

RESEARCH ARTICLE

Analysis of Inflation on Building Materials Used in Construction Projects in Abuja, Nigeria

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ABSTRACT

Scholars in the built environment have identified inflation as a major bottleneck in the construction industry. With the aforementioned in mind, this study aims to examine the effect of inflation on building materials used in construction projects in Abuja, Nigeria, with a view to enhancing real estate construction and mitigating the effects of inflation on construction. The research examines the rate of inflation in Nigeria between 2019 and 2024, and the level of variation in the prices of building materials used between the selected periods. An exploratory research design was adopted for this study using both primary and secondary sources of data. Two sets of questionnaires were administered to the target population, one to the property owners, while the other was administered to Real Estate Developers in Abuja. Using stratified sampling techniques, structured questionnaires were administered to the respondents, and 95 (63.33) and 210 (52.50) were retrieved from the target population using descriptive statistics. Key findings reveal that the rate of inflation increased from 11.40% in 2019 to 26.31 in 2024. This consequently affected the prices of building materials, which also witnessed significant increases during the period. Results of the ANOVA reveal statistically significant differences in the prices of building materials between 2019 and 2024, with $p\text{-value} \leq 0.05$. In addition, the results of the eta squared showed that inflation influences the variations in the prices of building materials by 70.5%. The study concludes that policy formulations and intervention strategies are essential in a bid to mitigate the effects of inflation and enhance real estate development. The study recommended that the government and private organizations should offer grants, subsidies, and low-interest loans to make construction more accessible in Nigeria.

Keywords: *Building infrastructure; PPP; Housing scheme; Nigeria*

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1. INTRODUCTION

The construction industry is a growing sector, and its activities are one of the primary drivers of economic growth, whose success indicates the state of the country's transformation. In Southern Ethiopia, the results of Wondimagen and Essubalew

(2022) show that poor risk management and poor team organization are the main effects of cost inflation on building materials. In Nigeria, Ogun et al. (2014) evaluated how Nigerian construction material prices were affected by inflation from 1998 to 2007. A thorough literature analysis, documents from the National Bureau of Statistics (NBS), the Central Bank of Nigeria (CBN), and the Nigerian Institute of Quantity Surveyors (NIQS) were the sources of the data. The data were subjected to regression analysis, and the findings indicated that the costs of construction materials and the cumulative inflation rate are related by a third-order polynomial equation. Akanni, Oke, and Omotilewa (2014) conducted a study on the effects of increased building material costs in Lagos State, Nigeria. Through a questionnaire survey, information about the factors was obtained from principal contractors, builders' merchants, and consultants who are registered with government bodies. The price indices and rates of inflation for building materials were computed using the average prices, which showed significant effects on inflation in prices. Similarly, Alabi and Fapohunda (2021) discovered that the construction industry is collapsing due to inflation in building material costs. This is because many contractors are unable to accurately forecast the expected profit on a project, and this has led to worker layoffs and the closure of businesses.

Over the years, numerous scholars in the built environment have listed the numerous advantages that the construction industry has provided for the Nigerian economy. Musarat, Alaloul and Liew (2020) stated that, as of July 2019, the Nigerian construction sector employed 7,505,000 persons and by 2026, the industry is expected to add 864,700 new jobs, growing at an approximate pace of 12%. In addition to its enormous size, the construction industry is significant because of what it contributes to other industries (Obiegbo, 2003). In light of this, construction services contribute significantly to the global economic boom by creating jobs for millions of people. In Uyo, Nigeria, Adu and Ekung (2019) conducted a study on strategies to mitigate the impact of building material price increases. Results indicate that the primary causes of the rise in building material prices are inflation, manufacturing costs, currency rates, a shortage of locally produced resources, and the costs associated with transportation and distribution. The analysis also shows that the elements with the biggest effects on rising building material prices are contractual claims, declining profit margins, rising construction costs, and an inability to give value for money.

Bello et al. (2022) investigated how the Bauchi Metropolis's residential property development in Nigeria was impacted by inflation. Both descriptive and inferential statistics were used in the study to display and analyze the data, and the findings revealed significant effects of inflation on residential property development. In another study, the implications of growing building material costs on property development in the Bariga district of Lagos State were studied by Abulakeem, Hadiza, and Yusuf (2021). The study's findings indicate that a number of factors, including the cost of land acquisition, cost of building materials, professional fees, and a lack of capital, are working against the development of real estate in the study area. Since the construction sector accounts for a sizable amount of Nigeria's GDP, there are claims that the country's building sector has been exploited by successive Governments as an economic regulator. According to Oliver (2025), Nigeria's economy is primarily driven by the construction sector, which accounts for 30% of GDP and 60% of capital investment. Onashile (2008) further posited that Nigeria's economic growth can be gauged by looking at the construction sector.

Onashile (2008) opined that the Nigerian construction industry is going through a very difficult time, while inflation and rising costs of construction materials have caused projects that could have raised living standards to either be abandoned or not get off the ground entirely. In addition, Daniel et al. (2025) further stressed that, building expenses could increase by 30% from the year before, due to inflation and the fact that many developers and builders may compromise on the quality of real estate constructions as a result of the continued rise in prices of building materials occasioned by the effect of inflation

(Okosun et al., 2024; Okosun et al., 2021). This situation has impeded the inflation and proliferation of sub-standard structures. In view of the current inflationary effects in the country, there has been a dearth of recent research on the effect of inflation on real estate construction. This study aims to examine the effect of inflation on building materials used in construction projects in Abuja, with a view to enhancing real estate construction and mitigating the effects of inflation on construction. The following objectives were pursued: Those are to: i) examines the rate of inflation in Nigeria between 2019 and 2024; ii) to ascertain the level of variation in the prices of building materials used in construction in Abuja between 2019 and 2024.

2. MATERIALS AND METHODS

Study Area

Abuja is situated in the North-Central zone of Nigeria; Abuja is the capital of Nigeria's Federal Capital Territory (FCT). Abuja is around 8,000 square kilometers in area and shares borders to the North with Kaduna State, to the west with Niger State, and to the East and south-east with Nasarawa State, while to the south-west is Kogi State.

Research Design

The study adopted an exploratory research design. Data were derived from both primary and secondary sources. The primary data include individual interviews, postal questionnaires, street interviews, telephone interviews, and direct observation. Secondary data were derived from the files and records of real estate construction, the NBS, and the CBN. The target populations were the Real Estate Developers and the private landowners in Abuja. According to the National Directory of the Real Estate Developers Association of Nigeria, Abuja has about 1,700,000 housing units and over 150 Real Estate Developers Association of Nigeria members in Abuja. Two sets of questionnaires were administered, one to the property owners, while the other to the Real Estate Developers. The first section dealt with questions on the background and characteristics of the respondents and the sampled firms in terms of sex, age, location of office, employment, year of establishment, etc, while the second section attempted to find out some vital information about their perceptions on the subject matter. Using stratified sampling techniques, structured questionnaires were administered to the respondents, while 95 (63.33) and 210 (52.50) copies were retrieved in usable form from the Real Estate Developers and Private Land Owners, respectively (Table 1). This indicates a low proportion of responses due to difficulty in persuading, accessing, and retrieving the questionnaires. The descriptive analysis and inferential analysis methods were used. The data collected were analysed using descriptive statistics.

Table 1. Questionnaire Administration Schedule

Respondents	Number Administered	Number Retrieved	Percent
Real Estate Developers in Abuja	150	95	63.33
Private Land Owners in Abuja	400	210	52.50
Total	550	305	55.45

3. RESULTS AND DISCUSSION

The findings on inflation and quality attributes in construction projects in Abuja, Nigeria are presented below.

The rate of inflation between 2019 and 2024 in Abuja, Nigeria

Relative to the inflation rate in the economy (Table 2), data derived from the Nigerian Bureau of Statistics [16] revealed that the inflation rate in 2019 dropped to 11.40% and further increased to 13.25% in 2020 as a result of economic fluctuations. However, the impact of the COVID-19 pandemic further affected the level of inflation and resulted into increment in the

prices of goods and services when the inflation rate hit 13.25%, indicating a 1.85% increase from the previous year. Furthermore, the inflation rate increased to 16.95% in 2021 and 18.85% in 2022. As a result of the inadequate balance in the economy, the inflation rate in 2023 increased to 24.66%, representing a 5.81% increment in the rate of inflation, and as at mid-2024, the rate of inflation in Nigeria stood at 26.31%, which caused major increases in the price of goods and services and subsequent effects on the real estate construction sector. Thus, the rate of inflation and the rate of annual change in the rate of inflation over the year's shows inflation is associated with increases and decreases in prices over the years. However, if adequate economic policies are not introduced in order to curb its effects on the economy, many of the current existing real estate construction sectors will become moribund.

Table 2. The Rate of Inflation in Abuja between 2019 and 2024

	2019	2020	2021	2022	2023	2024
Inflation (%)	11.40	13.25	16.95	18.85	24.66	26.31
Annual Change (%)	-0.70	1.85	3.71	1.89	5.81	1.65

Source: Bureau of Statistics (2024)

The rate of inflation between 2019 and 2024 in Abuja, Nigeria

Relative to the inflation rate in the economy (Table 3), data derived from the Nigerian Bureau of Statistics revealed that the inflation rate in 2019 dropped to 11.40% and further increased to 13.25% in 2020 as a result of economic fluctuations. However, the impact of the covid-18 pandemic further affected the level of inflation and resulted into increment in the prices of goods and services when the inflation rate hit 13.25%, indicating a 1.85% increase from the previous year. Furthermore, the inflation rate increased to 16.95% in 2021 and 18.85% in 2022. As a result of the inadequate balance in the economy, the inflation rate in 2023 increased to 24.66%, representing a 5.81% increment in the rate of inflation, and as at mid-2024, the rate of inflation in Nigeria stood at 26.31%, which caused major increases in the price of goods and services and subsequent effects on the real estate construction sector. Thus, the rate of inflation and the rate of annual change in the rate of inflation over the year's shows inflation is associated with increases and decreases in prices over the years. However, if adequate economic policies are not introduced in order to curb its effects on the economy, many of the current existing real estate construction sectors will become moribund.

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The study further examined the level of variation in the prices of building materials used in real estate construction between 2019 and 2024. Table 3 presented the prices of some selected building materials such as cement, high tensile bar, granite, sharp sand, soft sand, 225 and 150 sandcrete hollow blocks; aluminium, long span roofing sheets, stone coated roofing tiles, hardwood and vitrified tiles. From the table, the price of 50kg cement showed a progressive increase in the price of cement between 2019 and 2024. The price of cement was N2,800 in 2019 and N3,500 in 2020 as a result of the economic crisis and the Covid 19 pandemic.

For high tensile bar average which is, measured in tonnes, was initially pegged at N288,000 per tonne in 2019, while the price increased to N344,000 in 2020 and the price further increased to the sum of N427,000 in 2021. However, there was a significant increase in the price of high tensile bar to the sum of N604,500 in 2022 and a further increment to the sum of N641,700. This price increase continued all through the years up to 2024, when the price was pegged at N669,600 as a result of present economic issues and the increasing rate of inflation in the country. For a 3.81m³ of sharp and soft sand, the prices

of both types of sand were fairly similar and started at N16,000 and N15,000 for sharp and soft sand, respectively. The prices thus showed a continuous increase in the price of the sands up to the date when the sands were both sold at the same price. The price of 225 and 150mm sandcrete hollow blocks showed that the prices of the blocks were N250 and N230, respectively. The prices of the blocks continued to increase slightly up to the years 2022, 2023, and 2024, when increases in the price of cement also resulted in an increase in the price of cement to the sum of N500 and N400 for 225mm and 150mm blocks, respectively.

The square meter of long span aluminium sheets was N2,700 in 2019, while that of stone coated roofing tiles was put at N3,100. The impacts of the economy on the prices of building materials also followed the same trend for the roofing materials, and there was a continuous increase in the prices of the roofing materials; as at 2024, the prices stood at N6,500 and N6,400 per sqm, respectively, for the aluminium and stone-coated roofing tiles. The prices of other building materials also showed a similar trend, with a continuous increase in the prices of the materials between 2019 and 2024. For instance, the price of $50 \times 150 \times 3,600$ mm hardwood timber was N2,800 in 2019, and it increased to N4,550 in 2024. For 400mm $\times$ 400mm vitrified tiles, the price was N2,250 in 2019, and it increased to N3,650 in 2024. Thus, further showing the impacts of inflation on the prices of building materials between the selected periods of time. Construction materials such as high tensile bar, granite, aluminium long span roofing sheets, stone coated roofing tiles and hardwood are not left out of the sky-rocketing prices (Table 4). From the foregoing, it can be deduced that building material cost in Nigeria is a major bottleneck in the construction sector of the country.

Table 4. Prices of selected building materials between 2019 and 2024

S/N	Material	Unit	2019	2020	2021	2022	2023	2024
1	Cement	50kg Bag	2,800	3,500	3,700	4,500	5,600	7,500
2	High Tensile Bar	Tonne	288,000	344,000	427,800	604,500	641,700	669,600
3	Granite	3.81 m ³	3,500	3,700	4,500	5,800	6,100	7,200
4	Sharp sand	3.81 m ³	16,000	18,000	25,000	28,000	30,000	35,000
5	Soft sand	3.81 m ³	15,000	18,000	25,000	28,000	30,000	35,000
6	225 mm Sandcrete hollow block	No	250	300	330	350	350	500
7	150 mm Sandcrete hollow block	No	230	270	300	330	330	450
8	Aluminium long span roofing sheet	M ²	2,700	3,100	3,500	3,800	5,600	6,500
9	Stone-coated roofing tiles	M ²	3,100	3,500	3,800	4,100	5,600	6,400
10	$50 \times 150 \times 3,600$ mm hardwood timber	Length	2800	3,200	3,500	3,700	4,000	4,550
11	400mm $\times$ 400mm vitrified tiles	M ²	2,250	2,800	2,850	3,200	3,300	3,650

Furthermore, Analysis of Variance (ANOVA) and eta squared (effect size) were used to analyse the data. The values were then subjected to further analysis as presented in the tables below:

Table 5. Descriptive statistics of the various prices of selected building materials

Building Material	Mean	N	Std. Deviation	Grouped Median	Variance	Kurtosis
Cement	3450.0000	11	1802.35956	2800.0000	3248500.000	1.284
High Tensile Bar	338781.818	11	215711.10689	288000.0000	46531281636.36	-1.391
Granite	3990.9091	11	1687.27861	3500.0000	2846909.091	-.559
Sharp sand	19954.5455	11	8063.66711	16000.0000	65022727.273	-.851
Soft Sand	19818.1818	11	8158.65408	16000.0000	66563636.364	-.883
225mm sandcrete hollow block	277.2727	11	103.15919	266.6667	10641.818	.784
150mm sandcrete hollow block	250.0000	11	98.89388	243.3333	9780.000	.069
Aluminium Roofing Sheet	3363.6364	11	1441.02236	2700.0000	2076545.455	1.282
Stone Coated Roofing Tiles	3600.0000	11	1317.38377	3100.0000	1735500.000	.893
50x150x3600mm hardwood timber	2609.0909	11	1322.65229	2800.0000	1749409.091	-1.331
400mm x 400mm Vitrified Tiles	2231.8182	11	965.47209	2250.0000	932136.364	-1.824
Total	36211.5702	121	114746.06806	3180.0000	13166660135.014	19.037

Table 6 presents the descriptive statistics of the prices of the various selected building materials. The mean price of cement was N3,450, while the mean price of high tensile bar was put at N 338,781.88. Furthermore, the mean price for sharp and soft sand stood at N19,954.55 and N19,818.18. The mean prices of the various prices of the selected building materials have also been presented and shown in Table 6. In addition, the standard deviation, mean, variance, and kurtosis of the various values have also been analysed and presented.

Table 6. ANOVA Table for the variation in the prices of selected building materials

			Sum of Squares	Df	Mean Square	F	Sig.
Building Material *	Between Groups	(Combined)	1113244441983.47	10	111324444198.35	26.236	.000
		Linearity	197319486002.066	1	197319486002.07	46.502	.000
Building Material		Deviation from Linearity	915924955981.405	9	101769439553.49	23.984	.000
	Within Groups		466754774218.182	110	4243225220.165		
	Total		1579999216201.65	120			

The results of the ANOVA (Table 6) showed that there were statistically significant differences in the prices of the selected building materials between 2019 and 2024. This is because the p-value was ≤ 0.05 , thus indicating a variation in the prices of the selected building materials in Abuja, Nigeria.

Table 7. Measures of association for the difference in the values of the selected building materials

	R	R Squared	Eta	Eta Squared
Building Type * Building Material	-.353	.125	.839	.705

Eta squared is calculated as the sum of squared differences between group means and a grand mean divided by the total sum of squares. It is often used as an effect size measure. The results of the eta squared showed that inflation influences the variations in the prices of the selected building materials by 70.5%. This implies that 70.5% of the variation in the prices of the selected building materials was attributed to the effect of inflation.

The relationship between inflation and project quality attributes showed both statistically significant and non-significant relationships. There are positive and negative relationships between inflation and project quality attributes in Abuja because the values of the correlation coefficients are positive and negative. Inflation exhibits a correlation of -0.589 with functionality in terms of project quality. This negative relationship suggests that an increase in inflation corresponds to a decline in the functionality associated with the quality of real estate construction. Additionally, the analysis of other attributes reveals a mix of positive and negative correlations, indicating their varying impacts on project quality. The correlation coefficients for the majority of quality characteristics fall within the range of ± 0.41 to ± 0.70 . Therefore, the relationship between inflation and these quality characteristics is considered moderate. This suggests that inflation is not the sole factor influencing project quality.

4. CONCLUSION

The survey reveals significant insights into the fluctuation in the rates of inflation in Abuja, while the prices of building materials have continued to increase in the Nigerian construction industry. The results derived indicate that the prices of building materials have continued to increase as a result of the high rates of inflation. Additionally, intervention strategies that require appropriate policy formulation are essential; this includes the use of local building materials and appropriate budgeting inflation reduction measures, as this will help enhance real estate development and investment in the country.

With the right strategies, policies, and financial support, the construction sector can make significant progress in achieving quality and efficient building materials to combat the construction project crisis. On that note, the study recommends the following:

The Government should liaise with relevant stakeholders in their quest to reduce the effect of inflation on the prices of building materials. Governments and private organizations should offer grants, subsidies, and low-interest loans to make construction more accessible. Additionally, partnerships between educational institutions and industry experts can drive innovation and knowledge-sharing in sustainable housing delivery that is cost-efficient, of quality, and within a specified time. Government officials, professionals in the built environment, and universities should also engage in collaborative initiatives/research that allow them to share expertise and best practices in the development of new local building materials for production; this will reduce the reliance on expensive imported materials. The Government should re-subsidize the cost of power supply, transportation costs, and fuel prices to improve ease of movement and distribution of raw materials to the factory as well as distribution of the finished products from the factory to the end-user. However, developers should shift from over-dependency on imported materials to the use of local materials.

6. COMPETING INTERESTS

None to declare.

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