
Preventive Maintenance Culture And Durability Of Residential Buildings In Port Harcourt, Rivers State

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Abstract

The aim of this study is to investigate the concept of preventive maintenance culture and durability of residential buildings in Port Harcourt, Rivers State. The study intends to ascertain the extent to which preventive maintenance influence the durability of residential buildings in the area consisted of six thousand (6000) residential buildings. However, the sample size was three hundred and seventy five buildings-draw, using Taro Yamanes formula for finite population. One hypothesis was used to put the study on course. The data was correlated using Pearson product – moment using t-test for correlated data, at .05 level of significance. The r-value of 0.9 showed very high relationship between preventive maintenance durability of residential building in Port Harcourt. Similarly, the test of the hypothesis with $t(cal)$ of 0.31 [$t(table) = 1.96$] showed that preventive maintenance significantly influenced durability of residential buildings in Port Harcourt, Rivers State. Thus, it is recommended that supervision should be thorough, especially during repairs and installation activities, to ensure quality delivery.

Keywords: Preventive maintenance, durability, building, culture, residence.

Introduction

Buildings deteriorate over time due to loss of quality of materials used for the construction. However, to put them in good shape to ensure strength and durability, proper maintenance is essential. Maintenance as posited by Bamgboye (2006) in Chikezie et al (2017), is the art of returning the operating condition of an asset into the normal level at a cost that is able to promote the useful service life of the piece of item. However, in the vine of Usman (1988) in Adejuyigbe and Bolaji (2012), maintenance is the work essential to put equipment and machines into proper working conditions. From the definitions, therefore, maintenance is the act of returning a facility or structure to its normal working condition. However, for a structure being maintained to continue working at its normal condition over a long period of time, a good maintenance culture is necessary. Maintenance culture is the value, direction of thinking, behaviour, and the beliefs of any individual or group that see maintenance as an issue that is necessary. Therefore, the design and the implementation of procedures that help to prevent the breakdown or failure of a system without compromising the performance and safety of the system are the major focus of maintenance culture. This means that good maintenance culture brings about attitudes that ensure frequent repairs and maintenance facilities in order to ensure their usefulness.

In Nigeria, the idea of maintenance culture appears to be new (Chikezie 2017). Chikezie (2017) further noted that, more investments are made on infrastructure, machines equipment, while little or no attention is given to maintenance, hence, low result in outputs. In a study on the evaluation of maintenance culture in manufacturing industries in Akure metropolitan area of Nigeria, Bolaji and Adejuyigbe (2012) observed that overall maintenance was generally poor. This was as a result of improper evaluation, review and monitoring program. Similarity, the analysis of maintenance culture in the public primary and secondary schools in Edo State, carried out by Iyamu et al (2018), showed that the maintenance culture of the schools buildings was at a low ebb. Therefore, this study is aimed at appraising the relationship between good maintenance culture and durability of buildings in Port Harcourt, Rivers State.

Conceptual clarification

The advancement in technology, responsible for the development of new forms of roofing sheets and other kinds of more durable building materials seems responsible for the shift in interest, from the use of ancient, to modern materials in the building construction. The modern materials have structural properties such as resistance to fire, resistance to water, insulation from heat, comprehensive strength, and acoustic properties (Torrie, 2020). However, for any residential building, irrespective of the quality of the materials used for the construction to be durable, it must be properly maintained in the areas of changing of leaking roofing sheets, repainting of walls burglary proofs, regular mopping of floors, replacement of damaged electrical appliance and plumbing materials, and the frequent cleaning of glass windows and doors. Maintenance is the act of ensuring that an asset operates on the standard intended for it at no price more than is essential to increase its durability (Bamgboye, 2006, in Chikezie et al, 2017). It is also the activity necessary to return a piece of machine or equipment to a good working condition (Usman 1998) in Adejuyigbe and Bolaji (2012). Maintenance is a good culture and it ensures the durability of any equipment and building. Good maintenance culture ensures the prevention of the breakdown and failure of a system.

Aim and objective of the study

The aim of the study is to investigate the paradigms of improving maintenance culture and the durability of building in Port Harcourt, Rivers State.

The objective is to ascertain the extent to which preventive maintenance influences the durability of buildings in Port Harcourt, Rivers State.

Hypothesis

The null hypothesis is tested at 0.5 level of significance.

H₀: Preventive maintenance does not significantly influence the durability of buildings in Port Harcourt, Rivers State.

Significance of the study

The findings of this study will be useful to landlords and land developers through improved useful service lives of their buildings, and higher return on investment. This will be realized through the development and application of good maintenance culture that ensures the up keep and durability of their building.

Methodology

Survey research design was used in this research. The target population for the study was made up of 6,000 residential buildings in Port Harcourt, Rivers State, and the accessible population was derived using Taro Yamanes' Formula for finite population;

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = sample size, N = Population; e = error margin

$$\begin{aligned} \therefore n &= \frac{6000}{1 + 6000(0.05)^2} \\ &= \frac{6000}{16} \\ \therefore n &= 375 \end{aligned}$$

Instrument for data collection

Questionnaire was used as instrument for data collection. It was made up of two parts; part A which deals with respondents demographic data, and part B which contains structured questionnaire. Questions to obtain information about the extent to which routine maintenance influences the durability of buildings in Port Harcourt, Rivers State.

Instrument for data analysis

The hypothesis was tested at .05 level of significance using t-test for correlated data. However, Pearson product moment correlation coefficient will be used to analyze the statistical data with the objective of establishing the strength of the relationship among the variables.

Presentation, analysis and discussion of findings

Test of Hypothesis

H₀: Preventive maintenance does not significantly influence the durability of building in Port Harcourt, Rivers State.

Table 1: Correlation of the yes responses on preventive maintenance and durability of residential buildings in Port Harcourt using Pearson product moment correlation.

S/N	Preventive Maintenance	Durability of buildings	x^2	y^2	Xy
1.	265	259	70225	67081	68635
2.	193	182	37249	33124	35126
3.	249	231	62001	53361	57519
4.	278	277	77284	76729	77006
5.	235	294	55225	86436	69090
6.	197	272	38809	73984	53584
7.	271	281	73441	78961	76151
8.	218	173	47524	29929	37714
9.	267	155	71289	24025	41385
10.	2173	2124	533047	523630	516210

Applying $r = \frac{N\sum xy}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$

Where:

- N = Number of pairs of score
- $\sum XY$ = Sum of products of pairs of scores
- $\sum X$ = Sum of X score
- $\sum Y$ = Sum of Y score
- $\sum X^2$ = Sum of X – square scores
- $\sum Y^2$ = Sum of Y – Squared scores

Gives; $r = \frac{375(516210) - (2173)(2124)}{\sqrt{[(375(533047) - (2173)^2)][375(523630) - (2124)^2]}}$

$r = 0.9$

This shows very high relationship, implying that preventive maintenance influences durability of buildings in Port Harcourt to a very high extent. But we cannot conclude until further test of significance of the r-value support such statement.

Table 2: t-test for correlation of influence of preventive maintenance on durability of residential buildings in Port Harcourt, Rivers State.

S/N	Preventive Maintenance X	Durability of buildings Y	D = X - Y	D ²
1.	265	259	6	36
2.	193	182	11	121
3.	249	231	18	324
4.	278	277	1	1
5.	235	294	-59	3481
6.	197	272	-75	5625
7.	271	281	-10	100
8.	218	173	45	2025
9.	267	155	112	12544

$$\sum D = 49 = 24257$$

$$\text{Applying } t = \frac{\sum D}{\sqrt{\frac{N \sum D^2 - (\sum D)^2}{N-1}}}$$

Where; D = difference between the period score

N = Sample size

$$T = 4 \frac{49}{\sqrt{\frac{(375 \times 24257) - (49)^2}{375-1}}}$$

$$\therefore t = 0.31$$

$$\begin{aligned} \text{Degree of freedom} & \quad Df = N - 1 \\ & = 375 - 1 \\ & = 374 \end{aligned}$$

At 0.5 level of significance

The t(table) = 1.06

$\therefore t \text{ cal} < t$, where H_0 is accepted.

Discussion of findings

The analysis of the hypothesis showed that preventive maintenance significantly influence durability of buildings in Port Harcourt, Rivers State.

Recommendations

1. Landlords and land developers should ensure that materials bought to replace damaged or failed parts meet specifications, and are of high standards, to ensure durability.
2. There should be thorough supervision during repairs and installation activities to ensure quality delivery.
3. Residential buildings should be free of hazards which may be of effect on buildings.

References

- Chikezie, O. M.; Nzewi, H. N; & Odekima, F. (2017). Maintenance culture and performance of selected manufacturing firms in Benue State, Nigeria. *Archive of Business Research*, 5(3), 127-140.
- Iyamu, I. F., Imasuen, K; & Osakue, E. F. (2018). Analysis of Maintenance culture in public primary and secondary schools in Edo state. *International Journal of Vocational and Technical Education Research*, 4 (2), 3-30.
- Bolaji, B. O. & Adejuyigbe, S. B. (2012). Evaluation maintenance culture of manufacturing industries in Akure Metropolitan of Nigeria. *Journal of Information Engineering and Applications* 2(3).
- Leadership Newspapers (2012). *Education news Rivers: A controversy over recruitment of teachers*. Retrieved on 16/01/2020 from <https://www.nigeriaazz.com /2012/11.12/rivers-a-controversy-over-recruitment-of-teachers/sh/en-NG>.