

EFFECTS OF INFLATION ON THE PROCUREMENT OF CONSTRUCTION MATERIALS AND QUALITY DELIVERY OF PUBLIC BUILDING PROJECTS IN NIGERIA

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A B S T R A C T

Globally, the influence of the inflationary tendency poses significant challenges that affect the entire performance of all sectors of the economy, including project delivery in the construction industry. In Nigeria, the astronomical increase in inflation rate has had a significant impact on construction material costs, which have increased to more than 80%. This has resulted in thousands of abandoned projects across the country and has become a major impediment to quality project delivery. Apart from their far-reaching effect on the internal dynamics of the construction sector, inflation rates might also be evaluated in terms of how they affect project key success factors, such as cost, time, and project quality. This study aims to investigate the influence of inflation on construction material procurement and public project delivery in Nigeria's construction industry. The objective is to identify strategies for improving construction project procurement and delivery. A quantitative approach was adopted for data collection. Through a questionnaire survey, a hundred and five ($N = 105$) questionnaires were distributed to architects, builders, contractors, developers, engineers, and quantity surveyors. The findings brought to the fore influencing factors such as local sourcing, collaborative partnerships, value engineering, and technology adoption as areas where construction practitioners should focus more attention in order to minimise the identified effects of inflation on construction material procurement and project delivery. The paper recommended that digital procurement platforms and/or supply chain management systems be prioritised and used in order to optimise inventory management, uncover cost-saving opportunities, and streamline procurement processes. This could offset the effects of acknowledged inflation on building material procurement, allowing for more effective and timelier project delivery.



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1. INTRODUCTION

Inflation has become a global worry as global economies have faced crises, and the impacts of monetary policy in one country can spread to other countries, as seen in the majority of developing countries (Chen, 2022). The recent increase in the prices of goods, energy, and construction materials in several countries reflects the worldwide economic crisis. As a result, inflation has had a negative effect on the worldwide construction industry. This is because swings in inflation rates cause significant variations in the prices of project resources (Musarat et al., 2021). This, in turn, affects project stakeholders' ability to properly price their initiatives, whether in the short or long term. As a result, construction projects are frequently carried out in very unclear circumstances, with the risk of cost overruns (Firouzi et al., 2016). Musarat et al. (2020) provided data on the possible impact of inflation on building project cost overruns. According to the analysis, inflation may increase project expenses by 3.8% to 11.63%. Long-term projects may see increases of up to 23.23%. Undoubtedly, Musarat et al. (2020) as cited in Akal (2023) posited that regardless of project stakeholders' knowledge, they will be unable to overcome such overruns unless (i) they are aware of trends in inflation rates in their countries and (ii) they observe a decreasing or increasing trend in project resource prices over time given the impact of the inflation rate.

Shiha et al. (2020) identify three resources for construction projects: materials, labour, and equipment. However, while looking into the effect of inflation on the prices of construction resources, the focus should be on building materials. Rising building material prices are a global trend that affects both industrialised and developing countries. Several developed countries have recently seen price rises in building materials. Building materials prices in emerging countries are still rising. Windapo et al. (2017) discovered that the price of building materials in South Africa, among other factors, influences construction costs. This shows that construction materials play a significant role in project implementation.

2. LITERATURE REVIEW

The construction industry globally is dealing with the consequences of inflation, especially because swings in inflation rates produce significant price variations in project resources (Musarat et al., 2021). As a result of this uncertainty, project stakeholders struggle to effectively estimate project expenses in both the short and long term. This ambiguity frequently causes cost overruns in construction projects (Firouzi et al., 2016). Musarat et al. (2020) gave disturbing statistics about the possible impact of inflation on construction project expenses. Their research found that inflation might raise project costs by 3.8% to 11.63%, with long-term projects facing even larger increases of up to 23.23%. Regardless

of stakeholder knowledge, overcoming such overruns is difficult without analysing inflation rate patterns and tracking the changing pricing of project resources over time (Musarat et al., 2020). Numerous studies (El-Kholy, 2015; Balali, et al., 2022) have found that inflation-induced changes in construction material costs are significant contributors to cost overruns. In response to this difficulty, Musarat et al. (2020) suggested that construction industry experts regularly examine the behaviour of building material prices and their relationship with inflation rates. According to Marzouk and Amin (2013) and Shiha et al. (2020) performing such investigations has dual value for the construction sector. First of all, it sheds light on how country-specific economic factors affect material prices. Second, it shows how inflation rates affect construction material pricing over time. This knowledge provides improved planning for the timely procurement of building materials, reducing their impact on overall project costs.

A growing number of studies are investigating the relationship between economic growth and inflation, but no consensus has emerged. Globally, studies have been conducted to investigate the impact of inflation on economic growth, particularly in emerging countries. Mamo (2012) examines the effect of economic growth on inflation using panel data from thirteen Sub-Saharan African countries from 1969 to 2009. The study discovered a negative correlation between growth and inflation rates. Except for two of the thirteen countries, the panel Granger causality test estimate shows that inflation can have an effect on growth. Kasidi and Mwanemela (2013) used Tanzanian TSD to investigate the impact of inflation on economic development between 1990 and 2011. The study's data is analysed utilising the correlation coefficient, coefficient of elasticity, and co-integration approaches. The study found that inflation had a negative influence on economic growth. Furthermore, the study finds no significant cointegration between inflation and growth, meaning that there is no long-term contemporaneous relationship.

3. RESEARCH METHODOLOGY

In this study, a quantitative research approach was employed and relied on questionnaire surveys to collect data from construction stakeholders and contractors, aiming to evaluate the impact of inflation on the procurement of construction materials in public project delivery in Nigeria. The survey study design was chosen since it can efficiently capture essential data regarding the current state of a scenario and describe the conditions within that context. To thoroughly investigate the impact of inflation on the purchase of construction materials in public project delivery in Nigeria and produce reliable results, this study used both descriptive and exploratory research methodologies. Statistical and quantitative findings were used to investigate the phenomena. This study's sample frame consists of the list of registered construction professionals issued by several professional

associations representing the Nigerian construction sector. This includes listings compiled by organisations such as the Nigeria Institute of Architects (NIA), Nigeria Institute of Builders (NIOB), Nigeria Institute of Quantity Surveyors (NIQS), Nigeria Society of Engineers (NSE), and other registered construction professionals in the studied region. The sample size for this study was 105 construction professionals and stakeholders from various roles in Nigeria's construction industry (Table 1). In this investigation, the normal deviation at the required confidence interval was set to 95%; the Z-value at 95% is 1.96, and P represents the proportion of the population with the desired attribute. Q = The proportion of the population lacking the desired attribute. I2 = degree of precision, which was set to 10%.

Table 1. Sample size of Respondents

S/N	Respondents	No. of Respondents
1	Architects	26
2	Quantity Surveyors	24
3	Builders	06
4	Engineers	14
5	Estate Management	10
6	Project Management	18
7	Others (e.g., Building Material Vendors)	07
Total		105

The proportion of the population with the characteristic is unknown, thus 50% was used, yielding $n = Z^2 P (1-P) / I^2$. The required sample size ($n = 1.962 \times 0.5 [1 - 0.5] / [0.1] [0.1]$) is 96. To accommodate for any non-responses, 10% of the calculated required sample size (96) was increased, yielding 105 respondents. Consequently, 150 questionnaires were distributed to potential participants. This study used a stratified sampling technique, which is a sort of probabilistic sampling. This strategy involves selecting a sample from a heterogeneous demographic subset to ensure a representative sample during questionnaire administration. This method was chosen for its simplicity and convenience in gathering the required number of respondents for the study. The survey sample was taken from Nigeria's building experts. Respondents were chosen from professionals living in various cities around the study area. The professionals were chosen using systematic sampling.

3.3 Survey design and pilot testing

The survey procedure was adapted from Akande (2015) and identified as the "Identification of the variety of respondents" with the goal of performing the survey properly. Burke and Miller (2001) emphasised the significance of pre-testing research tools on people similar to the sample population prior to data collection for the main study. To guarantee that the obtained data would allow for the most effective type of analysis, the initial version of the questionnaire was tested with a small group of construction professionals.

3.4 Data collection and analysis

The study collected data through a closed-ended questionnaire survey. Primary data was gathered through questionnaires, while historical inflation and construction material data were sourced from the CBN, NBS, and media. Construction material suppliers also provided significant information. A total of 150 questionnaires were disseminated using an internet platform, with previous approval obtained via phone calls. A total of 105 replies were obtained, representing a 70% response rate. Data was analysed using both descriptive and inferential statistics. Principal Component Analysis (PCA) was used with SPSS version 22 to assess the influence of inflationary trends. Measurement reliability was verified by content and construct validity, and internal consistency was examined using Cronbach's alpha.

4. RESULTS AND FINDINGS

4.1 Respondent background characteristics

From the findings, 39% have a B.Sc. degree, 36.2% have a Master's degree, 16.2% have a Higher National Diploma, and 3.8% have a PhD. Professions include 24.8% architects, 22.9% quantity surveyors, 17.1% project managers, 13.3% engineers, and 9.5% estate managers. Professional memberships include Nigeria Institute of Architects (26.7%), Quantity Surveyors (23.8%), and Project Managers Association (16.2%). Project experience (last 5 years): 37.1% completed ≤ 5 projects, 30.5% finished 6-10 projects, and 16.2% completed 11-15 projects. 44.8% managed projects for ₦20 million or more, while 16.2% handled projects worth ₦6 to 10 million. Project Type Experience: 35.93% in homes, 17.76% in commercial buildings, and 13.17% in offices.

4.2 Factor extraction

PCA analysis determined that the extracted variables explained 62.38% of the total variance. Factor extraction reduced the indicator dimensions using eigenvalues greater than one, representing the contribution of each factor.

4.3 Factor rotation

Factor rotation (Table 2) validated three key components affecting procurement strategies: Component 1 (34.79% variance): Local sourcing, collaborative partnerships, value engineering, technology adoption, and government support. Component 2 (15.78% variance): Index-linked contracts, strategic stockpiling, and forward planning. Component 3 (11.83% variance): Long-term contracts and supplier diversification. These findings highlight strategic measures to mitigate inflationary impacts on public project material procurement in Nigeria. The scree plot of the eigenvalue is shown in Figure 1.

Table 2. Factor extraction

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.479	34.791	34.791	3.479	34.791	34.791
2	1.576	15.758	50.549	1.576	15.758	50.549
3	1.183	11.833	62.381	1.183	11.833	62.381
4	.822	8.217	70.598			
5	.659	6.590	77.188			
6	.617	6.167	83.355			
7	.486	4.862	88.217			
8	.429	4.287	92.504			
9	.387	3.875	96.379			
10	.362	3.621	100.000			

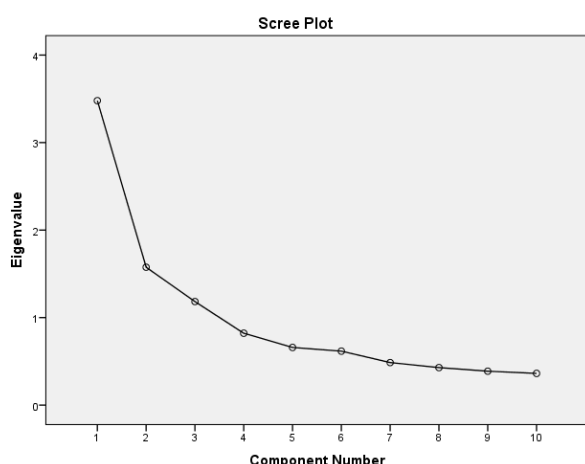


Figure 1: The scree plot of the eigenvalue.

4.4 Inflationary impact on construction material procurement and public project delivery in Nigeria

From the findings it was found that over the last five years, inflation has caused a significant increase in material costs, according to 80% of respondents. 15.2% felt a moderate impact, while 3.8% claimed no effect. Inflationary changes in material availability were observed by 74.3% of respondents. 16.2% reported no changes, while 9.5% were doubtful. 52.9% cited higher procurement costs for public projects. 22.9% reported delays in their procurement schedules. Cost variations forced 21.9% of respondents to modify their material requirements. 65.7% of projects were delayed owing to material procurement issues. 22.9% reported no significant influence on project timeframes. 11.4% reported faster project delivery, albeit this was less usual. 77.1% faced financial difficulties in public projects as a result of inflation-related procurement issues. 17.1% did not face fiscal limitations, whereas 5.7% were doubtful. Inflation has had a significant impact on construction material costs, availability, procurement efficiency, project schedules, and financial viability in Nigeria's public sector projects.

4.5 Measures to mitigate the impact of inflation on the procurement of construction materials

To examine the strategies implemented to minimise the impact of inflation on the purchase of building materials for public projects in Nigeria, the Relative Importance Index (RII) was used. Table 3 present the impact of inflationary trend on the procurement of construction materials. The factor rotation analysis confirms the derived components' dependability and clarity. The three primary components discovered account for a total of 62.38% of the variance, revealing important variables driving inflation in building material procurement for public construction projects in Nigeria. They are: (i) Component 1, Inflation Mitigation Strategies (34.79%): This includes local sourcing to reduce dependency on imports, collaborative partnerships for knowledge sharing, value engineering to lower costs while maintaining quality, technology adoption for efficient procurement, and government assistance in the form of tax breaks or subsidies. These measures serve to keep material prices stable and reduce the impact of inflation on public projects. (ii) Component 2: Cost-Management Measures (15.78%). Index-linked contracts ensure price adjustments in reaction to inflation, strategic stockpiling secures needed resources ahead of time, and advanced planning avoids costly last-minute buying. These strategies improve cost predictability and protect public projects from unexpected price increases. (iii) Component 3, Long-Term Stability Approaches (11.83%): Long-term contracts lock in material prices, reducing short-term inflation concerns, and supplier diversification decreases reliance on a single source, minimising supply chain disruption. These measures improve procurement stability and ensure long-term building performance and operation. The analysis emphasises the need for aggressive inflation management to ensure long-term public project execution.

5. CONCLUSION AND RECOMMENDATIONS

The study focusses on major elements that influence inflation in Nigerian building material procurement for public projects, such as exchange rate variations, inflation trends, and transportation costs. Effective budgeting, scheduling, and cost-cutting techniques are

required to offset inflationary effects. Flexible contractual agreements and open communication among stakeholders are critical for managing cost variances. The report also emphasises the impact of increased

material costs on project initiation rates, which may lead to the use of poor materials, reducing building quality and lifetime.

Table 3. Impact of inflationary trend on the procurement of construction materials

Variables	Frequency (Percentage)	Mean value	Decision
How has inflation affected the cost of construction materials in Nigeria over the past 5 years		4.74	Significantly Increased
Not sure	0		
Decreased	1 (1)		
Remained relatively stable	4 (3.8)		
Moderately increased	16 (15.2)		
Significantly increased	84 (80)		
Have you observed any changes in the availability of construction materials due to inflation?		1.35	Yes
Yes	78 (74.3)		
No	17 (16.2)		
Not sure	10 (9.5)		
How has inflation impacted the procurement process of construction materials for public projects in Nigeria		1.84	Delayed Procurement timelines
Increased procurement costs	55 (52.4)		
Delayed procurement timelines	24 (22.9)		
Forced changes in material specifications Others	3 (21.9)		
Not sure	3 (2.9)		
How has the impact of inflation on construction materials procurement affected the delivery timeline of public projects?		1.57	Expedited project delivery
Delayed project completion	69 (65.7)		
Expedited project delivery	12 (11.4)		
No significant impact	24 (22.9)		
Not sure	0		
Have there been any budgetary implications on public projects due to inflation-related procurement challenges		1.29	Yes
Yes	81 (77.1)		
No	18 (17.1)		
Not sure	6 (5.7)		

6. RECOMMENDATIONS

The following recommendations are made:

- **Local Sourcing:** Reduce reliance on imported materials to minimize exposure to currency fluctuations and global market volatility.
- **Collaborative Partnerships:** Foster cooperation among government agencies, private suppliers, and industry stakeholders to improve procurement strategies.
- **Technology Adoption:** Utilize digital procurement platforms and supply chain management systems to optimize inventory and cost control.

- **Capacity Building:** Train procurement professionals to enhance their ability to manage inflation-related challenges effectively.
- **Risk Management Planning:** Develop strategic plans to identify and mitigate potential inflation-related risks, ensuring smoother public project execution.

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