

An Assessment of Quality Material on Project Cost in Lagos State housing development Scheme

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Abstract

Material is a critical element in the construction project as it constitutes a larger portion of the cost of the project. It's important to determine the degree of relationship between the quality of material used in the construction of housing projects in Lagos State and the budget for housing project development. Therefore, this study tends to assess the degree of relationship between quality material and project budget. A survey research design was used for this study. Purposive and convenience sampling technique was used to select the top and middle management staff that are directly involved in housing development in Lagos State. Taro-Yamane's model was used to determine 105 sample sizes for the study. Primary data was collected using a structured questionnaire. The validity and reliability of the instrument were carried out using content and test-retest. The data collected were analyzed using both percentage distribution and Pearson's Product Moment Correlation coefficient. The findings of this study show that there is a strong positive relationship between the quality of material used in housing construction and the actual cost of the housing project ($r = 0.881$). It was recommended, among others, that the stakeholders should ensure the continuous use of quality materials in housing construction to avoid project cost overrun.

Keywords: quality, material, project cost, management quality, material management, cost efficiency.



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INTRODUCTION

The housing development project is a complicated, interconnected process that uses a variety of materials from its commencement to its finishing point (Sori et al., 2021). One of the main issues with most construction sites is the use of poor-quality materials, which leads to poor work, delays, and cost overruns material (Bekele et al., 2021). Men, materials, machinery, and money are resource inputs in a project and how well these resources are managed will determine the success of a project (Sori et al, 2021). Construction of industrial buildings has become much more expensive recently. Most building construction projects run late and are over budget, while some have poor quality.

Most defects and failures in building structures are caused by the inferior quality of material (Bekele et al., 2021). Lack of quality materials, material deficit, improper identification, rehandling, and insufficient storage, along with poor planning and control of resources, reduce labor efficiency and result in delays that can indirectly raise the cost of the entire project (Napoleon et al., 2018).

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The cost of materials is generally acknowledged to be a significant portion of the overall cost of construction projects (Jusoh & Kasim, 2017). Thus they are crucial and should be completed in accordance with standards (Jusoh & Kasim, 2017). Therefore, it is important to practice critical material management. Numerous writers from various countries have demonstrated that a sizable portion of the production costs is attributable to material waste from the construction industry (Saidu & Shakantu, 2016). Material mismanagement increased the overall cost of construction projects (Ameh & Itodo, 2013). Poor material quality resulted in cost and time loss (Saidu & Shakantu, 2016). It is obvious that the majority of housing scheme projects are of poor quality, which may have a negative impact on the project's cost.

Every developing country has observed a lot of urban evolution. People now prefer to live in cities. This was due to the initiation of a housing development scheme by the Government, especially in Lagos state (Oshodi, 2010). The effort of the Lagos state government in resolving the housing need of the people are not adequate because of the increase in the cost of housing, and this is against the objectives of the scheme. This problem can be attributed to the poor quality of materials used in building construction which results in cost overrun. Lack of proper management of material results in poor quality, cost overrun, and delay in the project. It is obvious that the masses are not happy with the development and would be united in an activity that would be modeled towards concentrating on their housing requirements.

Past studies like Bekele et al. (2021) and Tesema et al. (2021) on the subject matter concentrated on the factors affecting the building construction material cost and quality in the implementation of building construction projects but failed to assess the relationship between quality material and the actual cost of a housing project.

This study tends to fill this gap by evaluating this condition by focusing on the quality of material used in housing construction projects and the subsequent outcome on a budget of a housing project in Lagos State.

LITERATURE REVIEW

Quality Materials

Quality materials are important for valuable outcomes; quality materials, in conjunction with quality control, provide a durable and strong construction. Quality building materials, as an investment, work in tandem with other aspects of a building. When it comes to wall construction, high-quality materials create an ideal environment for insulation, electrical components, and plumbing. (Muleya & Kamalondo, 2017).

This study conceptualizes quality material as a material that meets the specification, cost, and timely delivery.

According to Muleya & Kamalondo (2017), the study identified the importance of Quality Material as follows.

Durability

Choosing high-quality materials that can be used to their full potential ensures durability and reduces the likelihood of them needing to be replaced. Furthermore, their performance will be superior to that of other materials, ensuring that they will last for decades. Low-quality materials

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are prone to cracks and breaks, whereas a construction project made of high-quality materials is guaranteed to last a long time. Quality materials also ensure that your property requires less maintenance and always looks its best.

Cost Efficiency

Quality construction materials save you money in the short and long term. Other, lower-quality materials necessitate more frequent maintenance, which is an expensive endeavor. Replacing or repairing broken areas of a wall can be an expensive and difficult process, and using quality materials from the start can help to avoid larger problems later on. If a project is built with high-quality materials, your property has a higher market value if you ever decide to sell.

Safety

Quality materials have reassertion and rigidity to time and weather conditions, giving you greater assurance of safety. The integrity of the overall design is increased by proper wall construction. A professional team of bricklayers is aware of all building regulations and legislation, ensuring that they are followed and that you receive a safe solution.

Sustainability

In terms of sustainability, the right materials must be considered in order to provide a sustainable future. Concerns about the environment have grown in recent decades, prompting materials to become more environmentally friendly. Building walls with quality materials ensure proper insulation when working toward a green future. Insulation has a significant impact on the efficiency of a home and aids in the preservation of heat. It is critical to building the foundations of a property's walls to account for every aspect. When constructing elements such as walls, the combination of these factors (along with ensuring health and safety procedures at all times) ensures that every aspect is working together to ensure the highest quality of the end result.

Material Management

Ajayi et al. (2017) defined Construction material management as reducing the amount and environmental impact of material waste generated by reducing the number of materials consumed in a project. Muleya and Kamalondo (2017) define material management as an integrated process of designing, constructing new structures or remodeling existing structures, and using materials more efficiently, with the goal of improving construction industry performance and reducing material waste. Purchasing, inventory control, receiving, warehousing, materials handling, planning, and transportation should all be coordinated by material management. Materials management entails the coordinated execution of all material-related functions. These functions can only be performed efficiently if the adequate emphasis is placed on early project planning, the use of qualified personnel, adequate personnel training, and proper communication among those involved in the process (Keitany & Mutwol, 2014). The main factors influencing construction material quality are specification, material usage, and material management. Quality control is an important and necessary function of material management in order to purchase the right quality of material (Sori et al., 2021).

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Quality Control

According to Sori et al. (2021), quality control is the operational technique and activity used to meet the quality requirement; it is a system of ensuring quality output that includes inspection, analysis, and action to meet the required standard.

Project Cost

According to Shaiful, Rosli, and Liu (2019), the definition of the actual project cost is the accounted cost at the time of project completion. Towereight (2017) defines project cost as a portion of the total cost incurred during the development of a building project. This cost includes construction-related expenses such as labor, materials, and equipment. Quality construction materials save you money in the short and long term. Lower-quality materials necessitate more frequent maintenance in the long run, which is an expensive endeavor. Replacing or repairing broken areas of a wall is an example of the long-term effect of using poor-quality material. Using quality materials from the start can help to avoid larger problems later in the future. A project built with high-quality materials will be more valuable in the market if you decide to sell. According to Albtoush, Doh, and Abdul Rahimi (2020), material-related issues contribute to cost overruns.

Theoretical Review

Application Theory

Donyavi and Flanagan (2009) investigated the role of this model for customers and construction planning firms. The model's actual effects on customers and contractors in the construction industry. Using this theory, a construction firm can achieve the highest level of project success in terms of timely project delivery, project quality, and project cost; however, other theories must be viewed as critical phases to the attainment of higher effectiveness provided by the entire construction sector. Nonetheless, several elements were advanced, one of which is the construction management theory, which establishes a method that can be evaluated and they confirm information required to assess key terms in the model (Donyavi & Flanagan, 2009). Another component argued that while studies and surveys were adequate, organizing teamwork, cooperation, and information dissemination were insufficient. According to scholars, the theory established a situation in which Construction Management studies could be adopted and provide greater clarification and application than previously available, as well as stimulate future research (Bank, 2018).

Using this theory, A construction company can achieve the greatest level of project accomplishment in terms of timely delivery of the project, project quality, and project cost.

Empirical Review

Adebiyi and Bako (2020) present a review of the role and contribution of materials on construction time and cost overruns of residential building projects in Nigeria. The analysis was based on a questionnaire survey. Three hundred and seventy (370) small, medium, and large private residential projects in Lagos state, Nigeria, were collected for qualitative and quantitative project information. It was discovered that for the majority of the studied projects, material delivery was accompanied by the agreed-upon price, while only about half of the projects received their materials on time. Material delays accounted for 20% of total project delays, and these material

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delays accounted for 18% of total project cost overruns during the construction process. The length of the selection period, the type of construction materials used, and their availability on the local market all had an impact on the extent of the delay and cost overruns. According to the survey, a month is the best time frame for material selection. Imported materials contributed the least to construction time and cost overruns, whereas material scarcity in the local market contributed significantly to project costs due to the late delivery of construction materials on site; large and expensive projects experienced longer time delays and higher cost increases.

Keubitoronye et al. (2018) conducted a study to identify and assess the material management techniques required for construction firms in Ghana's Tamale Metropolis. The study used a descriptive quantitative survey method. The data were analyzed using descriptive and inferential statistics such as factor analysis and Pearson product-moment correlation coefficient to confirm that effective materials management techniques on construction sites are important for project success.

This study adopts the methodology of Adebisi and Bako (2020) by using primary data for the study. Also, the study uses the methodology of Keubitoronye et al. (2018) for analysing the data using Pearson product-moment correlation coefficient.

RESEARCH METHOD

For the purpose of this study, a survey research design was adopted. The population used for the study is 150, which constitutes the senior and middle management staff that are involved in housing development in Lagos state. Purposive and convenience sampling techniques were used to determine the choice of staff. In order to reduce the sample size to a manageable size, Taro-Yamane's model is applied. This is expressed below:

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

Where: N = Population

e = allowable error (%)

1 = a constant value

Given that, N = 150 (Total Population)

and e is assumed to be 5% (allowable error)

, then the sample size is;

$$n = \frac{150}{1+150(0.05)^2}$$

$$n = \frac{150}{1+150(0.0025)}$$

$$n = \frac{150}{1.375}$$

$$n = 109$$

109 will be used as the sample size, which includes land surveyors, Land officers, and engineers. Data for this study were collected from a primary source. The primary data are taken through the use of a questionnaire. The questionnaire was divided into two sections; section A on demographic questions, and section B bothers on a question relating to the subject matter of the research. Using a Likert scale of 5 points, the degree of agreement by the respondents to each of the items in the questionnaire is measured by calibrating the scale into strongly agree (SA), agree (A),

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Undecided(U), Disagree (D) and strongly disagree (SD) with the value 5,4,3,2 and 1 respectively. Collected data were analyzed and interpreted, and simple frequency tables were used in presenting the results. The hypothesis was tested using Pearson's Product Moment Correlation coefficient to determine whether there is a significant relationship between independent variables and dependent variables, with the aid of statistical packages for social science scientists (SPSS).

FINDINGS & DISCUSSION**Descriptive Statistics of Study Variable**

Table 1. Descriptive statistics of Quality Material

Quality Material	Level of Agreement					Average	
	SA	A	U	D	SD	Mean	Standard Deviation
The needs of the stakeholders are satisfied	5.50%	33.00%	11.90%	36.70%	13%	2.78	1.03
Materials are cost-effective.	13.20%	55.30%	24%	8%	0	2.82	1.19
Wastage of resources is minimized	45%	47.40%	0.00%	0.00%	8%	2.73	0.93
Quality is in line with the design	31.60%	68.40%	0.00%	0	0	2.9	1.12
Materials used are durable	44.70%	39.50%	15.80%	0.00%	0	2.81	0.79
Grand Average						2.808	1.0116

Source: Field Survey (2022).

From the result above, the grand mean of 2.808 for quality material indicates that respondents are in agreement with most of the statements on the average scale as it relates to the quality material with the overall standard deviation of 1.012, which implies that the response is not clustered around the mean.

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Table 2. Descriptive statistics of Project Cost.

Project Cost	Level of Agreement					Average	
	SA	A	U	D	SD	Mean	Standard Deviation
The housing project is affordable	0.00%	49.50%	12.80%	24.80%	13%	2.99	1.126
Project scheduling is used to design costs.	17.40%	0.00%	28%	37%	18%	2.61	1.290
Projects are carried out within the budgeted cost.	0.00%	45.00%	11.90%	11.90%	31%	2.71	1.321
The quality plan is in line with cost reduction	5.50%	39.40%	5.50%	18%	31%	2.7	1.404
Proper costing techniques are used in costing the housing project	22.90%	27.50%	0.00%	37.60%	11.9%	3.12	1.432
Grand Average						2.826	1.315

Source: Field Survey (2022).

As shown on the table above, the grand mean of cost efficiency of 2.826 indicates that respondents are in agreement with most of the statements on the average scale as it relates to project cost with the overall standard deviation of 1.315, which implies that the responses are not clustered around the mean.

Test of Relevant Hypothesis

Ho: there is no significant relationship between quality material and Project Cost.

The research hypothesis is tested using Pearson's Product Moment Correlation coefficient to determine whether there is a significant relationship between the independent variables and dependent variables correlation model, as shown below, and the results are presented as follows. Quality material formed the independent variable, and project cost was the dependent variable. The correlation result is presented in the table below.

		Quality Material	Project Cost
Quality material	Pearson Correlation	1	.881**
	Sig. (2-tailed)		.000
	N	109	109
Project Cost	Pearson Correlation	.881**	1
	Sig. (2-tailed)	.000	

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	N	109	109
**. Correlation is significant at the 0.01 level (2-tailed).			

The correlation result above indicates that there was a strong positive relationship ($r=0.881$; $p<0.05$) between quality material and the actual cost of the project. Therefore, the null hypothesis was rejected. This implies that there exists a strong positive relationship between material quality and project cost.

Discussion of Findings:

Material is a key resource in a construction project; it constitutes a greater portion of construction expenses. It's essential to manage and ensure the material is of high quality so as for the company to survive and achieve its objectives. The result from the hypothesis testing shows that quality material has a strong positive relationship with project cost. This result is in alignment with the study of Adebisi & Bako (2020), the study concluded that the selection period, the type of construction materials, the quality of the material, and their availability at the local market all affected the extent of delay and cost overruns.

CONCLUSION

The result of the study shows that quality material is an essential factor in achieving project success. For this reason, there should be continuous improvement in material quality used in the construction of housing projects in Lagos State. It needs to be managed and controlled throughout project implementation. The majority of the government construction project in Nigeria suffered from cost overrun due to poor quality of the material.

Recommendation

This study suggests the training of project managers, engineers, and other stakeholders involved in a construction project on the importance of quality materials and how to ensure continued usage of superior materials in the construction of a housing project.

Limitations and Suggestion for further study

This study focused on material quality and project cost in housing development in Lagos State using the senior and middle management staff that are involved in housing development in the state. Various studies can be conducted in the future to evaluate quality material and other project success indicators, such as the timely delivery of a project in the construction industry.

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