

**OPTIMUM STANDARD NEEDS OF GRADUATES OF TECHNICAL  
COLLEGES IN PUBLIC BUILDING MAINTENANCE  
FOR SELF RELIANCE IN  
ENUGU STATE.**

By

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**Abstract.**

*This study aimed at determining the optimum standard needs of graduates of technical colleges in public building maintenance for self reliance in Enugu State. Two research questions and two corresponding null hypotheses guided the study. The study adopted a descriptive survey research design with the population of 72 respondents (33 supervisors and 39 craftsmen obtained via pilot study) in Enugu State. The instrument for data collection was a structured 21-item questionnaire developed by the researchers. The instrument was validated by three research experts while the reliability index of 0.71 was obtained using Cronbach Alpha reliability estimate. Mean was used to answer the two research questions while the null hypotheses were tested using t-test statistics at .05 level of significance and appropriate degree of freedom. The result of the study revealed that; implementation of building maintenance law would guide and ensure optimum standards as it relates to material usage, maintenance attitudes of buildings owners and others; competent human resources capacity development would enhance maintenance of building defects like growth of fungus, deboning of finishes, water dripping, rust staining, crack and falling of concrete. It was recommended that proper supervisory measures should be taken by building maintenance supervisors to ensure that buildings are maintained as stated by law.*

**Keywords:** Optimum standard needs, effective maintenance, public buildings.

**Introduction**

Buildings play significant role in development of a nation and one of the criteria for a developed nation is the type of structures available in the cities, town and rural areas. Such structure like the type of building is a basic necessity of man. A refers to an enclosed structure intended for human occupancy. In the words of Fadamiro and Ogunsemi (2006),

a building can mean the structure itself and nonstructural components like cladding, roofing; interior walls and ceilings, HVAC systems, electrical systems and other structures that are permanently attached to and supported by the structure for convenience of man. Buildings vary in design and appearance depending on the purpose for which it is erected. The purpose of a building among

others may include the public use.

Public building involves structures (buildings) made for multi purposes. This purposes may include; industrial purposes, sports and recreation, educational and the likes. Similarly, oxford dictionaries.com (2017) defined a public building as a structure erected for use by the public for any purpose, such as assembly, education, entertainment, or worship. According to Building Regulations (2010) public building means a building consisting of - (a) a theatre, public library, hall or resort; (b) a school or other educational establishment not exempted from the operation of building regulations by virtue of section 4(1)(a) of the Act(b); or (c) a place of public worship.

These buildings are widely in use in Nigeria and Enugu State in particular. Enugu State is one of the States located at the South-Eastern part of Nigeria which enjoys average sunshine of about six hours daily with a population of over one million according to year 2015 census (Wikipedia, 2018). These buildings age as year progresses and thus demands corresponding maintenance from competent human resources. These competent human resources who may work in the capacity of craftsmen are usually found to be graduates of colleges of education especially, technical education.

However, Federal Republic of Nigeria (FRN, 2013) stated that technical education is a programme in Nigeria given the mandate to produce craftsmen or middle level manpower that will acquire practical skills in utilization of technological devices. In the same vein, Technical education in view of this study

inculcates the background knowledge of technology and necessary manipulative skill for its utilization to the students. Okoro (2008) stated that technical colleges are the principal vocational institutions in Nigeria designed to give full craft man training to prepare the individual exposed to its programme for practical skills, knowledge and aptitude required of technicians at sub-professional level.

Technical education programmes as offered in Nigeria technical colleges according to National Board on Technical Education (NBTE, 2012) syllabus include: window and door installation, roofing, radio and television repairs, auto-wiring, wiring and equipment installation, coil and armature winding and repair, auto-mechanic, wheel alignment and tyre balancing, auto-body repair, auto-shop and service station management, auto-air conditioning, engine cleaning and lubrication, brick laying and concreting, building construction, block molding and bricks making, painting, air conditioning and refrigeration servicing and repair, welding and fabrication, mechanical operation, woodwork, computer science foundry and forging technology. In the programmes, building maintenance taught under the umbrella of building construction trade is to enable technical college students acquire skill for effective employment on graduation especially in building maintenance services. Thus, the FRN (2014) stated that technical education is offered in technical colleges, universities, monotronics, polytechnics and colleges of education (Technical) for the production of high skilled manpower to help them apply scientific knowledge to



olve environmental problems and, provide goods and services for the convenience of man especially when these graduates are effective in building maintenance.

Maintenance is measures taken to overcome unexpected breakdown of buildings. Onyebuenyi (2018) perceived maintenance as the art and act of retaining machine or equipment in its working order. Onyebuenyi further noted that maintenance takes place either in a functioning system to improve its performance or in broken down system to restore it to its functional order. Maintenance involves different types and procedures. Zakaria and Ali (2006a and 2006b) identified in the maintenance procedures as predictive (routine), corrective and preventive maintenance. He stressed that service involves taking measures while the material piece is still functional before it breaks down, however, there are continuous realizations that the best value cannot be derived from any of these approaches to buildings maintenance. When maintenance is not well carried out, it often leads to buildings that will be very expensive to own or operate in the long run (Spare, 2001). Corrective maintenance is failure-based, while periodic and preventive is condition-based. This is because corrective maintenance is initiated when the building has already failed with the intent to restore the building to its original condition. Most public and private buildings in Enugu State are faced with maintenance challenges resulting in deteriorations and ultimate defects of various degrees.

Ipingbemi (2010) stated that many people emphasize on the development of new properties with little attention to the maintenance of the existing ones. Based on this, individuals, corporate bodies and the nation as a whole need to invest more in maintenance considering its place in prolonging the life of a building. Individuals especially graduates of technical colleges (building technology) require necessary skills to enable them engage in public building maintenance in the state. This in addition to sustaining the structure enhance their capability for self reliance.

Self reliance simply means totally free from dependency. Self reliance according to Onoh & Onyebuenyi (2017) is the capacity of being the boss of oneself as a result of saleable skills acquired for proper adaptation to the world of work. One can be self-reliant through maintenance practices especially in building. Nevertheless, building maintenance becomes more difficult according to age of the structure and this depends on the quality of the original building coupled with the rate of maintenance of the structure (Adenuga, 2009). It is pertinent to note that the maintenance objective is to preserve buildings in their initial functional, structural and aesthetic states. This is to ensure that they continue to remain in such states and retain their investment value over a long period of existence (Ipingbemi, 2010). These maintenance measures are to be carried out to ensure that the life spans of buildings are prolonged in the country at large and Enugu State in particular.

Subsequently, in Enugu State, the reverse has been the case to the extent that the place of technical college students in maintenance activities has been under utilized and most public building users do not always make use of the property and the services in good condition, often users do not obey the information contained in the maintenance manual of the building if it exists at all (Siyanbola, Ogunmakinde and Akinola, 2013). Most property owners in Enugu State sometimes endeavour to keep maintenance expenditure to the least, eliminating the consequences of the long term effect of such actions thereby contributing to the increasing number of deteriorating buildings in the State. There ought to be minimum standards needed for building maintenance to be effective. The acceptable standard is necessary to meet the needs and sustain the utility value of the facility. These standards may include implementation of building maintenance laws and human resources (craftsmen) capacity development needs. The human resources (craftsmen) need to be retrained over time to ensure that they are updated skillfully but in most cases, the optimum standard document does not exist. Non availability of this document deters graduates of technical colleges from public building maintenance. To effectively determine these needs by the study, the opinions of building supervisors and craftsmen would be sought. Supervisors in this regards refers to professionals who inspects building from construction period through its usage while craftsmen refers to lower level

skilled workforce who carry out building construction and maintenance services. Hence, it is against these background this study was conceived to determine optimum standards needs of graduates of technical colleges in building maintenance for self reliance in Enugu State.

### **Statement of the Problem**

In order for a facility to continue to perform its required functions, maintenance is needed. In Enugu specifically, some degree of improvement are needed over the life of most public buildings as standards of comfort and amenity arise where the statutory requirements for maintenance. The number of buildings requiring maintenance is high as a result of deterioration and decay with age as a result of various factors, including use of quality materials, bad workmanship, excessive usage, abuse and inadequate and poor maintenance practices. Buildings naturally wear and tear over time and use. Nevertheless, issues of use of quality materials, bad workmanship, abuse and misuse of buildings are common in Enugu with most internal spaces inadequate and inappropriate maintenance service including absence of implementation of building maintenance laws, poor maintenance attitudes of most building owners, marginalization of craftsmen and technical college graduates fundamentals and serious issues in Enugu State. These has affected the development (both social and economically), settlement and contributed to increased rate of unemployment.



invariably increased dependency ratio of youths specifically, technical college graduates and other vices. On these grounds arouse the need to determine by the study, the optimum standard needs of graduates of technical colleges in public building maintenance for self reliance in Enugu State.

### Purpose of the Study

The general purpose of this study was to determine the optimum standard needs of graduates of technical colleges in public building maintenance for self reliance in Enugu State. Specifically, the study sought to identify;

1. needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State.
2. retraining needs of the graduates of technical colleges for self reliance in Enugu State.

### Research Questions

The following research questions guided the study:-

1. What are the needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State?
2. What are the retraining needs of the graduates of technical colleges for self reliance in Enugu State?

### Hypotheses

The following null hypotheses mulated and tested at .05 level of nificance guided the study;

There is no significant difference in the mean ratings between

supervisors and craftsmen on the needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State.

**H<sub>0</sub><sub>2</sub>:** There is no significant difference in the mean ratings between supervisors and craftsmen on the retraining needs of the graduates of technical colleges for self reliance in Enugu State.

### Research Method

The study employed a survey research design; the study was carried out in Enugu State. The population for the study was made up of 72 respondents (33 supervisors; and 39 craftsmen) all from Enugu State. Due to manageable population size, no sampling was adopted by the study. The instrument for data collection was a 21-item structured questionnaire developed by the researchers sectioned A and B with response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The response categories were assigned numerical values of 4, 3, 2 & 1 respectively. The instrument was validated by three experts while the reliability of the instrument was established using Cronbach's Alpha which gave a high co-efficient result of 0.71.

Mean was used to answer the research questions. Real limits of the mean responses were used as basis for decision, thus;

Strongly Agree (SA): 3.50 - 4.00, Agree (A): 2.50 - 3.49, Disagree (D): 1.49 - 2.49

Strongly Disagree (SD): 1.00 - 1.49

The null hypotheses were tested using t-

test at .05 level of significance. The null hypotheses was rejected when t-calculated value is greater than t-table value, otherwise not rejected when t-calculated value is less than t-table value.

### Research Question 1

What are the needs of the graduates of technical colleges in the implementation of building maintenance laws for self reliance in Enugu State?

**Table 1: Mean and standard deviation of mean responses of respondents regarding needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State.**

S/N	Implementation of building maintenance law would guide and ensure;	Supervisors N=33		Craftsmen N=39		Overall (72)		Decision
		$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>	$\bar{X}$	SD	
1	standard material usage	3.31	0.73	3.21	0.80	3.26	0.77	Agree
2	maintenance attitude improvement	3.48	0.62	3.38	0.72	3.43	0.67	Agree
3	maintenance personnel statutory requirements	3.38	0.68	3.25	0.85	3.32	0.67	Agree
4	number of occupants	3.15	0.87	3.17	0.84	3.16	0.86	Agree
5	price bargain standards	3.09	0.90	3.24	0.71	3.18	0.81	Agree
6	conformity of replacement material	3.54	0.66	3.43	0.69	3.49	0.68	Agree
	<b>Building usage against;</b>							
7	industrial to office	3.40	0.63	3.35	0.59	3.38	0.61	Agree
8	office to domestic	3.35	0.78	3.29	0.85	3.32	0.82	Agree
9	domestic to office	3.02	0.84	2.88	0.90	2.95	0.87	Agree
10	canopy to accessible flat roof or balcony	3.62	0.49	3.54	0.50	3.58	0.58	Strongly Agree
11	domestic to restaurants	3.32	0.64	3.29	0.69	3.31	0.67	Agree
	<b>Cluster Mean</b>	<b>3.33</b>	<b>0.72</b>	<b>3.28</b>	<b>0.74</b>	<b>3.31</b>	<b>0.73</b>	<b>Agree</b>

Note: X: Mean, SD: Standard Deviation

Data analysis as presented in Table 1 showed that the mean rating of 3.58 was obtained for item number 10 indicating that the itemized need was strongly agree by the respondents. Nevertheless, the

### Results

The results are presented in Table(s) 1 to 4 in line with the research questions and hypotheses that guided the study.

mean rating range of 2.95 to 3.49 was obtained in items 1, 2, 3, 4, 5, 6, 7, 8, 9 & 11 indicating that the respondents agreed that the itemized needs are necessary and worth implementation as law for effective maintenance of public buildings by technical college graduates for self



reliance in Enugu State. The grand mean of 3.31 obtained for all the items attested to that while the relatively low standard deviation of 0.73 shows homogeneity of opinions of respondents.

### Research Question 2

What are the retraining needs of the graduates of technical colleges for self reliance in Enugu State?

**Table 2: Mean and standard deviation of mean responses of respondents regarding the retraining needs of the graduates of technical colleges for self reliance in Enugu State.**

S/N	Needs for human resources capacity retraining include updates in;	Supervisors N=33		Craftsmen N=39		Overall (72)		Decision
		$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>	$\bar{X}$	SD	
12	Skill	3.09	0.65	3.09	0.92	3.09	0.79	Agree
13	Deboning of finishes	3.28	0.78	3.26	0.78	3.27	0.78	Agree
14	Water dripping	3.54	0.66	2.92	1.05	3.23	0.86	Agree
15	Rust staining	3.42	0.79	3.12	0.82	3.27	0.81	Agree
16	Defective concrete	3.48	0.62	3.22	0.86	3.35	0.74	Agree
17	Water staining	3.40	0.70	3.02	0.84	3.21	0.77	Agree
18	Falling of concrete	3.08	1.00	3.17	0.84	3.13	0.92	Agree
19	Falling off wall	3.48	0.50	3.49	0.71	3.49	0.61	Agree
20	Loosening of parts of building	3.48	0.81	3.05	0.96	3.12	0.89	Agree
21	Cracks	3.14	0.63	3.05	0.96	3.21	0.80	Agree
<b>Cluster Mean</b>		<b>3.01</b>	<b>0.71</b>	<b>3.14</b>	<b>0.87</b>	<b>3.24</b>	<b>0.80</b>	<b>Agree</b>

Note: X: Mean, SD: Standard Deviation.

Table 3 showed that the mean ranges of 3.09 to 3.49 were obtained for all the items numbered 12 to 21. This indicated that the presented and itemized needs were agreed by the respondents as the retraining needs of the graduates of technical colleges for self reliance in Enugu State. Similarly, the grand mean of 3.24 obtained for all the items (10 items) indicates that the items on human resources retraining are necessary for

effective maintenance of public buildings by technical college graduates for self reliance in Enugu State. The grand standard deviation of 0.80 also denotes that the disparity in opinions of respondents is slim.

### Hypothesis 1

There is no significant difference in the mean ratings between supervisors and craftsmen on the needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State.

**Table 3: t-test analysis between mean responses of supervisors and craftsmen on the needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State.**

Respondent	N	$\bar{x}$	SD	Df	Prob.	t-cal	t-tab	Decision
Supervisors	33	3.33	0.72	70	.05	0.289	2.000	NS
Craftsmen	39	3.28	0.74					

**Note:** NS: Not Significant. SD: standard deviation. DF: Degree of freedom, P: Level of Significance.

**Result in Table 2 above unveils that the t-calculated value of 0.289 was obtained at .05 level of significance and 70 degree of freedom for the 11 items (research question 1 items) with the t-table value of 2.000. Since the t-calculated value (0.289) is less than the t-table value of 2.000; the null hypothesis is therefore not rejected for these items. This implies**

that a significant difference does not exist between the mean ratings of supervisors and craftsmen on the needs of the graduates of technical colleges in implementation of building maintenance laws for self reliance in Enugu State

**Hypothesis 2**

There is no significant difference in the mean ratings between supervisors and craftsmen on the retraining needs of the graduates of technical colleges for self reliance in Enugu State.

**Table 4: t-test analysis between mean responses of supervisors and craftsmen on the retraining needs of the graduates of technical colleges for self reliance in Enugu State.**

Respondent	N	$\bar{x}$	SD	Df	Prob	t-cal	t-tab	Decision
Supervisors	33	3.01	0.71	70	.05	-0.698	2.000	NS
Craftsmen	39	3.14	0.87					

**Note:** NS: Not Significant. SD: standard deviation. DF: Degree of freedom, P: Level of Significance.

**Result in Table 4 above shows that the t-calculated value of -0.698 was obtained at .05 level of significance and 70 degree of freedom for the 10 items in research question 2 with the t-table value of 2.000. Since the t-calculated value is less than the t-table value; the null hypothesis is therefore not rejected for these items. This invariably implies that there is no significant difference in the mean ratings between supervisors and craftsmen on the retraining needs of the graduates of technical colleges for self reliance in**

**Enugu State. Discussion of findings**

The findings of the study in research question one revealed that implementation of building maintenance law would guide and ensure standard material usage, improve maintenance attitudes of buildings owners, state the statutory requirements of maintenance personnel, conformity of replaced/replaceable material, price bargain standards and others. These items are needful and demands implementation for effective maintenance of public buildings by technical college students for self reliance in Enugu State. The findings of the study in this direction is i



agreement with the findings of Roslan, Ghafar, Noorzawati & Mohd (2014) which identified various factors affecting building maintenance and defects of public buildings in Penang, Malaysia. The identified factors require consideration and necessary for integration into the curriculum for teaching and learning for effective maintenance practices especially in public buildings by technical college students for self reliance in Enugu State.

The result of the analysis of research question two revealed that all the items are retraining needs of the graduates of technical colleges for self reliance in Enugu State. Some of the items identified include competent human resources development in maintaining building defects like growth of fungus, deboning of finishes, water dripping, rust staining, crack and falling of concrete. These findings are in agreement with the findings of Olanrewaju, Babatunde, & Anifowose (2015) which stated that *availability of qualified and competent construction industry professionals was generally believed to be the most significant factor that would impact on the drive to achieve quality of maintenance operations in Nigeria.*

The result of hypothesis 1 showed that a significant difference does not exist between the ratings of supervisors and craftsmen on the needs for implementation of building maintenance law for effective maintenance of public buildings by technical college students for self reliance in Enugu State. This invariably implied that the status of the respondents had no influence on their opinion regarding the needs for implementation of building maintenance

law for effective maintenance of public buildings by technical college students for self reliance in Enugu State.

Similarly, the t-test result (hypothesis 2) showed that the null hypothesis was not rejected; denoting that a significant difference does not exist between the mean ratings of supervisors and craftsmen on the needs for human resources capacity development for effective maintenance of public buildings by technical college students for self reliance in Enugu State.

### Conclusion

Based on the findings of this study, implementation of building maintenance law would guide and ensure optimum standards as it relates to material usage, maintenance attitudes of buildings owners, the statutory requirements of maintenance personnel, conformity of replaced/replaceable material, price bargain standards and others. the respondents (teachers and craftsmen) agree that implementation of building maintenance law would ensure effective maintenance of public buildings by technical college graduates for self reliance in Enugu State as it would stand as a guide against the improper use of public buildings and as well help in the equipment (teaching) of technical college students towards effective discharge their duties especially in building maintenance practices on graduation. Similarly it would help to curb the youth's unemployment menace in the State. Also, the respondents agreed that human resources capacity development is needed for effective maintenance of completed public buildings in Enugu. Some of the needs identified include competent

human resources capacity development in maintaining building defects like growth of fungus, deboning of finishes, water dripping, rust staining, crack and falling of concrete. These training would over-time keep technical college graduates' skills updated. This would ensure effectiveness in maintenance practices especially in public buildings by technical college graduates for self reliance in Enugu State.

### Recommendations.

The following recommendations were made based on the findings of the study:

- 1) Building maintenance laws should be implemented, it would serve as a standard against building misuse.
- 2) Human resources (craftsmen) capacity development should be emphasis on for better equipment of maintenance personnel.
- 3) Building maintenance laws technical colleges by curriculum planners and developers for effective teaching and learning.
- 4) Building maintenance laws should be integrated into the curriculum of technical colleges by curriculum planners and developers for effective teaching and learning.
- 5) Proper supervisory measures should be taken by building maintenance supervisors to ensure that buildings are maintained as stated by law.

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