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Impact of Naira Exchange Rate on Prices of Selected Construction Materials in Ekpoma, Edo State, Nigeria

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Abstract

This paper presents the result of the impact of naira exchange rate on prices of selected construction materials in Ekpoma of Edo state, Nigeria, by examining the trend in naira exchange rate values and selected construction material prices over a five (5) year duration and the impact of naira exchange rate on the price of selected construction materials. The study extracted information on monthly naira exchange rate values from the monetary authority's database of the central bank of Nigeria and adopted a survey approach to gather information on the prices of selected construction material. Data obtained were analyzed using percentages, Pearson Correlation Coefficient and regression analysis. Findings revealed that there was a strong positive correlation between the naira exchange rate and construction material prices. The study recommends that the monetary authority should research and implement a naira exchange rate stabilization/reduction policy.

Keywords: Construction; Exchange-rate; Material; Naira; Price.

1. Introduction

Author [1] envisaged the construction industry would play a powerful role in economic growth and produce structures that will add to productivity and quality of life. Construction objectives are achieved through the harness of resources (Manpower, Money, Machines and Materials). The author [2] outlined that building materials are expected to satisfy three basic functions. The material must meet some technical performance requirements of the building or structure itself to ensure normal use; the building material must resist the erosion of the surrounding and harmful medium in use to ensure a durable building or structure, and the building material must not pose a threat to the safety and health of the user.

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Author [3] emphasized materials constitute the largest single input in building construction. Furthermore, [4] agreed that building materials constitute the highest percentage of input in the building components. Thus, considering all elements that make up a building in terms of cost, the cost of building materials to other elements is enormous and represents the largest percentage [5]. A review of previous studies indicated building materials represent between 50-60% of the total construction input [3, 6, 7]. Author [8] reviewed the unchecked state of importation and taste for foreign materials in Nigeria. He decried the current state and commented that very little has been done to curb this development or ameliorate it. Author [7] stated, "apart from the few major manufacturers of building materials in the country, most of the roofing, windows, electrical items, pipes, sanitary wares and finished materials are imported". Author [9] emphasized that available statistics showed Nigeria spent ₦13.6 trillion ($69.56 billion) on the importation of raw materials within six years (2010-2015), especially on building materials that could have been sourced locally. Nigeria further spent ₦5.89 trillion ($23.19 billion) in 2016 on the importation of similar raw materials. Thus, the majority of the building materials utilized in the Nigerian construction industry were sourced overseas, which made the industry heavily dependent on imports as a source for its materials. Author [10] established that there was a spectacular increase in the cost of building materials in Nigeria over the past 10years. Also, [8] acknowledged "the current incessant rising cost of building materials". Reference [11] discovered a price increase in building materials was a common trend in both developed and developing countries. Author [12] reviewed and identified exchange rate as one of the factors that contribute to the trend in building materials. More so, [13] established the exchange rate has a significant effect on the prices of building materials. Also [10] found that the exchange rate of the Nigerian Naira was one of the three most rated factors responsible for the rising cost of building materials. More so, [14] agreed that foreign exchange is one of the significant factors that affect imported building material prices. Author [15] also classified exchange rate, amongst macroeconomic factors as one of the drivers of construction costs. Also, [16] emphasized that several scholars who had brought to attention the problem of construction materials' fluctuation identified exchange rate as one of the contributing factors. Central Bank of Nigeria (CBN), the monetary authority in Nigeria that manages the exchange rate expressed exchange rate as the price of one currency in terms of another currency [17]. The exchange rate is a strong economic indicator for assessing the overall performance of an economy. It is one of the macroeconomic variables that reflects the strength and weakness of an economy [18]. Furthermore, [19] emphasized that a country's exchange rate is an important determinant of the growth of its cross-border trading and it serves as a measure of international competitiveness. The exchange rate is expressed as several units in a domestic currency that will purchase one unit of a foreign currency or vice versa. Exchange rate of the Naira (₦) refers to the amount of Naira required to purchase foreign currency (the popular foreign currency in convertible use in Nigeria is the United States Dollar, $). When the amount of Naira required to buy a unit of Dollar falls, the Naira is said to increase in value or strengthen. When the amount of Naira required to buy a unit of Dollar rises, the Naira is said to decrease in value or weaken. Nigeria operates a dual exchange rate: the official rate fixed by CBN and the market exchange rate fixed by demand and supply. Also, [20] noted the Naira lost half of its foreign exchange value in less than two years following the oil price crash in 2014 and has not recovered despite numerous government's attempt. Studies of [12, 13, 14 ,15 , 16] have established that exchange rate has significant effects to the trends in building material prices. However, literature addressing this in the study area are scares and limited. The trend in the naira exchange rate and building material prices between 2015 – 2019 within Ekpoma and its environs are

not known. Also, literature and data on the nature of the relationship between the naira exchange rate and building material prices for previous years till date within the study area are scanty. Hence, this study attempt to investigate the impact of naira exchange rate fluctuations on building material prices to enhance building projects' delivery. To achieve this, the study identified and examined the trend in naira exchange rate values and selected construction material prices over a five (5) year duration (2015AD- 2019 AD) in Ekpoma. Also, it identified and examined the existence of a statistical relationship between naira exchange rate and selected construction material prices within the period under review in the study area; and identified and examined the impact of naira exchange rate on the price of selected construction materials within the period under review in the study area.

2. Material and Methods

The monetary authority's database provided data on monthly naira exchange rate values. The Naira exchange rate was compared against the United States Dollar. Market survey in the study area provided data on the prices of the selected construction materials. The data obtained covered the period from 2015AD – 2019AD, a period of five (5) years. Also, [21] expressed the average exchange rate as the arithmetic average of the monthly exchange rates during a given period.

$$\text{Average Exchange rate} = \Sigma \frac{\text{Exchange rates}}{12 \text{ months}}$$

The average naira exchange rate was adopted as the annual naira exchange rate for the specific year. The construction materials were selected based on their essential utilization in the construction process irrespective of clients' taste. Pearson correlation coefficient identified and examined the nature and extent of the relationship between the naira exchange rate and construction material prices. Multivariate linear regression analysis examined the impact of the naira exchange rate on construction material prices within the period under review. Data were presented in tables and charts.

3. Results

Naira exchange rates were monthly collated from the database of CBN (2020) for five years, 2015AD – 2019AD found in table 1, were used to examine the trend in naira exchange rate shown in figure 1. Based on computation using the monthly exchange rates from table 1, the average naira exchange rates were calculated and presented in table 2.

Annual Naira exchange rates illustrated in figure 2 ranged from ₦195.52k in 2015, ₦253.49k in 2016, ₦305.79k in 2017, ₦306.08 in 2018 to ₦306.92k in 2019. There was a 56.97% increase in the naira exchange rate from 2015 to 2019. Prices for Cement (50kg), Granite (30 tonnes), Sand (9 tonnes), Cement fibre ceiling sheet (1.2m X 1.2m), Reinforcement bar (12mm), Emulsion paint (20 litres) for 2015 – 2019 presented in Table 3 was illustrated in Figure 3.

Table 1: Monthly Naira Exchange rate (against the United States Dollar) values from 2015AD -2019AD

YEAR	Jan (₦)	Feb (₦)	Mar (₦)	Apr (₦)	May (₦)	June (₦)	July (₦)	Aug (₦)	Sep (₦)	Oct (₦)	Nov (₦)	Dec (₦)
2015	181.78	194.48	197.07	197.00	197.00	196.92	196.97	197.00	197.00	196.99	196.99	196.99
2016	197.00	197.00	197.00	197.00	197.00	231.76	294.57	309.73	305.23	305.21	305.18	305.22
2017	305.20	305.31	306.40	306.05	305.54	305.72	305.86	305.67	305.89	305.62	305.90	306.31
2018	305.78	305.90	305.74	305.61	305.83	305.87	305.81	306.06	306.27	306.50	306.71	306.92
2019	306.85	306.77	306.92	306.96	306.95	306.95	306.94	306.93	306.92	306.96	306.95	306.95

Source: CBN (2020)

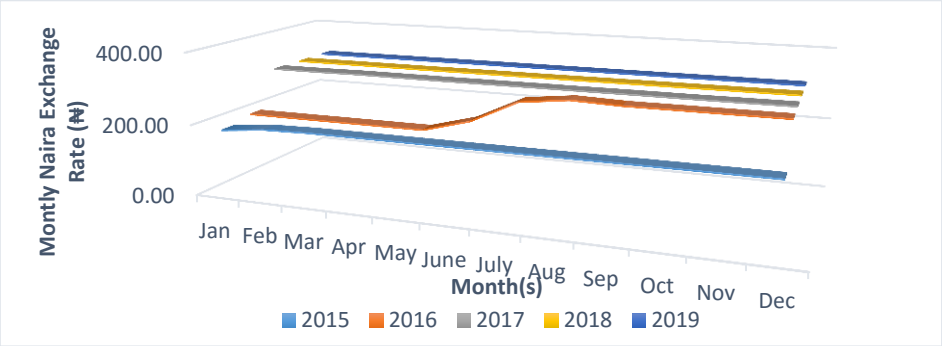

Figure 1: Monthly Naira Exchange rates from January 2015 to December 2019

Source: Fieldwork (2020)

Table 2: Annual Naira exchange rate

Year	Annual Exchange rate (₦)
2015	195.52
2016	253.49
2017	305.79
2018	306.08
2019	306.92

Source: Fieldwork (2020)

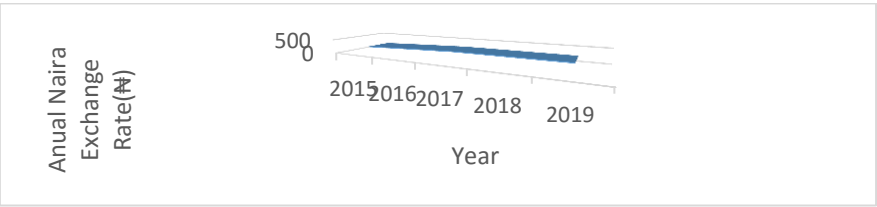

Figure 2: Annual Naira Exchange rates from 2015- 2019

Source: Fieldwork (2020)

Table 3: Selected construction materials' prices in Ekpoma

Year	Cement (₦)	30 tonnes of Granite (₦)	9 tonnes of Sand (₦)	Cement Fibre Ceiling sheet (₦)	A piece of 12mm Rebar (₦)	20litres of Emulsion paint (₦)
2015	1500.00	111000.00	10000	900	1200	2800
2016	2500.00	110000.00	10000	950	1100	3000
2017	2500.00	142000.00	14000	1200	1850	3400
2018	2550.00	160500.00	14000	1400	2100	3800
2019	2600.00	169500.00	14000	1600	2350	4000

Source: Fieldwork (2020)

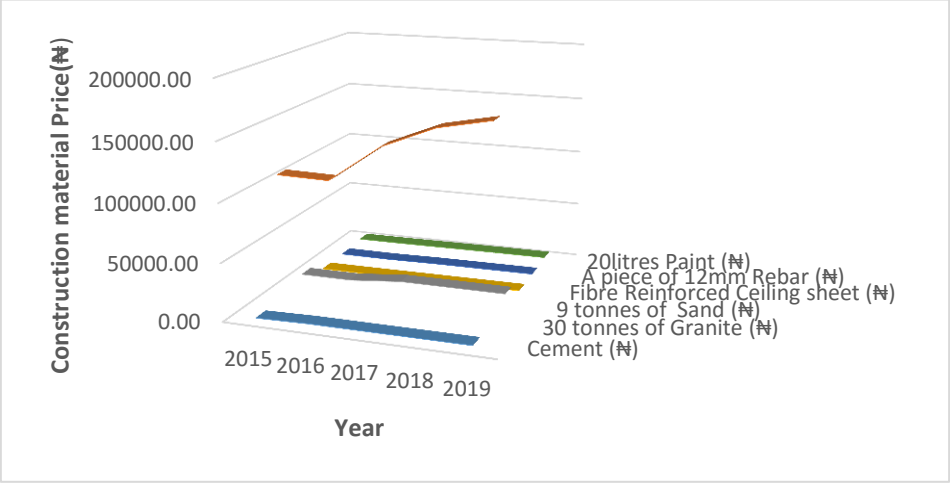

Figure 3: Selected Construction Materials' prices from 2015 to 2019

Source: Fieldwork (2020)

Cement (50kg)'s price was ₦1500 in 2015, ₦2500 in 2016 and 2017, and increased further from ₦2550 in 2018 to ₦2600 in 2019. Granite (thirty tonnes)'s price was ₦111000 in 2015, ₦110000 in 2016, ₦142000 in 2017, ₦160500 in 2018 and ₦169500 in 2019. Sand (Nine tonnes)'s price was stable between 2015 and 2016 at ₦10000, increased to ₦14000 in 2017 and maintained that price in 2018 and 2019. Cement Fibre ceiling sheet (1.2m x 1.2m)'s price was ₦900 in 2015, ₦950 in 2016, ₦1200 in 2017, ₦1400 in 2018 and ₦1600 in 2019. Reinforcement bar (12mm)'s price was ₦1200 in 2015, ₦1100 in 2016, ₦1850 in 2017, ₦2100 in 2018 and ₦2350 in 2019. Emulsion paint (Twenty litres)'s price was ₦2800 in 2015, ₦3000 in 2016, ₦3400 in 2017, ₦3800 in 2018 and ₦4000 in 2019. Granite prices underwent a 0.9% decrease from 2015-2016, and a 54.09% increase from 2016-2019. Similarly, 12mm reinforcement bar prices underwent an 8.33% decrease from 2015-2016 and a 113.64% increase from 2016-2019. From 2015- 2019, the percentage increase in prices was 73.33%

for Cement; 40% for Sand; 77.78% for Cement fibre reinforced ceiling sheet, and 42.86% for Emulsion paint. Thus, there was an upward movement in prices from 2015-2019 within the study area. Pearson correlation coefficients presented in table 4 identified the existence and strength of the association between the naira exchange rate and the construction material prices. Naira exchange rate was the independent variable and construction material prices was the dependent variable.

Table 4: Pearson's correlation coefficients for Naira Exchange rate and selected construction materials' prices

S/N	Variables Paired	Pearson Correlation Coefficient
1	Naira exchange rate and Granite	0.845
2	Naira exchange rate and Sand	0.909
3	Naira exchange rate and Cement	0.904
4	Naira exchange rate and 12mm Rebar	0.835
5	Naira exchange rate and Ceiling Sheet	0.826
6	Naira exchange rate and Emulsion paint	0.875

Source: Fieldwork (2020)

Table 4, presents the Pearson correlation coefficient of the Naira exchange rate and selected construction materials prices. Granite was 0.845. It was 0.909 for Naira exchange rate and Sand; 0.904 for Naira exchange rate and Cement; 0.835 for Naira exchange rate and 12mm reinforcement bar; 0.826 for the Naira exchange rate and Cement fibre ceiling sheet; and 0.875 for Naira exchange rate and Paint. The Pearson correlation coefficients confirmed relationships existed between the naira exchange rate and the selected construction material prices within the study area. Pearson correlation coefficient of 0.845 showed there was a strong and positive relationship between the Naira exchange rate and Granite, which implied changes in the naira exchange rate strongly correlated with changes in the price of granite. Thus, as the naira exchange rate increased in value, the price of Granite also increased in value and vice versa. Pearson correlation coefficient of 0.909 showed there was a strong and positive relationship between the Naira exchange rate and Sand, which implied changes in the naira exchange rate strongly correlated with changes in the price of sand. Thus, as the naira exchange rate increased in value, the price of sand also increased in value and vice versa. Pearson correlation coefficient of 0.904 showed there was a strong and positive relationship between the Naira exchange rate and Cement, which implied changes in the naira exchange rate strongly correlated with changes in the price of Cement. Thus, as the naira exchange rate increased in value, the price of cement also increased in value and vice versa. Pearson correlation coefficient of 0.835 showed there was a strong and positive relationship between Naira exchange rate and 12mm reinforcement bar, which implied changes in naira exchange rate strongly correlated with changes in the price of 12mm reinforcement bar. Thus, as the naira exchange rate increased in value, the price of the 12mm reinforcement bar also increased in value and vice versa. Pearson correlation coefficient of 0.826 showed there was a strong and positive relationship between Naira exchange rate and cement fibre ceiling sheet, which implied changes in naira exchange rate strongly correlated with changes in the price of cement fibre ceiling sheet. Thus, as the naira exchange rate increased in value, price of cement fibre ceiling sheet also increased in value and vice versa. Pearson correlation coefficient of 0.875 showed there was a strong and

positive relationship between the Naira exchange rate and Emulsion paint, which implied changes in naira exchange rate strongly correlated with changes in the price of Emulsion paint. Thus, as the naira exchange rate increased in value, the price of Emulsion paint also increased in value and vice versa. Multivariate linear regression analysis used to examine the impact of the naira exchange rate on construction material prices was presented in table 5. Naira exchange rate was the predictor variable and prices of the selected construction materials was the outcome variable.

Table 5: Regression Analysis parameter estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
Price of Portland Cement (50Kg)	Intercept	-10.282	645.416	-.016	.988
	Naira exchange rate	8.555	2.329	3.673	.035
Price of Granite (30 tonnes)	Intercept	9450.538	47717.105	.198	.856
	Naira exchange rate	472.107	172.212	2.741	.071
Price of Sharp Sand (9 tonnes)	Intercept	1334.960	2962.142	.451	.683
	Naira exchange rate	40.448	10.690	3.784	.032
Price of Cement Fibre Ceiling sheet	Intercept	-151.208	542.986	-.278	.799
	Naira exchange rate	4.976	1.960	2.539	.085
Price of Reinforcement bar (12mm)	Intercept	-834.188	984.145	-.848	.459
	Naira exchange rate	9.337	3.552	2.629	.078
Price of Emulsion Paint (20 litres)	Intercept	922.293	802.386	1.149	.334
	Naira exchange rate	9.057	2.896	3.128	.052

Source: Fieldwork (2020)

For the price of Portland cement (50kg), the constant, which is the height of the regression line when it crossed the Y-intercept, was -10.282 as found in table 5. The coefficient for the Naira exchange rate was 8.555. The regression equation was Price of Portland Cement (50kg) = -10.282 + 8.555 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of Portland cement would increase by ₦8.56k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of Portland cement. Thus, as the value of the Naira exchange rate increased, the price of Portland cement (50kg) increased. For the price of Granite (30 tonnes), the constant, which is the height of the regression line when it crossed the Y-intercept, was 9450.538 as found in table 5. The coefficient for the Naira exchange rate was 472.107. The regression equation was Price of Granite (30 tonnes) = 9450.538 + 472.107 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of Granite would increase by ₦472.11k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of Granite. Thus, as the value of the Naira exchange rate increased, the price of Granite increased. For the price of Sand (9 tonnes), the constant, which is the height of the regression line when it crossed the Y-intercept, was 1334.960 as found in table 5. The coefficient for the Naira exchange rate was 40.448. The regression equation was Price of Sand (9 tonnes) = 1334.960 + 40.448 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of Sand would increase by ₦40.45k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of Sand. Thus, as the value of the Naira exchange rate increased, the price of Sand increased. For the price of Cement Fibre Ceiling Sheet, the constant, which is the height of the regression line when it crossed the Y-intercept, was -151.208 as found in

table 5. The coefficient for the naira exchange rate was 4.976. The regression equation was Price of Cement fibre ceiling sheet = -151.208 + 4.976 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of Cement fibre ceiling sheet would increase by ₦4.98k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of Cement fibre reinforced sheet. Thus, as the value of the Naira exchange rate increased, the price of Cement fibre reinforced sheet increased. For the price of Reinforcement bar (12mm), the constant, which is the height of the regression line when it crossed the Y-intercept, was -834.188 as found in table 5. The coefficient for the naira exchange rate was 9.337. The regression equation was Price of Reinforcement bar (12mm) = -834.188 + 9.337 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of 12mm reinforcement bar would increase by ₦9.34k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of 12mm reinforcement bar. Thus, as the value of the Naira exchange rate increased, the price of the 12mm reinforcement bar increased. For the price of Emulsion Paint (20 litres), the constant, which is the height of the regression line when it crossed the Y-intercept, was 922.293 as found in table 5. The coefficient for the naira exchange rate was 9.057. The regression equation was Price of Emulsion Paint (20 litres) = 922.293 + 9.057 Naira exchange rate. This implied that for every unit increase in Naira exchange rate, price of Emulsion paint (20 litres) would increase by ₦9.06k. The regression model implied a positive linear relationship exists between the Naira exchange rate and price of emulsion paint. Thus, as the value of the Naira exchange rate increased, the price of Emulsion paint increased.

4. Discussion of Findings

There was a 56.97% increase in Naira Exchange rate between 2015 and 2019. Pearson correlation of Naira exchange rate and price of Granite was 0.845; Naira exchange rate and price of Sand was 0.909; Naira exchange rate and price of Cement was 0.904; while Naira exchange rate and price of Reinforcement bar were 0.835. Also, the Pearson correlation of Naira exchange rate and price of Cement Fibre ceiling sheet was 0.826; and Naira exchange rate and price of Emulsion paint were 0.875. Pearson correlation confirmed relationships existed between naira exchange rate and construction material prices within the study area. The relationship between the variables was strong and positive, which implied changes in the naira exchange rate strongly correlated with changes in construction material prices. Thus, as the naira exchange rate increased in value, the price of construction materials increased in value and vice versa. The results in this study agreed with the studies of [8, 9 and 10] which established incessant increase in the prices of building material as a result of fluctuation in the exchange rate of the naira to the dollar. Multivariate Linear Regression analysis indicated a positive linear relationship existed between the naira exchange rate and the selected construction materials. This implied that as the Naira exchange rate increased, the price of construction materials also increased. From the regression models obtained for the selected construction materials, for a unit increase in Naira exchange rate, price of Portland cement (50Kg) increased by ₦8.56k (eight naira, fifty-six kobo) and price of Granite (30 tonnes) increased by ₦472.11k (four hundred and seventy-two naira, eleven kobos). Furthermore, price of Sand (9 tonnes) increased by ₦40.45k (forty naira, forty-five kobo), price of Cement fibre ceiling sheet increased by ₦4.98k (four naira, ninety-eight kobo); price of reinforcement bar (12mm) increased by ₦9.34k (nine naira, thirty-four kobo), and price of Emulsion paint (20 litres) increased by ₦9.06k (nine naira, six kobo). Thus, between 2015 and 2019, from the increase in the naira exchange rate, price of Cement (50kg) increased by

1.57%; price of Granite (30 tonnes) increased by 86.71%; price of sand increased by 7.43%; price of Cement fibre ceiling sheet increased by 0.91%; price of Reinforcement bar (12mm) increased by 1.72%; while the price of Emulsion paint (20 litres) increased by 1.66%. The results of this study agreed with studies of [10,12, 13,14 and 16] which established that exchange rate has a significant effect on the prices of building materials.

5. Conclusion

This study investigated the impact of naira exchange rate on prices of selected construction material within Ekpoma, Edo State, Nigeria. To achieve this, it identified and examined the trend in the naira exchange rate and selected construction material prices over five years period (2015AD- 2019AD). Also, determined the statistical relationship between naira exchange rate and the selected construction material prices. The study found a strong positive correlation between the naira exchange rate and construction material prices. The study established a positive linear relationship between the exchange rate and the selected construction material prices. In light of the research findings, the study, therefore recommends that the monetary authority should research and implement a naira exchange rate stabilization/reduction policy. Policymakers should enact and pass into law legislation that will ensure local mass production of construction materials suitable for the country. This will help to reduce the importation of construction materials whose prices are subject to fluctuations in the naira exchange rate. Also, the Government should urgently adopt a policy that will attract manufacturers of construction materials to set up production units within the country. This will improve the availability of construction materials and reduce the impact of naira exchange rate fluctuations on their prices. However despite the contribution of this study to the body of knowledge, care must be taken in generalizing it findings as it is limited based on the selected building materials and sample size. The study was conducted in Ekpoma further studies can conducted considering other building materials and other state within the country, to compare results and to garner information on larger sample size.

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