Innovations

Critical assessment of the effects of cost of building materials building projects' delivery in Ogun State, Nigeria

***Fayomi, F. O.**
Works and Physical Planning Department,
Abraham Adesanya Polytechnic, Ijebu-Igbo, Ogun State, Nigeria.

****Onifade, M. K.**
Mechanical Engineering Department,
Bells University of Technology, Ota, Ogun State, Nigeria.

*****Oyebiyi, S. A.**
Building Department,
Federal Polytechnic, Ado-Ekiti, Ekiti State, Nigeria.

Corresponding author: **Fayomi, F. O.**

Abstract: *The performance of the construction industry is threatened by the enormous rise in building material prices that has occurred in Nigeria during the previous ten years. The study's goal was to determine how building material costs affected the completion of construction projects in Nigeria. Through a questionnaire survey, the principal contractors, professionals managing building projects' delivery, builders' merchants, and consultants who are registered with or actively engaged in building procurement and production in the Public service and/by government authorities provided information on the causes of and impacts of the rising cost of building materials. The records of the field survey of builders' merchants were used to compile information on building material pricing. The computations of price indices and rates of inflation for building materials used the average prices. The exchange rate of the Nigerian Naira, the price of fuel and power, and changes in government policies and legislation were the three most rated factors responsible for the rising cost of building materials, while fluctuations in the cost of construction, a decline in output, and the risk of project abandonment were the three most rated implications revealed. The analysis concluded that the consequences might hurt the GDP of the country's economy.*

Keywords: *1.Building cost, 2.building materials, 3.building projects, 4.project delivery, 5. Nigeria*

1.0 Introduction

According to earlier surveys of the construction industry, between 50 and 60 per cent of the entire construction input is made up of building materials (Adedeji, 2012; Ogunsemi, 2010). The largest single input in the construction of buildings, including residential buildings, is building materials. The price of building material supplies has been one of the barriers to successful building delivery (Adedeji, 2012). Nega (2008)

opined that the cost of building materials is the main element that drives up construction costs, and this in turn has a huge impact on the whole plan cost of construction. The biggest factor in deciding how to carry out any building project has always been the cost (Ayodele & Alabi, 2014). While the use of non-conventional building materials can reduce the problem of the increase in the cost of building rationally. It cannot be done so without taking into account the sustainability of these alternative materials, the appropriate initiative, and the cost of processing (Dhupe, Kokane, Sable, Tathe and Darad, 2021). This is true even though excessive building material costs have significantly slowed down the delivery of buildings. In recent decades, the construction industry has paid a lot of attention to the sustainability hypothesis.

Building availability is determined by the way it is made and how long it lasts, both of which contribute to the residents' economic stability by taking into consideration how many land and other resources are used throughout each stage of development (Solanke, 2015). To provide sustainable Building delivery, it is essential to take into account the costs of materials and the availability of resources (sustainability) from the stage of project conceptualisation and planning (design) through the stage of production (Alabi & Fapohunda, 2021). This will ensure adequate and efficient building material utilisation.

Thus, by analyzing how the cost of building materials affects the construction industry and how it affects the delivery of sustainable and affordable Building delivery, this research study provides information on the implications of a rising building material cost. It also suggests potential solutions for reducing the cost of building materials to sustain the delivery of sustainable Building delivery in Ogun State and throughout all of Nigeria.

Building materials, according to Ogunsemi (2010), are the primary elements that limit the variety of Building types and options and, they account for between 50 and 60 per cent of building costs. Adedeji (2002) correctly highlighted that Nigeria's high Building delivery costs have been a major impediment to the achievement of effective and efficient Building delivery, as evidenced by consecutive government initiatives. He revealed that because building materials could be obtained locally at reasonable prices in the early years, Buildings in Nigeria were easily accessible. Technology was likewise easily accessible and has comparable straightforward methods. However, as a result of colonization, which involved professional interregional and international training in foreign nations, people's tastes and, consequently, perspectives, changed. The undeveloped native building materials were no longer suitable as a result of these developments, and there was a rise in the demand for exotic materials. Arayela (2002) and Maiauduga, Zadawa and Mukhtar (2020) asserted that modern construction places a lot of emphasis on high-end, expensive, and energy-intensive building materials and methods. Although prohibitive building material costs have hindered Building delivery efforts, this issue cannot be reasonably and reliably solved by using locally accessible materials alone without taking into account the relevant initiative, the cost of processing, and the sustainability of the local materials. Material efficiency is one of the most crucial aspects of a sustainable building.

By picking products with little negative environmental impact and considering their entire life duration, building materials can be chosen correctly. For instance, González and Navarro (2006) calculated that choosing building materials with minimal negative environmental effects might save carbon dioxide (CO2) emissions by as much as 30 per cent. Since a building's life cycle and that of its components can be closed, the use of renewable and recycled resources is strongly promoted (Chwieduk, 2003). Costs and societal demands, such as thermal comfort, strong and durable mechanical qualities, aesthetic appeal, and quick construction speed, are the main elements that strongly influence the choice of building materials. A detailed description of the material should be provided by the combination of all environmental, economic, and social considerations to aid in the selection of building materials that are affordable (Abeysundara et al. 2009). Up until the price of building materials is subsidised, perhaps by a tax cut, Nigerians would continue to pay more for building products in large cities. It was suggested that the fluctuation in building material costs was a direct effect of high taxes, which also affected the cost of Building delivery in the nation's largest cities.

To develop Buildings that are equally sustainable (accessible to both the present and future users) and inexpensive, the Building delivery problems must be approached holistically. Therefore, it is necessary to explore how the price of building materials affects the growth of delivery of affordable and efficient Buildings, which is what this research aims to do through its conceptual framework. The effect of the cost of building materials, typical selection criteria, and typical elements responsible for the cost of building delivery is provided within a conceptual framework. This framework identifies the functional relationship between these elements for a process of delivering affordable and sustainable Buildings.

1.2 Statement of the problem

The cost of building materials in the construction sector has been severely challenged by the demand for Buildings of all types, inflation, and the availability of funds (Eshofonie, 2008). Given how essential and significant a role building materials play in the production of Buildings, the issue of excessive building material costs works against the effective delivery of sustainable buildings.

Jagboro and Owoeye (2004) found that the price of building materials has a variety of impacts on the market in the Building sector. In addition to increased asset risks, the inability of developers to provide affordable Buildings and a decrease in investment in the construction industry, a large increase has resulted in a loss of customer confidence in consultants. Therefore, better sustainable Buildings must be delivered within the allotted time, cost, and quality expectations while taking stakeholder satisfaction and the cost of building materials into account (Onifade, M.K., Afolabi, O. J. & Omogbolahan, I. A. (2017), Owolabi, J. Ojelabi, R., Ogunde, A. O., Olaolu, O, & Afolabi, A. (2017).

1.3 Objectives of the study.

The project aims to assess the effect of the cost of building materials on Building projects' delivery in Ogun State.

The following are the objectives of this study:

- To examine factors responsible for an increase in the cost of building materials that ultimately hinder sustainable Building delivery
- To evaluate the effects of an increase in the cost of building materials on the delivery of affordable and efficient Buildings;
- To establish solutions to mitigate the effects of factors causing an increase in the cost of building materials with a focus to achieve sustainable and affordable building project delivery.

1.4 Significance of the study.

The following are the significance of this study:

- The results of this study will sensitize the policymakers and the government on the need to make and implement policies that will reduce the cost of building materials in Nigeria thereby encouraging the delivery of affordable and efficient Buildings all over the country.
- The findings from this study will educate the general public on the influence market cost of building materials in Nigeria and its effect on sustainable Building delivery in Nigeria.
- This research will also serve as a resource base for other scholars and researchers interested in carrying out further research in this field subsequently if applied will go to an extent to provide new explanations for the topic.

2.0 Literature Review and Theory

2.1 Building Materials

Building materials are necessary for the construction industry since they are the resources used to create buildings. Without the use of building materials, a construction project cannot be finished (Akanni *et al.,*

2014). According to Akanni *et al.* (2014), building materials continue to be the most significant input in project creation, and as a result, they play an undoubtedly important role in the execution of construction projects. Adedeji (2012), estimates that the cost of building materials accounts for around 60% of total housing expenditures. The strength, functionality, and quality of the structure are determined by the appropriate use of the building materials about the knowledge used in the building construction process, according to the research. Building materials are essential for improving buildings' sustainability and adding to the country's economic prosperity (Akadiri 2011). Donyavi and Flanagan (2011) noted that material management efficacy must be the top priority if construction costs are to be reduced and productivity, quality, and on-time project delivery are to be improved. It is impossible to undervalue the role that building materials play in the creation of sustainable homes

2.2 Factors responsible for an increase in the cost of building materials

The cost of construction materials has been a significant obstacle for the sector (Akanni *et al*., 2014). According to Windapo and Cattell (2013), the primary issue affecting the performance of the Nigerian construction sector and projects is essentially the rising cost of building materials. As a result, volatility frequently drives up the price of building materials and poses a significant risk to all parties involved, including suppliers, contractors, and clients (Li, 2001). The devaluation of local currencies, according to Ughamadu (1993), was another factor driving up the price of building supplies.

In their studies, Jagboro and Owoeye (2004), and Rajaprabha, Velumani and Jayanthi (2016) identified several factors, including shifting governmental regulations and policies, a lack of raw construction materials, fluctuations in the price of fuel and electricity, shoddy infrastructure, unfortunate corruption, fluctuating plant and labour costs, and seasonal variations, as contributing to the rising cost of building materials. Researchers have identified several additional factors that contribute to the rising cost of building materials, including changes in the price of distribution and transportation, political interference, local taxes and fees, changes in the price of raw materials, changes in the cost of financing, inflation, and changes in the value of the dollar. The exchange rate of the local currency to other currencies globally, the inflation rate, and the interest rate paid on loans are some additional macroeconomic indicators Oladipo and Oni (2012) examined that have an impact on the cost of building supplies.

The four types of factors that affect the cost of building materials are those that are economic, production-related to the construction industry, external in nature, and stakeholder-related in nature.

2.2.1 Exchange Rates

The amount for which one currency is exchanged for another is known as the exchange rate, and it is used to gauge how strong one currency is relative to another (Windapo & Cattel, 2012). Nigeria manufactures its strategic materials but is dependent on foreign machinery. Consequently, industry-wide rises in material costs are a matter of concern (Windapo & Cattell, 2013). However, around 50% of all building materials and components used in construction, or portions of the raw resources needed to make construction goods, are imported from other countries (Udeh, 1991). Exchange rates have an impact on building material prices to varying degrees, depending on the type and quantity of materials imported by a nation at a given time, the need to import raw materials used locally to produce building materials, and whether or not local materials (like copper, timber, and steel) are traded internationally (Windapo & Cattell, 2012). According to Oladapo and Oni (2012), the establishment of the foreign exchange market has harmed the cost of building materials.

2.2.2 Inflation

Inflation, according to Adamu (2013), is an increase in the general level of prices in any economy. It primarily serves as a gauge for how quickly prices for products and services rise over time (Fichtner, 2011). A project will be much more at risk of inflationary cost increases due to any additional delays. However, as noted by

Windapo and Cattell (2012), there is a lag time between an increase in inflation and a real increase in the cost of building supplies. The consequences of inflation can result in a loss of profit for contractors and a bigger cost overrun for project owners due to the nature of the process and the rate of return for work completed on construction projects (Nega, 2008).

2.2.3 Fluctuation in the cost of building materials

According to research by Rahman *et al.* (2013), cost overruns were significantly influenced by changes in the price of building materials. Price variation was identified by Frimpong *et al.* (2003) as the major contributor to project cost growth. In a study conducted by Zewdu *et al.* (2015) to determine the causes of cost overrun in Ethiopia, the results showed that fluctuations in the cost of building materials—a fluctuation attributed to the exchange rate's cap—were the primary culprit. These fluctuations also had an impact on the overall cost level.

2.2.4 Inadequate production of raw material

According to Ogunlana, Krit, and Vithool (1996), the reason for the material shortage may be the inefficient supply of materials brought on by industry-wide shortages, poor communication between sites and the head office, poor purchasing planning, and poor material coordination. Where there is an extremely high degree of development activity, shortages of some building supplies may occur. The cost of these materials would have gone up if this hadn't been foreseen and factored into the initial cost estimate. Material management must ensure a timely flow of materials because a lack of materials will almost certainly cause delays and additional costs (Rajaprabha *et al*., 2016).

2.2.5 Supply and demand for building materials

The cost of building materials is determined by the availability and demand for supplies (Oladipo & Oni, 2012). According to Windapo and Cattell (2012), where the law of supply and demand may be related, the need for the production of more Buildings and the delay in delivering building supplies (or lack thereof) will contribute to trends in building material prices. Building materials' price rises, according to Windapo and Cattell (2012), are influenced by the market conditions in which they are produced. For instance, if only one or two businesses produce building materials, as opposed to those for which numerous manufacturers compete for the same market, material costs will rise, according to the study. The availability of construction supplies at the required time and place on site is a need for cost-effective construction (Mohan *et al*., 2002). One reason for cost overruns in building projects, particularly in poor nations, delays in the supply of materials on site.

2.2.6 Improper planning

One of the most significant elements influencing the cost of building materials is poor planning. All resources should be used wisely by contractors. According to Eshofonie (2008), where no efficient contractor is scheduling and planning on-site, these elements will cause construction project delays. Proper scheduling is crucial to project resource utilisation because the opposite, inadequate planning, will raise the project cost (Vides, Pertuz & Diaz, 2021, Neyestani, 2016).

2.3 Implications of Rising the Cost of Building Materials

The general upward trend in building material prices in Nigeria is a result of several factors, including high-interest rates, the depreciation of the naira, inflation, and a weak distribution system for the materials (Ogu & Ogbuozobe, 2001; Oladipo & Oni, 2012). Mojekwu et al. (2013) claim that the Nigerian government restricted the importation of Portland cement between 2003 and 2007 to restrict activity in the cement industry. The investigation also revealed that, even though the importations were restricted to support local producers, this

step led to an increase in the price of the product because the local cement maker was unable to meet demand.

However, as noted by Jagboro and Owoeye (2004) and Aibinu and Jagboro (2002), an increase in building material prices has multiplier effects on the sector as it causes changes in construction costs and, ultimately, the abandonment of projects. Elinwa and Buba (1993); Idoro and Jolaiya (2010); Okpala and Aniekwu (1988); Oladipo and Oni (2012); and Windapo *et al*. (2004) identified additional implications, including completion at the expense of other projects, delay in the progress of project works, other valuable projects not being commissioned, rate of employment of construction workers, poor workmanship as a result of the use of low-quality local materials, and inhibited innovations in construction methods.

Inhibited innovations in construction methods and material research

According to Egan's (1998) assessment, construction has an extremely low and erratic rate of profitability, which is a barrier to long-term, healthy growth. When initial budget figures turn out to be wholly unreal, the report reasoned that increased financial pressure is going to be placed on contractors, and it came to the conclusion that the scenario will harm the industry and risk its survival.

Fluctuation in construction costs

Both the client and the project contractors have expressed severe concerns about how to maintain consistent cost forecasts on building projects. Azhar, Farooqui, and Ahmed (2008) observed that the primary cause of cost overruns is that the majority of contractors base their price quotes on predicted projections; nevertheless, the costs fluctuate so quickly that the initial budget calculations turn out to be wholly unrealistic. The project cost overrun, with its attendant consequences of finishing projects at amounts higher than the initial sum, is one of the most serious issues in the Nigerian construction industry, according to Jagboro and Owoeye (2004), who concluded that project abandonment occurs in the majority of cases.

Construction contracts are impacted by the high cost of building materials, especially when such contracts are awarded based on a set price. This implies that any increase in the contract amount due to changes in the cost of labour and supplies will not be accepted by the client. The contractor includes the risk of inflation in his pre-tender estimation procedures to avoid a scenario where high inflation erodes the contractor's profit margins (Ashworth, 1983). Pricing inflation risk at the pre-contract stage requires a fundamental understanding of how building material prices have changed over the past few years about the rate of inflation.

Ramus (1981) also noted that in contracts with variable pricing, increases or declines in material prices necessitate that payment from the employer to the contractors and vice versa becomes due. However, because of inflation, the relationship between the employer and the contractor is always one-sided in Nigeria. The extremely high price also has an impact on the clauses of the standard forms of contracts that provide recommendations on methods of valuation or adjustment in the calculation of the real changes due to variable inflationary trends in the economy. For instance, the contract form's clauses 39 and 40 provide for adjustments for fluctuations, however, due to the inherent difficulties in valuing or calculating for any. The numerous high prices seen in Nigeria within a year render clause 38 of the JCT 1980, which represents the firm price contract (i.e. contracts during one year), ineffective. Okike (2004) contends that regardless of the approach employed for fluctuation reimbursement, the actual increases or decreases in costs and prices of resources used can never be fully assessed or recovered and are typically greater or less than the amount incurred due to fluctuation.

Quality of workmanship is affected

The production of high-quality buildings and structures, according to Lam, Chan, Wong, and Wong (2007), is one of the characteristics of the developed construction sector. Construction work quality is evaluated by the

requirements of the applicable standard, and marks are given if the workmanship conforms with the standard (Construction Industry Development Board, 2011).

The construction industry and the country's economy are in grave danger, according to Oladipo and Oni's (2012) study, because there have been conflicts between building contractors and their clients over increases in contract sums. To avoid these conflicts and stay in business, some contractors have turned to use inferior or insufficient materials for construction projects.

Risk of project abandonment

As most clients are not fully informed about the financial repercussions of the project to be undertaken, project abandonment has become a national issue in Nigeria's infrastructure development (Ayodele & Alabi, 2011; Idoro & Jolaiya, 2010). These authors claimed that the prevalence of several incomplete and subpar structures was related to inflation and the high cost of construction supplies. Their research also supported the idea that the scenario might have a multiplier effect on the sector and might cause changes in construction costs.

The volume of construction output is affected

Fagbenle, Adeyemi, and Adesanya (2004) claimed that when compared to the construction sectors of several affluent nations, Nigeria's construction industry produces relatively little. According to Windapo *et al*. (2004), conditions caused by the sharp rise in building material prices may result in severe housing shortages, with millions of middle- and low-income families being priced out of the homeownership market throughout Nigeria. According to Anosike (2009), who discovered that Nigeria has a housing shortage of more than 17 million as of 2004, the findings from this research were caused by the high cost of construction materials.

The rate of employment is affected

The construction industry's workforce is extremely diverse and includes different types of individuals working in construction such as unskilled workers, skilled workers, craft, managerial roles, and administrative workers. According to research, maintaining and attracting the right people within the construction industry is a priority due to the scarcity of both skilled people and experienced managers. Ayodele and Alabi (2011) found that inflation in the costs of building materials is killing the construction industry as many contractors are unable to forecast accurately the expected profit on the project, and the situation had contributed to the laying-off of the workers and closure of firms in some extreme cases.

2.4 Ways to minimise cost.

There are several ways in which the cost of construction can be minimized. Fisk (1997) reveals two cost reduction measures. The first is the application of a value engineering concept, which aims at a careful analysis of each function and the elimination or modification of anything that adds to the project cost without adding to its functional capabilities. He argues that by carefully investigating costs, availability of materials, construction methods, procurement costs, planning and organizing, cost/benefit values and similar cost-influencing items, an improvement in the overall cost of the project can be realised. The second is to provide comprehensive and error-free designs and specifications to avoid misinterpretations by the contractor or delays due to missing details.

Cooke and Williams (2003) recommended cost reduction measures are the elimination or minimization of design/specification, delivery and site wastes through the formulation and implementation of effective material policy and material management.

In addition, Ashworth (2000) observed that profitable firms may be generating their revenues from the elimination of waste at both professional and trade practice levels. Cost reduction measures also include: establishing the requirements and features of the project at the onset before getting started, preparing the project team to do its best by getting members to sign off on capabilities and responsibilities, and staying diligent about keeping the project the project on the right path through contract clauses that disallow significant changes once the project is underway, effective human resource management through effective motivation, and project tracking involving discerning early what area or paths are leading to dead ends and applying early corrective actions.

3.0 Methodology

The study was to assess the effect of building material cost on Buildings' delivery in Nigeria and this was achieved through the following objectives: to examine the effect of building materials cost on Buildings' delivery in Nigeria, to determine the factors responsible for the high cost of building materials in Nigeria, as well as to proffer solutions that will reduce the cost of building material to ensure adequate and effective Buildings' delivery in Nigeria. In doing this, there is a need survey sample of the firms involved in the building industry in Ogun State.

The chapter, therefore, presents the method and techniques of investigation used in the study. The sampling procedure and research instrument needed for this study are discussed in this chapter. Similarly, the discussion on procedures for data collection and its analyses are within the chapter.

A survey design was used in this study because the research is both descriptive and qualitative. It is aimed at investigating the effect of building material costs on Buildings delivery in Nigeria to suggest ways of reducing their effects. The use of questionnaires allowed for easy data collection.

3.1 Population and Sample Frame

The study is carried out in Ogun State southwest region of Nigeria. The breakdown of the construction industry was selected from Abeokuta the capital of Ogun State in Nigeria.

3.2 Sample and Sampling Techniques

The survey covered the building industry in Abeokuta as a whole using random sampling styles for this study. The technique used is the administration of questionnaires among the professionals managing the delivery production activities in the ongoing projects within the building industry.

3.3 An instrument for Data Collection

The principal research instrument used in the study is the questionnaire. A total number of fifty (50) questionnaires will be administered to construction companies in Ogun State, Nigeria to be completed by designated respondents.

3.4 Data Collection

During the study, relevant information and fact will be collected from the related literature review. The researcher personally will visit all the construction companies on ongoing sites selected for the study and Government Agencies executing building projects purposely to administer the questionnaire. The exercise will be carried out with the permission and assistance of the authority of the selected firms and the relevant agencies concerned. In each firm or agency, the questionnaires will be discussed with the heads of the projects planning and/ or development departments and/or professionals engaged in building projects works who are involved in the management of the delivery of building projects.

3.5 Method of Data Analysis

Descriptive statistics such as tables, frequencies, graphs, charts, and diagrams would be employed. A relative importance index/mean score would be used to analyse the questionnaires. The successful data analysis would serve as a framework for drawing conclusions and recommendations.

4.0 Discussion of Findings

4.1 Data Analysis and Presentation of Data

This chapter contains the analysis and presentation of the data from the questionnaire. The data were presented using tables for clarification and better interpretation. The analysis tools included both descriptive and inferential statistics.

4.1.1 Data Analysis

Table 4.1: Sex

Sex	Frequency	Percentage
Male	29	58
Female	21	42
Total	50	100

Source: Field survey, 2022

The table above shows the respondents' gender, It shows the frequency and percentage that 29 and 58% are male, and 21 and 42% are female. The result indicates that males are mostly common in the site than females and that males had the highest frequency and percentage than females.

Table 4.2.: Academic Qualification

Academic Qualification	Frequency	Percentage
SSCE	4	8
ND	15	30
HND	20	40
B.Tech/BSc	6	12
M.Tech/MSc	5	10
Total	50	100

Source: Field survey, 2022

Table 4.2 show the frequency and percentage that 4 and 8% of the respondents had SSCE (Senior Secondary School Certificate), 15 and 30% had a National Diploma (ND), 20 and 40% had a Higher National Diploma (HND), while B.Tech/BSc has 12% of the respondent and M.Tech/MSc holders in the study area have 10% of

the respondents. The results indicate that the majority of the respondents possessed Polytechnic Higher National Diplomas.

Table 4.3: P**rofessional Discipline**

Professional	Frequency	Percentage
Architect	14	28
Builder	18	36
Engineer	8	16
Project Manager	4	8
Quantity Surveyor	6	12
Total	50	100

Source: Field survey, 2022

Table 4.3 showed the professional disciplines and competence of the respondents in the study area. It showed that 28% were architects, 36% were Builders, 16% were engineers, 8% were Project managers and 12% were Quantity surveyors. From the table above, it can be deduced that there are more builders in the study area. This signifies a likelihood of accelerating the pace of quality building delivery work in the study area.

Table 4.4: Years spent in the industry (Industrial/Technical experience)

Years spent in the industry	**Frequency**	**Percentage**
1-5	16	32
6-10	15	30
11-15	15	30
16-20	4	8
Total	50	100

Source: Field survey, 2022

Table 4.4 shows the frequency and percentage of years spent in the industry 16 and 32% of the respondents had spent 1-5 years and 30% had spent 6-10 and 11-15 years respectively in the industry, 8% had spent 16-20 years in the industry. The results indicate that the majority of the respondents have good working experience and also affirm the reasonable competence level of professionals involved in the building production activities in the study area.

Table 4.5: Factors responsible for the increase in the cost of building materials.

Factors responsible for the increase in the cost of building materials	4	3	2	1	Total	RSI	Rank
Exchange rate of the Naira	26	22	2	0	50	0.870	2
Inflation	21	19	8	0	50	0.795	9
Interest rate	14	24	10	2	50	0.750	11
Local taxes and charges	30	13	7	0	50	0.865	3
Fluctuation in the cost of raw materials	28	21	1	0	50	0.885	1
Inadequate production of building materials	16	18	14	2	50	0.730	13
Supply and demand for building materials	22	16	12	0	50	0.800	8
Cost of building materials	19	30	1	0	50	0.840	5
Scarcity of building raw materials	31	15	4	0	50	0.885	1
Market condition	24	21	5	0	50	0.845	4
Cost of transportation and distribution of labour	15	18	16	1	50	0.730	13
Communication problems between workmen and supervisors	18	17	12	3	50	0.750	11
Change initiated by the contractor to improve quality	13	25	12	0	50	0.755	10
Client demand for high-quality project delivery	17	18	10	5	50	0.735	12
Client contribution to design change	21	25	4	0	50	0.835	6
Changes in government policies and regulation	19	26	5	0	50	0.820	7

Source: Field survey, (2022)

Table 4.5 above showed the Relative Significance Index (RSI) of the Factors responsible for the increase in the cost of building materials. It revealed that the Scarcity of building raw materials and Fluctuation in the cost of raw materials were ranked first with an RSI value of 0.885 (85%) respectively, Exchange rate of Naira was ranked second with an RSI value of 0.870 (87%). Local taxes and charges were ranked third with an RSI value of 0.865 (86%) while the Market condition was ranked fourth with an RSI value of 0.845 (84%). Cost of building materials was ranked fifth with an RSI value of 0.840 (84%), while Client contribution to design change was ranked sixth with an RSI value of 0.835 (83%), followed by Change in government policies and regulation was ranked seventh with an RSI value of 0.820 (82%), while Supply and demand of building materials were ranked eighth with an RSI value of 0.800 (80%). Inflation was ranked ninth with an RSI value of 0.795 (79%), followed by Change initiated by contractors to improve quality was ranked tenth with an RSI value of 0.755 (75%), while Communication problems between Workmen and supervisors and Interest rates were ranked eleventh with an RSI value of 0.750 (75%) respectively, while Client demand on high-quality

project delivery was ranked twelfth with an RSI value of 0.735 (73%) followed by Cost of transportation and distribution of labour and Inadequate production of building materials were ranked thirteenth with an RSI value of 0.730 (73%) respectively.

Table 4.6: Effects of increase in the cost of building materials on the delivery of building projects

Effect of increase in the cost of building materials on the delivery of building projects.	4	3	2	1	Total	RSI	Rank
Fluctuation in the cost of construction	31	14	5	0	50	0.880	6
Unemployment of construction workers	33	15	2	0	50	0.905	3
Hindered adequate implementation of innovation in construction	29	14	7	0	50	0.860	10
Low volume of construction product	16	31	3	0	50	0.815	13
Poor quality of construction product	27	18	5	0	50	0.860	10
Increase in project abandonment	34	16	0	0	50	0.920	1
Shortage in the delivery of adequate buildings	27	19	4	0	50	0.865	9
Delay in the progress of project works	30	18	2	0	50	0.890	5
Poor workmanship due to inadequate materials to use	33	17	0	0	50	0.915	2
Building collapses due to the use quality of materials	32	15	3	0	50	0.895	4
Affect gross domestic product (GDP) contribution to the economy	25	21	4	0	50	0.855	11
High maintenance costs due to the use of limited-quality materials	34	16	0	0	50	0.920	1
Increase in the cost of repair due to inferior materials used	31	16	3	0	50	0.890	5
Affect the aesthetic value of building product	29	16	5	0	50	0.870	8
High rate of contractors' fraudulent practices	30	15	5	0	50	0.875	7
Threatening the health and safety of workers on site	34	15	1	0	50	0.915	2
Affect client expectation's on quality project delivery	27	13	10	0	50	0.835	12
Investment returns on Construction projects are delayed	29	15	6	0	50	0.865	9

Source: Field survey, (2022)

Table 4.6 above showed the Relative Significance Index (RSI) of the Effect of an increase in the cost of building materials on the delivery of building projects. It revealed that High maintenance cost due to the use of fewer quality materials and an Increase in project abandonment was ranked first with an RSI value of 0.920 (92%)

respectively, Threatening the health and safety of workers on site and Poor workmanship due to limited quality materials to use, was ranked second with an RSI value of 0.915 (91%) respectively. Unemployment of construction workers was ranked third with an RSI value of 0.905 (90%) while Building collapses due to the use less quality of materials were ranked fourth with an RSI value of 0.895 (89%). An increase in the cost of repair due to inferior materials used and a Delay in the progress of project works were ranked fifth with an RSI value of 0.890 (89%) respectively, while Fluctuation in the cost of construction was ranked sixth with an RSI value of 0.880 (88%), High rate of contractors' fraudulent practices was ranked seventh with an RSI value of 0.875 (87%), Affect the aesthetics value of building product was ranked eighth with an RSI value of 0.870 (87%). The investment return on a Construction project is delayed and Shortage in the delivery of adequate and effective buildings to house the populace was ranked ninth with an RSI value of 0.865 (86%) respectively, followed by Hindered adequate implementation of innovation in construction and Poor quality of construction product were ranked tenth with an RSI value of 0.860 (86%), while Affect gross domestic product (GDP) contribution to the economy was ranked eleventh with an RSI value of 0.855 (85%), while Affect client expectation's on quality project delivery was ranked twelfth with an RSI value of 0.835 (83%) followed by Low volume of construction product was ranked thirteenth with an RSI value of 0.815 (81%).

Table 4.7: Solutions to the problems associated with the cost of building materials.

The solution to the problems associated with the cost of building materials	4	3	2		Total	RSI	Rank
Tax relief for local manufacturers and importers of building materials	18	27	5	0	50	0.815	8
Revitalization of the industrial base	32	16	2	0	50	0.900	3
Subsidy of Building materials	18	20	10	2	50	0.710	9
Reduction in interest rate	20	24	6	0	50	0.820	7
The stabilization of the cost of raw materials	34	16	0	0	50	0.920	1
Effective human resource management through effective motivation	28	20	2	0	50	0.880	4
Project tracking and early corrective actions	27	21	2	0	50	0.915	2
Creating Enabling Environment	22	24	6	0	50	0.860	5
Government Intervention	26	24	0	0	50	0.850	6

Source: Field survey, (2022)

Table 4.7 above showed the Relative Significance Index (RSI) of the Solution to the problem of the cost of building materials. It revealed that the stabilization of the Cost of raw materials was ranked first with an RSI value of 0.920 (92%), and Project tracking and early corrective actions were ranked second with an RSI value of 0.915 (91%). Revitalization of the industrial base was ranked third with an RSI value of 0.900 (90%) while Effective human resource management through effective motivation was ranked fourth with an RSI value of 0.880 (88%). Creating Enabling Environment was ranked fifth with an RSI value of 0.860 (86%), while Government Intervention was ranked sixth with an RSI value of 0.850 (85%), and Reduction in interest rate

was ranked seventh with an RSI value of 0.820 (82%), Tax relief for local manufacturers and importers of building materials were ranked eighth with an RSI value of 0.815 (81%). Subsidy on Building materials was ranked ninth with an RSI value of 0.710 (71%).

5.0 Conclusion and Recommendation

5.1 Conclusion

The identified variables of the factors and implications of the rise in the cost of building materials had been quantitatively analysed and evaluated. The nature of the cost of material and time was also established to follow a trend, which was explained by the varying degree of coefficients of the relationship of cost and time, respectively, and it could be concluded that there is an inflationary trend in the cost of building materials with an average inflation rate between 5% and 21% during the past 10-year.

The study also concludes that the exchange rate of the Naira, cost of fuel and power supply, and changes in government policies and legislations were the three topmost factors responsible for the rising while fluctuations in the construction cost, reduced volume of construction output, and risk of project abandonment were the three topmost implications.

Inferences drawn from the conclusions on the implications of the rising costs of the building materials are that there is the likelihood of a downward effect on the GDP in the nation's economy and that the expectations of the government policy toward the realization of the program on "housing for all by the year 20/20" are no longer certain.

5.2 Recommendations

It is suggested that government should formulate a policy that will play down the agitations on the use of imported building materials by encouraging research in the production of local building materials. Government should also take drastic steps to reduce the cost of production and transportation of goods by ensuring an adequate supply from the power sector and production of petroleum products through the local refineries as against dependency on importation.
However, a good government economic policy which encourages the localization of Industries and the adequate provision of basic support infrastructures will be a booster to the building industry.

References.

1. *Abeysundara U.G, Babel S, Gheewala S (2009). A matrix in life cycle perspective for selecting sustainable materials for buildings in Sri Lanka. Build. Environ. 44: 997-1004*
2. *Adedeji, Y.M.D (2002). Achieving affordable housing in South-West Nigeria through Local building materials. J. Environ. Technol. 1(2): 15- 21,*
3. *Adedeji, Y.M.D (2010). Technology and standardized composite cement fibres for housing in Nigeria. J. Niger. Inst. Archit. 1: 19-24.*
4. *Adekoya, S. O. (2003, July). Housing development in Nigeria, which way forward. The Professional Builders, 4, p. 29. Google Scholar*
5. *Akanni, P. O. (2006, August). Small-scale building material production in the context of the informal economy. The Professional Builders, pp. 13-18.*

6. *Aibinu, A. A., Jagboro, G. O. (2002). The effects of construction delays on project delivery in the Nigerian construction industry. International Journal of Project Management, 20, 593-599. Google Scholar, Crossref*
7. *Alabi, B and Fapohunda, J.(2021). Effects of increase in the cost of Building materials on the Delivery of Affordable Housing in South Africa. MDPI Sustainability, 13, 1772.*
8. *Ayodele, E. O., Alabi, M. O. (2011). Abandonment of construction projects in Nigeria: Causes and effects. Journal of Emerging Trends in Economics and Management Sciences, 2, 142-145. Google Scholar*
9. *Jagboro, G. O., & Owoeye, C. O. (2004). A model for predicting the prices of building materials using the exchange rate in Nigeria. The Malaysian Surveyor, 5(6), 9-14.*
10. *Egan, J. (1998). Rethinking construction: The report of the construction task force. London, England: Department of the Environment, Transport and the Regions. Google Scholar.*
11. *Egwunatum, S.T., Awo-Osagie, A.I., Awodele, I.A, and Eze, E.C.(2021). Predicting Cost performance of Construction projects from the projects procurement procedure. Journal of Engineering, Project and Production Management, 11(3), 181-195.*
12. *Elinwa, A.U., Buba, S.A. (1993). Construction cost factors in Nigeria. Journal of Construction Engineering and Management, 119. 698-713.*
13. *Maiauduga, J.B, Zadawa, A.N., and Mukhtar, A. R. (2020). Factors Accountable for High Cost of Building Materials for Housing Development in Nigeria: A Review Paper. International Journal of Innovative Science and Research Technology, 5(5), 1434-1440.*
14. *Mekson, J. (2008, August). Prices change of building materials in developing communities in Nigeria. The Professional Builders, pp. 21-27.*
15. *Mohammed, H. Y. (2008, December 25). Nigeria: Builders groan on the rising cost of building materials. Daily Trust, p. 29.*
16. *Njoku, J. (2007, April 9). Grappling with the escalating cost of construction materials. The Vanguard, pp. 36-37.*
17. *Ogunsemi DR (2010). The use of enough quality and quantity materials for building a durable edifice. A Lecture delivered at Campus Transformation Network, Federal University of Technology, Akure*
18. *Onifade, M. K., Afolabi, O. J. & Omogbolahan, I. A. (2017). Evaluation of the effect of project management techniques on road construction projects in Nigeria. European Project Management Journal, 7(1): 1-12.*
19. *Rajaprabhi, R., Velumani, P., & Jayanthi, B. (2016). Factors affecting the Cost of Building materials in Construction projects. International Journal of Science and Engineering Research, 4, 1-6.*
20. *Solanke, B. H. (2015). An effective strategy for construction materials procurement during construction towards the enhancement of sustainable building products in Western Cape, South Africa (Doctoral dissertation, Cape Peninsula the University of Technology).*
21. *Udosen, J. U., & Akanni, P. O. (2010). A factorial analysis of building material wastage associated with construction projects. Journal of Civil and Environmental Systems Engineering, 11(2), 81-90.*

Corresponding e-mail: ***kay1fayomi@yahoo.com***

Questionnaire

Section A *(To be completed by the Respondent)*

1. Name of Firm/Industry:……..
2. Designation……
3. Sex: Male ☐ Female ☐
4. Education qualification. ☐

SSCE
N D
H.N.D
B.Tech/BSc
M.Tech/ MSc
Others (state): ……..

5. Professional Discipline.

Architect
Builder
Engineer
Project Manager
Quantity Surveyor
Others (State)……

6. Years of experience: (a) 0 - 5 (b) 6-10 (c) 5 (d) 16-2

B. Factors responsible for the increase in the cost of building materials.

Which of the following statement in your opinion, best describe the factors responsible for the increase in the cost of building materials Tick 4 = very aware, 3 = Fairly aware, 2 = Aware, 1= Not aware.

Factors responsible for the increase in the cost of building materials	4	3	2	1
Exchange rate of the Naira				
Inflation				
Interest rate				
Local taxes and charges				
Fluctuation in the cost of raw materials				
Inadequate production of building materials				
Supply and demand for building materials				
Cost of building materials				
Scarcity of building raw materials				
Market condition				
Cost of transportation and distribution of labour				
Communication problems between workmen and supervisors				
Change initiated by the contractor to improve quality				
Client demand for high-quality project delivery				

Client contribution to design change				
Changes in government policies and regulation				

C. Affects of increase in the cost of building materials on the delivery of building projects.
Which of the following statement in your opinion, best describe the factor responsible for the increase in the cost of building materials in building delivery

Tick 4 = very aware, 3 = Fairly aware, 2 = Aware, 1= Not aware.

Effect of increase in the cost of building materials on the delivery of building projects.	4	3	2	1
Fluctuation in the cost of construction				
Unemployment of construction workers				
Hindered adequate implementation of innovation in construction				
Low volume of construction product				
Poor quality of construction product				
Increase in project abandonment				
Shortage in the delivery of adequate and efficient buildings to the populace				
Delay in the progress of project works				
Poor workmanship due to limited quality materials to use				
Building collapses due to the use quality of materials				
Affect gross domestic product (GDP) contribution to the economy				
High maintenance costs due to the use of fewer quality materials				
Increase in the cost of repair due to inferior materials used				
Affect the aesthetic value of building product				
High rate of contractors' fraudulent practices				
Threatening the health and safety of workers on site				
Affect client expectation's on quality project delivery				
Investment returns on Construction projects are delayed				

D. Solution to the problems associated with the cost of building .materials.

Which of the following statement in your opinion, best describe a solution for the increase in the cost of building materials?

Tick 4 = very aware, 3 = Fairly aware, 2 = Aware, 1= Not aware.

The solution to the problems associated with the cost of building materials	4	3	2	1
Tax relief for local manufacturers and importers of building materials				
Revitalization of the industrial base				
Subsidy of Building materials				
Reduction in interest rate				
The cost of raw materials should remain stable				
Effective human resource management through effective motivation				
Project tracking and early corrective actions				
Creating Enabling Environment				
Government Intervention				