total		28	39	34

Source: Ministry of Housing for South East states (2018)

$$n_o = \frac{(t^2) \times (p)(q)}{(d^2)}$$

Equation 1

Where:

- ➤ t = value of selected alpha level usually 0.025 in each tail of a normal distribution obtained as 1.96 (the alpha level of 0.05 indicating that the risk the researcher is willing to take that the true margin of error exceed the acceptable margin of error is 5%).
- ➤ (p)(q) = this is the estimate ratio given as (0.5) (0.5) = 0.25
- ➤ d= acceptable margin of error for proportion being estimated given as 0.05 (this is the error level the researcher is willing to expect).

Thus, after calculating the Cochran's return sample size no (see Equation 1), we will employ the Cochran's correction formula to obtain the appropriate or final sample size and the formula is given in equation (2) as:

$$N1 = \frac{No}{(1+no/Population)}$$

Equation 2

However, to obtain the sample size using the procedure discussed, equations 1 and 2 would be applied. Applying equation, gave a sample of 384 as presented equation 3 and 4 respectively

$$n_o = \frac{(1.96^2) \times (0.5)(0.5)}{(0.05^2)} = 384$$

Equation 3

Thus, the sample size of the respondents for this study is 384. Likewise, using the same formula, the sample size of respondents selected is 390

2.5.3 Questionnaire

Since this research were limited in resources (time), in addition to the need to protect the confidentiality of information sources, it were appropriate to use questionnaires for gathering data. The questionnaires were used to investigate the four key areas which was developed in chapter one to answer the four research questions.

2.5.4 Field observations

The researcher to ensure the physical conditions of public buildings carried this out. This should ensure a firsthand assessment of the physical conditions of the buildings at the time of the field study.

2.5.5 Validity of research instrument

Validity testing which is accuracy and meaningfulness of data obtained in respect to the variables of the study were measured using content validity test. In this case, construction professional experts did the assessment of content validity from the ministry of housing and the supervisor of the project. The experts evaluated the tool and made recommendations accordingly. They both concurred that the research instruments (Questionnaire) would measure the desired objective and could be used in the industry. They however, suggested changes to be incorporated in the questionnaire, which were effectively done. The questionnaire was reviewed through restructuring and reduction of the questions.

2.5.6 Reliability of research instrument

The instrument were subjected to a test of internal consistency to ensure its reliability. In the test of reliability, Cronbach Alpha were used to determine the level of internal consistency of the responses of respondents. This were used to determine the consistency of the respondents for decision-making. Inconsistent responses cannot be used for decision-making as may lead to wrong conclusion. Using Cronbach Alpha at 5% level of significance, Alpha value less than 0.60 is said to be weak and value greater than 0.60 is said to be strong. Hence, Cronbach's alpha of respondents from Abia is 0.827, which indicates a high level of internal consistency for the scale of the questionnaire, while Cronbach's alpha of respondents from Imo is 0.903, which indicates a high level of internal consistency for the scale of the questionnaire.

2.6 Method of Data Presentation and Analysis

The data collected for the study was analysed using descriptive statistics such as mean and Relative Importance Index (RII).

The formula is show below:

$$RII = \frac{\sum fx}{\sum f} \times \frac{1}{k}$$

Where,

$\sum fx$ = is the total weight given to each attributes by the respondents.

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∑f = is the total number or respondents in the sample.

K = is the highest weight on the likert scale.

The rating of all the items for extent of significance was based on the value of their respective relative importance index (RII). Presentation is in tables.

3. RESULT AND DISCUSSION

This section encompasses the presentation of the data, analysis of the data and the discussion of the data gotten from the questionnaire and checklist survey.

3.1 Questionnaire Survey Result and Analysis

Three hundred and ninety questionnaires were administered to respondents within the areas of study. The percentages of responses are presented in Table 3 below. Form the table it can be gathered that a total of three hundred and fourteen were received adequately filled giving a percentage response of 80.5%.

3.2 Respondents Profile

From the result of the analysis, the profile of the respondents is presented in Table 4. From the

table it can be deduced that a greater percentage of the respondents were males (67.7%) while only 32.3% were female. The result also revealed that a greater percentage of the respondents (45.7%) had HND/BSc as their highest qualification. However, 34.6% of the respondents had MSc/MEng; 13.4% had NCE/ND while only 6.3% of the respondents had PhD.

With regard to the duration of stay in the public buildings under study area, a larger percentage of the respondents affirmed to have been using the building for a period of 11-15yrs (48.8%). This is followed closely by those who have spent between over 15years (28.3%) and indication that a larger percentage of the respondent have spent a reasonable number of years in the building to give a reliable information of the maintenance trend of the buildings.

3.3 Factors Affecting Building Defects

Table 5 presents the respondents ranking of the factors affecting building defects and maintenance cost. From the Table it can be deduced that 'Poor quality of building material used' (RII=0.86) was ranked first. This was followed closely by 'Unplanned maintenance policy' (RII=84); 'Age of building' (RII= 0.81) and

Table 3. Questionnaire administered and retrieved

Questionnaires	Frequency	Percentage of (%)
Number returned	314	80.5
Numbers not returned	76	19.5
Total	390	100

Source: Field Survey, (2018)

Table 4. Respondents Profile

S/N	Variable	Option	Frequency (No)	Percentage (%)
1	Gender :	a) Male	212	67.7
		b) Female	102	32.3
		Total	314	100
2	Highest qualification of respondent :	a) NCE/ND	42	13.4
		b) HND/BSc	143	45.7
		c) MSc/MEng	109	34.6
		d) Phd and above	20	6.3
		Total	314	100
3	Duration of use of the Public Building	a) 0-5yrs	17	5.5
		b) 6-10yrs	54	17.4
		c) 11- 15yrs	154	48.8
		d) Over 15yrs	89	28.3
		Total	314	100

Source: Field Survey, (2018)

'Pressure on facilities' (RII=0.80) which ranked second, third and fourth respectively. Also, it can be seen from the mean values of all the factors identified that which were all closer to 4.0 that the respondents agreed that they are all potential factors affecting building defects and maintenance cost. See Table 5.

3.4 Constraints to the Maintenance of the Public Buildings

The factors that constraints the maintenance of public buildings were also ranked and the result is as presented in Table 6. From the Table, 'Lack of timely response maintenance request' (RII= 0.92) was ranked first and the most significant constraint to the maintenance of public buildings in the study area. Other constraints ranked according to their order of severity are; 'lack of maintenance policy' (RII=0.82); 'Poor communication of maintenance departments' (RII=0.80) and 'Financial issues' (RII=0.80) which were ranked second, third and fourth respectively. The details of the ranking of other factors identified are as presented in the Table.

The result shows that these constraints contribute significantly towards discouraging the development of a framework for evaluating the effectiveness of building survey for the

maintenance of public buildings in South-East (t=8.578; p<0.001).

3.4.1 Hypothesis

Ho: Problems associated with building maintenance have not significantly affected the building conditions in the study area.

Ha: Problems associated with building maintenance have significantly affected the building conditions in the study area.

Level of significance (α) = 0.05

Test statistic: t = $\dfrac{\bar{x} - \mu_o}{\frac{s}{\sqrt{n}}}$

3.4.2 Decision Rule

Reject the null hypothesis for p-value ≤ 0.05, otherwise do not reject.

3.4.3 Interpretation

The empirical result (with t-statistic = 8.578; p<0.001) indicates that these challenges associated with public building maintenance in the area had significantly affected the building conditions in the area. The researcher therefore, rejects the null hypothesis.

Table 5. Factors affecting building defects

S/N	Weightng/Response Frequency										
	Factors	1	2	3	4	5	(∑f)	∑fx	Mean	RII	Rank
1	Age of building	-	10	12	249	43	314	1267	4.03	0.81	3rd
2	Pressure on facilities	-	-	47	227	40	314	1249	3.98	0.80	4th
3	Unplanned maintenance policy	-	05	-	242	67	314	1313	4.18	0.84	2nd
4	Misuse of building	-	07	131	109	67	314	1178	3.74	0.75	7th
5	Weather effect on building	32	42	101	126	13	314	988	3.14	0.63	9th
6	Difficulty in identifying true cause of defects	-	43	96	175	-	314	1074	3.42	0.69	8th
7	Poor quality of building material used	-	-	-	225	89	314	1345	4.28	0.86	1st
8	Design defects and poor workmanship in the initial construction stage of the building	-	30	47	198	39	314	1188	3.78	0.76	6th
9	Floor	-	20	42	217	35	314	1209	3.85	0.77	5th

Source: Field Survey, (2014); Where: 1= never Affect, 2= Slightly Affect, 3=Inconsequential, 4=Always Affect, 5=Strongly Affects

Table 6. Constrains to the maintenance of the public building

S/N	Weightng/Response Frequency										
	Constrains to the maintenance of the public building	1	2	3	4	5	(∑f)	∑fx	MEAN	RII	RANK
1	Lack of maintenance policy	-	15	-	242	57	314	1283	4.09	0.82	2nd
2	Inadequate provision of fund for maintenance	-	17	62	48	-	314	412	3.24	0.65	11th
3	Lack of timely response maintenance request	-	15	10	57	232	314	1448	4.61	0.92	1st
4	Poor management of maintenance team	-	52	12	217	33	314	1173	3.74	0.74	9th
5	Unqualified maintenance contractors	-	-	74	198	42	314	1224	3.90	0.78	6th
6	Government policy of awarding the contract to the lowest bidder	-	12	67	217	18	314	1183	3.76	0.75	8th
7	Poor communication of maintenance departments	-	49	30	92	143	314	1271	4.05	0.81	3rd
8	Financial issues	-	40	49	94	131	314	1258	4.00	0.80	4th
9	Lack of supervision from maintenance team	30	37	-	133	114	314	1206	3.84	0.77	7th
10	Lack of engineers and specialist	-	49	67	64	134	314	1225	3.90	0.79	5th
11	Failure of preventive maintenance	-	57	20	237	-	314	1122	3.57	0.71	10th

Source: Field Survey, (2018); Where: 1= strongly disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= strongly agree

Table 7. Result and interpretation

One-Sample Test: Test Value = 3.0						
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Mean Responses	8.578	10	.000	.88182	.6528	1.1109

Diagnostic Tests
Kolmogorov-Smirnov Test stat. = 0.180
Prob.(K-S) = 0.200
Shapiro-Wilk stat. = 0.945
Prob.(S-W) = 0.585

Source: Researcher's SPSS 25.0 output

4. CONCLUSION AND RECOMMENDATIONS

The study upheld the alternate hypothesis "Problems associated with building maintenance have significantly affected the building conditions in the study area. Poor quality of building materials use is the predominant factors affecting building defect and maintenance cost. However, other viable factors include 'Unplanned maintenance policy', 'Age of building' and 'Pressure on facilities' expressed in there order of severity. Lack of timely response to maintenance request identified as the major constrains to maintenance of public buildings. In line with this, other constrained to the maintenance of the public building ranked in their order of severity are: 'lack of maintenance policy'; 'Poor communication of maintenance departments' and 'Financial issues'.

Furthermore, the challenges identified occur mainly due to the maintenance procedure usually adopted. However, 'Planning the Implementation' was identified as the realistic and suitable method of maintaining the public buildings. Also with regard to the developing of a condition survey framework, it was discovered that priority ought to be given to ranking of maintenance works in order of priority, proper implementation of design and the possible institutional challenges attached to the maintenance of public buildings.

There is no substantial development in the condition of public buildings in South East states. In addition, the problems associate with building maintenance have significantly affected the building conditions in the study area.

Adequate planning of maintenance work that are proactive nature and not the once that are corrective in nature. Aging building parts should be replaced to avoid it making other parts of the building dilapidating. Government should ensure that most of the public buildings have a maintenance policy and there is an effective communication between the maintenance department and the building occupants. Government should ensure that there is a condition survey for the public building adopting the approach of the framework developed in this study.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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