

THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

The Correlation between Foreign Exchange Rates and Prices of Building Materials in Nigeria, 2011-2017

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Abstract:

This study was aimed at determining the statistical relationship that exists between the Naira-Dollar exchange rate and the prices of some selected building materials in Nigeria. These materials comprise cement, tiles and reinforcement bars, and were selected via market survey; informed by their cost significance in building construction and frequency of importation. Data on Foreign exchange Rates were obtained from Central Bank of Nigeria (CBN) statistical bulletin and covered a period of 2011 to the 1st quarter of 2017. The inferential analysis carried out indicated that the relationship between exchange rate and the price of tiles, cement and reinforcement bars are very strong, with correlation coefficients of 0.93, 0.83 and 0.99. Undoubtedly, there are other factors that could account for increase in these material prices and correlation does not necessarily imply causation. The study however recommends that the Nigerian government should formulate policies that are not detrimental to the value of the Naira, such as encouraging and boosting domestic production of goods and services and reducing dependence on imported materials, in order to stabilize the price of building materials, encourage building construction and make housing readily affordable for the citizenry.

Keywords: *Building construction, Building materials, Exchange rate, Nigeria, Government Policies*

1. Introduction

Building construction represents one of the most dynamic and complex industrial development the world over, involving varying forms of materials. Building materials are those materials put together in erecting or constructing structures; in fact, no field of engineering is conceivable without their use (Akanni, 2006; Udosen and Akanni, 2010). They constitute a major component of construction and contribute immensely to the quality and cost of construction, from the foundation to the finishing. The building materials industry is regarded as an important contributor to the national economy of any nation as its output governs both the rate and the quality of construction. Various researches carried out by Adedeji (2002); Arayela (2005) & Ogunsemi (2010) have established that materials account for as much as 50 -60% of building constructions, hence it demands a serious attention, especially in view of factors or policies that may increase their prices and slow down the growth of the building construction sector.

Aibinu and Jagboro, (2002); Jagboro and Owoeye, (2004); Mekson (2008); Njoku, (2007); Anosike (2009) note that increase in the price of building materials poses a significant threat and to the construction industry as it leads to fluctuation in construction costs and the eventual abandonment of projects. According to Oladipo and Oni (2012), high prices of building materials had form a crucial constraint to improving construction procurement in Nigeria. Other implications are that it delays progress of works and reduces volume of construction output, leads to non-commissioning of other valuable projects, reduces rate of employment of construction workers, poor workmanship as a result of the use of low-quality local materials and inhibits innovation in construction method and materials research as identified by Windapo, Ogunsanmi, & Iyagba (2004); Idoro and Jolaiya (2010).

Studies carried out by Oladipo and Oni (2012); Akanni, Oke, & Omotilewa (2014) established that exchange rate of the Nigerian Naira ranked highest amongst the factors responsible for the rising cost of building materials in Nigeria. The Nigerian building materials market which has been stable for some time has recently experienced adjustments in prices that have been blamed on such factors as the exchange rate (Uwaegbulam, Alao & Badejo, 2009).

In view of the afore-mentioned issues, the study sought to determine the statistical correlation between building material prices in Nigeria and the exchange rate of the Naira. This is in the wake of economic recession that hit the Nigerian economy.

1.1. Significance of the Study

It is expected that the findings from this study will sensitize policy makers and the government on the need to make and implement policies that will reduce the exchange rate and ultimately the cost of building materials in Nigeria, thereby encouraging construction activities in the country, which will in turn boost economic development.

1.2. Scope of the Study

This exchange rates and prices of building materials used in the study covered a period of 2011-2017. This period was selected because it marked the time when Nigeria witnessed severe economic recession. The materials surveyed include: cement, reinforcements and tile because they are largely imported materials (either as raw materials or finished products) which also makes them vulnerable to exchange rate policies.

2. Aim and Objectives of the Study

The aim of this research is to assess the impact of foreign exchange rate on the prices of building materials in Nigeria, from 2011 to the 1st quarter of 2017, with a view to establishing the statistical significance. The following specific objectives will be pursued to achieve this aim:

- a) To obtain the foreign exchange rate of Nigeria from 2011 to the 1st quarter of 2017.
- b) To obtain the prices of some selected building materials; cement, reinforcements and tiles for the study period.
- c) To assess the effect of exchange rate on the prices of building materials from 2011-2017.

3. Research Hypothesis

The following hypothesis were postulated and validated:

Ho: There is no significant relationship between exchange rate and price of cement.

Ho: There is no significant relationship between exchange rate and price of reinforcement.

Ho: There is no significant relationship between exchange rate and price of tiles.

4. Literature Review

4.1. Overview of exchange rate, the Nigerian scenario and the effect on building material prices

Exchange rate is the price of domestic currency in terms of another countries currency. The worth of a nation's currency depends on a number of factors including the state of the economy, the competitiveness of the exports, the level of domestic production and the quantum of her foreign reserves. The objectives of exchange rate are to preserve the value of the domestic currency, maintain favourable externally reserve position and ensure price stability (World Bank, 1997).

The management of exchange rate is one of the instruments used by a state in pursuit of economic development. How it manages its finance – fiscal policy as well as trade policies are also key. However, in a globalised world, the management of exchange rate has taken an add importance. This is because most countries have opened their economies by adopting export led development, which is underpinned by a low cost of production and an undervalued exchange rate. The exchange rate value of their currency therefore plays a vital role.

4.2. Exchange Rate Policy and Movements

The exchange rate policies applied in Nigeria have traversed into two main mechanism: the fixed and the flexible regimes. According to World Bank (1997) the more diversified an economy is, the more geographically concentrated the trade and the stronger the case for fixed exchange rate regime. On the other hand, the diversified an economy is, the greater the openness of the economy, the better for the country to adopt flexible exchange rate adjustment regime. The type of exchange rate regime with a country adopts influences her international trade. In the view of Frankel and Rose (2002) trade should be higher under fixed regime since exchange rate volatility and uncertainty will be lower, which will tend to reduce the cost of trade and hence increase its volume.

An exchange rate is a normal value of one currency against another of a trading partner. For example, the Nigerian naira against the US dollar, pound or the euro. The job of managing an exchange rate falls under a country's Central bank, which controls monetary policies. Which regime it chooses has a direct impact on every aspect of the economy. There are those very much in favour of fixed exchange rates, and just as many vehemently oppose to them. Some view fixed exchange rate as being too inflexible. Others point out that it reduces uncertainty in the face of international capital flow.

Nigeria floated its fixed currency exchange rate for the first time in history, however, the freeing of Nigeria's naira after months of debates saw the currency immediately plummet by 40%. One would have to go back two decades to find parallels. South Africa, then Africa's largest economy also went through an agonising shift from fixed exchange rate to a free-floating exchange rate after many permutations. In the 1970s, after the collapse of the gold standard, south Africa fixed its exchange rate against the US dollar within a band. Similarly, between February 2015 and June 2016, Nigeria pegged the naira against the US dollar. It did this because of the concern about the currency (naira) depreciating against the dollar, making inputs expensive.

The biggest weakness of a fixed exchange rate is that interest rate hikes in the pegged country's currency, may also strengthen the domestic currency. This inevitably leads to an excess demand of foreign goods and unsustainable external borrowing by the government. For example, if the US increased interest rate and the dollar strengthened, the naira would also strengthen. Nigerians, experiencing wealth effect, would respond by importing more. This phenomenon would not have been caused by factors in Nigeria,

such as higher economic growth or higher oil prices, but because of actions by the US Federal Reserve. It is this artificial wealth that is of concern. Nigeria abandoned this approach in 2016 and replaced it with floating exchange rates.

4.3. Why Nigeria Changed Course

At the height of oil boom, Nigeria's economy grew rapidly and overtook South Africa as the continent's largest economy. But when the oil price plummeted, the country's weaknesses were exposed. As the Nigerian dollar receipt dropped due to lower oil price, the naira also weakened prompting the government to fix its currency in February 2015. However, dollar receipt from the sale of oil continued to fall, making it difficult for importers. It also led to a scarcity of dollars. That in turn led to the development of a parallel dollar market that worsened the shortage in the formal sector. When there is scarcity of dollars, the dollar exchange rate market is illiquid making it difficult to pay dollar commitments.

The illiquidity and the difficulty to service foreign dept. prompted the state to respond by floating the currency's exchange rate. The aim was to discourage imports emanating from the parallel market and devaluing the naira. It is not surprising that the naira responded by depreciating against the dollar to find its true value. However, Nigeria's decision is no panacea for the country's ailing economy. Nigeria needs to diversify its export basket away from oil and equally has a host of structural problems it need to address, such as high levels of unemployment, poverty and inequality.

4.4. The Present Scenario

After several years of stability in the foreign exchange rates, the Naira started tumbling against the United States Dollar and other currencies following the falling fortunes of crude oil, Nigeria's main foreign exchange earner. From rates of around N150 – N160 to one United States Dollar, the Naira is exchanging at slightly over N200 to 1USD and on the parallel market at up to N225 to 1USD. With a large number of the components of construction imported (even locally manufactured materials rely on foreign components), the expectation has been that building material prices will continue to move up, unless measures are taken by the Government to address (Mohammed, 2008; Dipo, 2015).

Dipo (2015) further reports that experts are of the opinion that many building material suppliers are more likely to absorb some of the costs of the increased foreign exchange rates instead of passing all to their customers. This is because customers are more likely to resist such price increases by cutting back on their purchases and using lower grade materials instead. How far building material suppliers and manufacturers will be able to absorb the rising costs of foreign exchange will depend on how much further the Naira will fall.

Uwaegbulam, Alao & Badejo (2009) assert that in the wake of the global economic recession, which is hitting hard on the world economy, developers and independent builders in Nigeria are becoming unsettled with the development and are therefore calling for the intervention of government. The skyrocketing exchange rate of the dollar to the naira is killing the building materials' sector in the Nigeria. Depreciation in naira value is working against the building materials importers. It weakens the strength of the naira and the moment that happens, it earns significant losses instead of profits. This situation, if not checked may lead to total collapse of the industry.

Njoku (2015), corroborates the assertion of Uwaegbulam, Alao & Badejo (2009) by stating that the free fall of the Naira against the US Dollar has unsettled the nation's fledgling construction industry and created an atmosphere of uncertainty which is scaring potential investors away from the sector regarded as the barometer for measuring the nation's economy. Njoku explains that since most materials used in the building and construction industry are imported, devaluation of the Naira jerks up prices of imported construction materials. What this means is that projects under construction will have their contract sums reviewed upwards due to obvious inflationary trends. He posits that even the prices of locally produced building materials like cement have gone up despite the abundant supply of limestone in Nigeria. Most of the spare parts for the plants and raw materials are imported. Gypsum for example which is one of the raw materials used in cement production is still being imported. These factors have reflected on the cost of cement. "Beyond this, workers will also agitate for increase in their salaries because the present pay packet is no longer sustainable. The cost of production will rise and those who had the intention of embarking upon new projects will suspend it. The result is a reduction in the tempo of construction activities, the saying that 'one man's meat is another man's poison' fits into to this situation. Those living abroad who intend to embark on new projects will celebrate the present scenario because they will spend less to actualize their projects. If they had planned to spend \$5000, they may end up spending \$4000.

The consistent devaluation of the Naira and the fall in the price of crude oil, have stalled further developments in Nigeria. The cost of construction has gone up because most building materials – tiles, sanitary fitting, electrical fittings and furnishings are imported. No sensible developer will embark on new developments with the situation on ground. A walk round the country will reveal that new developments are stifled. Everything appears to be stagnant because nobody is sure of when the Naira will pick up. The government is not helping matters. The annual budget is usually passed late, thus no major construction activity can take place because nobody knows the policy thrust. The government is not ready to fund the economy because it is only through capital expenditure that the economy will grow. A situation where a very large percentage of the budget estimates is devoted to recurrent expenditure is not healthy for the economy.

5. Methodology

Survey design was adopted for this study. The materials (reinforcement, cement and tiles) were selected via Purposive sampling, while their prices (average) were obtained via market survey at the three major commercial cities of Nigeria; Namely Lagos, Kano and Onitsha. Furthermore, data on exchange rates were retrieved from Central Bank of Nigeria (CBN) statistical Bulletin. The results were

presented using Tables and Line graphs for pictorial elucidation, while correlation was used in analyzing the data; to determine the relationship between the variables.

5.1 Correlation Analysis

Pearson correlation analysis is the most widely used method in measuring the extent of relationship between two or more variables and used for both interval and ratio scales (Kothari, 2004).The formula for Pearson correlation coefficient is expressed as:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)]}} \quad (1)$$

- Where $r < +0.5$, a weak positive relationship exists
- Where $r \geq +0.5$, a strong positive relationship exists
- Where $r < -0.5$, a strong negative relationship exists
- Where $r \leq -0.5$, a weak negative relationship exists
- Where $r = +1$, a perfect positive relationship exists
- Where $r = -1$, a perfect negative relationship exists
- Where $r = 0$, no relationship exists.

6. Data Presentation and Analysis

Year	Price of tile (per m ²) (₦)	Price of Reinforcement (per ton)(₦)	Price of cement (per 50kg bag) (₦)	Exchange Rate (₦)
2011	2300	122200	1650	155.79
2012	2300	122200	1700	158.26
2013	2600	126900	1800	159.27
2014	2600	130000	2000	164.88
2015	2600	187500	1550	195.52
2016	3200	206800	2200	365.37
2017	3200	253800	2650	431.44

Table 1: Prices of the surveyed building materials and exchange rates from 2011 – 2017
 Source: CBN statistical bulletin and Researchers’Market Survey (2011 - 2017)

6.1. Descriptive Analysis

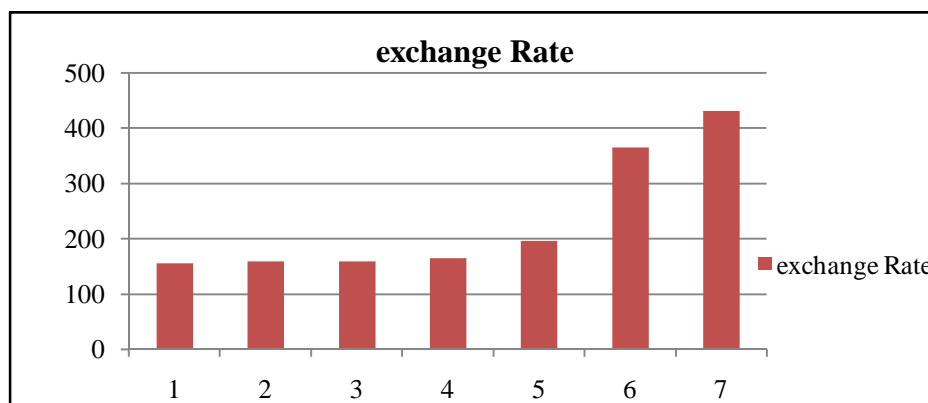


Figure 1:Trend in exchange rate– 2011 to 1st quarter of 2017 (Researchers’ plot, 2017)

From figure 1, it can be observed that exchange rate was at its peak in the 1st quarter of 2017 with an average value of N431.44/dollar and lowest with an average value of N155.79/dollar in 2011. The rate shows a sharp increase from 2015 to 2017 as a result of CBN’s decision in the devaluation of Naira. The rate remained apparently stable with little changes from 2011 to 2015.

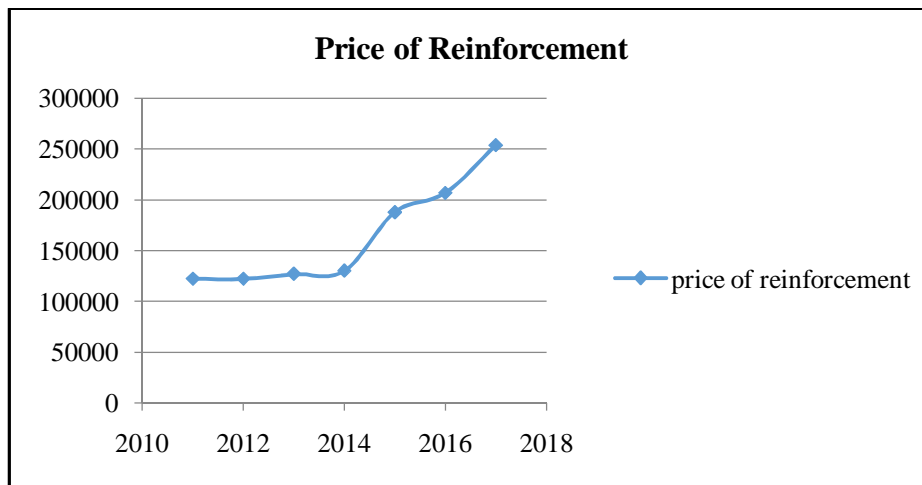


Figure 2: Trend in price of reinforcement bars – 2011 to 1st quarter of 2017 (Researchers’ plot, 2017)

Figure 2 shows the price of reinforcement with the highest price of N253800/ton in the year 2017 which is in line with the increase in exchange rate. This also shows the lowest price of N122200/ton in 2011. The chart shows that there is a relationship between exchange rate and the price of reinforcement.

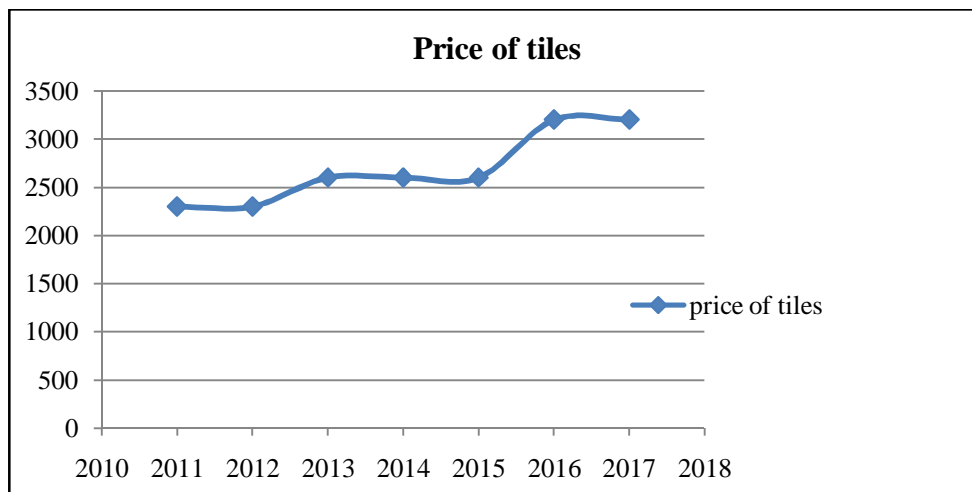


Figure 3: Trend in price of tiles – 2011 to 1st quarter of 2017 (Researchers’ plot, 2017)

Figure 3 above shows the trend in the price of tiles with the highest price of N3200/carton (600mmx600mmx8mm thick) in 2017 and the lowest price of N2300/carton in 2011. The chart shows a sharp increase in price from 2015 -2017 which coincides with that of exchange rate. The chart equally shows that there was a stable price from 2013-2015.

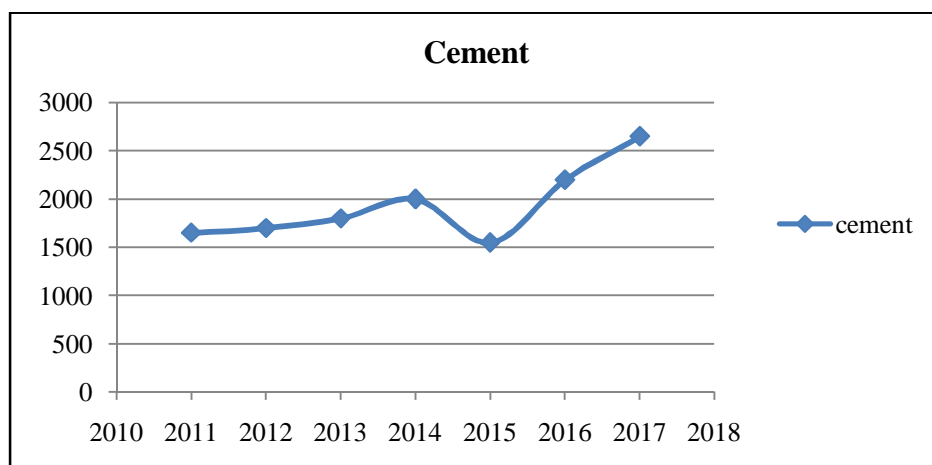


Figure 4: Trend in price of cement – 2011 to 1st quarter of 2017 (Researchers’ plot, 2017)

In figure 4, it can be observed that there was an increase in cement prices with its peak at N2650/50kg bag of cement in 2017 and the lowest of N1550/50kg bag in 2015. Cement experienced reduction in price in 2015 meaning that some other factors must have led to the drop-in price. The sharp increase in price from 2015 to 2017 coincides with the trend in exchange rate.

6.2. Inferential Analysis

S/N	Variable		Type of Analysis	Correlation Coefficient	Strength of relationship	Remark	Action on Hypothesis
	Y	X					
1	Exchange rate	Tiles	Correlation	0.93	very strong	SS	Reject Ho
2	Exchange rate	Cement	Correlation	0.89	very strong	SS	Reject Ho
3	Exchange rate	Reinforcement	Correlation	0.99	very strong	SS	Reject Ho

SS= Statistically significant

Table 2: Analysis of the relationship between the independent variable (exchange rate) and the dependent variables (tiles, cement and reinforcement bars). Source: Researchers' computation (2017).

Table 2 can be interpreted as follows:

- There is a significant relationship between increase in exchange rate and price of steel reinforcement bars.
- There is a significant relationship between increase in exchange rate and price of tiles.
- There is a significant relationship between increase in exchange rate and price of cement.

7. Summary, Conclusion and Recommendations

Results of the analysis carried out by the study suggest that there is a significant positive relationship between the variables tested. This is because the correlation coefficient exceeds 0.5. Therefore, the null hypotheses were rejected. The use of correlation coefficient is to test the level of significance of the variables tested and this indicates that a strong statistical relationship exists. The results justify that for every policy made by the government with respect to exchange rate; there will be corresponding effect on the price reinforcement, tiles and cement.

The study therefore concludes that the government policy of devaluation of the Naira which accounts for the increase in the price of building materials in Nigeria. From the R value of above 0.5, indicating a positive level of significance between the dependent and independent variables under study. Thus, Policies exchange rate can be regarded as being a core determinant of the price of building materials.

The study advances that the Nigerian government should provide a good platform through provision of infrastructure, empower small and medium enterprises and evolves table policies that encourage the use of locally produced building materials while playing down the over-dependence on imported materials.

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