

Nexus of Economic Recession and Building Construction Cost in Nigeria

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Abstract

Economic recession became pronounced in the year 2008 to 2009 when the annual growth rate of Nigeria dropped from over 9% to 6.7% leaving macroeconomic variables such as GDP growth rate, oil price, exchange rate, unemployment and underemployment, inflation and external reserve relatively unstable. This study is aimed at examining the nexus of economic recession and building construction cost in Nigeria. Secondary data were obtained from journals, Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and archival data on prices of building materials from building materials merchants. The data were analysed using inferential statistics and it was revealed that the indicators of economic recession (inflation rate, prime exchange rate, prime lending rate, gross domestic product (GDP), price of building construction materials and crude oil have strong influence on building construction cost in Nigeria. It was thus concluded that economic recession was not anticipated by the Nigerian government and as such relevant strategies to neutralize the effect of the economic recession that can stabilize construction materials prices and macroeconomic variables was not in place. It was therefore, recommended that; petrol pump price and crude oil should be regulated to prevent its resultant effects on construction cost and that viable fiscal policies should be instituted by government to prevent future occurrence of recession.

Keywords: Economic recession, building, construction cost, macroeconomic variables

Introduction

The Nigerian economy is currently not stable, and most organizations and firms are finding ways to survive the impact of the recession. The Nigerian construction industry could be said to be hard hit because it is a major employer of labour (Polycarp and Ubangari, 2017). A report by Chinedum et al. (2016), shows that "Construction sector in Nigeria is the single largest economic activity and the biggest industrial employer". The common and easier thing to do in a recession by employers of labour is by shading work force or creating alternative and cheaper ways of doing things. Similarly, Ugwu (2016) stated that the Federation of Construction Industry (FOCI) said that the ongoing recession had caused redundancy in Nigeria's construction industry while many construction companies have practically laid off their staff.

However, overwhelming shortchange has been witnessed in Nigeria's construction industry owing to the reality that most construction contracting is ruled by foreign companies with few indigenous companies (Idoro, 2009), this coupled with major financial crisis witnessed in the country in the past few years has further aggravated the spite of the construction industry. Pells (2008) reported that the major financial crisis was the global financial recession of 2007, and it is the worst of its kind since the great depression of the 1930's. According to Ogunleye (2009), recessions are typically shorter than the periods of economic expansion that they follow, but they can be quite severe even if brief. During the period of any recession, many macroeconomic indicators vary in a myriad of ways. Production as measured by Gross Domestic Product (GDP), employment, investment spending, capacity utilization, household incomes, business profits and inflation all fall during recession; while bankruptcies and unemployment rate rise (Crashaw, 2009). This point was additionally buttressed by Oyesiku (2009) that economic recession does not simply happen; and certain factors which include oil price rise, loss of investor and consumer confidence, dollar collapse, bursting of the housing bubble, inflation, and excess buying greatly contributed to the financial crisis of 2007.

However, Bakrania and Lucas (2009) stated that Africa's generally feeble global linkages positioned it to be the least affected from the terrible impacts of the global crisis as compared to its effects on many developed and emerging market economies from around September 2008. Other studies by Nistorescu and Ploscaru (2009) observed the impact of economic and financial crisis on the construction industries in Europe. Rai and Ghawate (2013) also noted the slow pace of infrastructure development in India owing to the effects of the recent slowdown.

The recent economic recession came into limelight in the year 2008 to 2009 when the annual growth rate of Nigeria dropped from over 9% to 6.7% leaving macroeconomic variables such as GDP growth rate, oil price, exchange rate, unemployment and underemployment, inflation and external reserves relatively unstable (Olanrewaju, 2017; Olanrewaju

et al., 2018). According to the National Bureau of Statistics [NBS] (2016), Nigeria's economy in the second quarter of 2016 showed oil price crashed to less than \$50 per barrel. Similarly, Nigeria's production output has crumbled over

400,000 barrels due to militancy activities in Niger Delta region. Oil production dramatically fell to 1.69 million from 2.11 million barrels per day in the second quarter of 2016, resulting to contraction of oil-based GDP by 17.5% in the second quarter compared to 1.9% in the first quarter. Nigeria's economic situation according to the Finance Minister, Kemi Adeosun is said to be in its worst possible times. Inflation rate, GDP growth rate, exchange rate and other macroeconomic variables which are indicators of an impending economic recession were in critical state in periods prior to the 2008–2009 economic recession (Osalar, 2016). Olanrewaju et al. (2018) expressed that the effect of economic recession on the Nigerian building construction industry cannot be underestimated as it results to high rate of unemployment and paralyzes construction activities in the country. Hence, this study seeks to explore the relationship between economic recession and building construction cost in Nigeria.

Literature review

Macroeconomic Variables as an Indicator of Economic Recession

It is frequently debated that macroeconomic variables such as gross domestic product (GDP), inflation rate, exchange rate, unemployment, money supply, interest rate, stock market, and foreign direct investment (FDI) are determinant of financial performance (Mwangi, 2013). Macro-economic variables relate to components that are appropriate to the larger economy at the national level and have huge impacts on the overall population. The major indicators of economic performance include macroeconomic variables such as savings, unemployment, economic output, investment and inflation which are closely monitored by government, consumers and businesses (Khalid et al., 2012). Khalid et al. (2012) opined that interest rate, real GDP, exchange rate, unemployment rate, level of the stock market and inflation rate are all key macroeconomic factors.

Inflation Rate

Inflation can be defined as a measure of general price increase of the price level in an economy. It is commonly measured using the Consumer Price Index (CPI). The consumer price index is a tool used to measure changes in the price level of consumer goods.

It is calculated as:
$$CPI = \frac{\text{Current year price index}}{\text{Base year price index}} \times \frac{100}{1}$$

Peridun and Adebisi (2006) reported that Nigeria's inflation rate has continued to increase in double digits up to the last decades. The inflation trend in Nigeria is unique and can be traced to oil boom in 1971 and subsequently also, after the adoption of a Structural Adjustment Programme (SAP) in 1986. Inflation is triggered by fluctuation in oil price regimes (Batini 2004). Oyediran (2006) showed that inflation has significant effect on construction market than other common goods and services. Before the adoption of SAP, inflation rate in Nigeria was single digit as shown by some economic report (Loungani and Swagel, 2001; Adebisi, 2006). Mallik and Chaodhry (2001), discovered that moderate inflation rate improves the economy and established that there is a positive relationship between GDP growth rate and inflation rate using data collected from four Asian countries which are namely; India, Sri Lanka, Bangladesh and Pakistan.

Qayyum (2006), discovered that as a result of failure in monetary policies in developing countries, excessive money supply is an important determinant of inflation increment. Similarly, a study conducted by Umaru and Zubairu (2012), revealed that inflation has a positive impact on overall output level and productivity of an economy. In 2016, Sub-Saharan Africa region experienced a rapid change in inflation rate that rose from 11.6% in April to 12.6% in May, which represent an increase of 8.62%. Depreciation in currencies, water shortage and electricity scarcity contributed immensely to the rapid change (Central Bank of Nigeria [CBN], 2016).

Exchange Rate

Exchange rate is defined as the price of one unit of a currency in terms of another currency. Many researchers have pointed out the relationship between exchange rate and other macroeconomic variables such as GDP, stock market, crude oil, etc. (e.g. Adebisi et al., 2008; Iheanacho, 2016). As observed by the former Governor of CBN (Sanusi, 2004), exchange rate placement in the country "moved from a fixed regime in the 1960s to a pegged arrangement between 1970s and the mid – 1980s, and finally to the various types of floating regime since the adoption of Structural Adjustment Program (SAP) since 1986".

Barkoulas et al. (2002) researched on the effect of exchange rate fluctuation on volume and unstableness of trade flows. They discovered that volatility of exchange rate does not support volume of trade increment and this reduces the overall

benefits. Similarly, Aleisa and Dibooglu (2002) employed Vector Auto Regression (VAR) technique to disintegrate the shocks influencing exchange rate fluctuations in Saudi Arabia and arrived at a conclusion that oil production has a great

impact on exchange rate movements. Report from Batini (2004), showed that specific number of methods have been deployed frequently to manage exchange rate policies in Nigeria from earlier decades back, which incorporate the Interbank Foreign Exchange Market (IFEM), Dutch Auction System (DAS), among others. This study also suggests that Nigeria utilize a managed free float system to stabilize exchange rate and enhance management of foreign debt. Levy-Yeyati and Sturzenegger (2002) found out that there was a significant relationship between exchange rate and growth of the economy and confirmed that countries with limited access to capital market are not affected by the de facto classification based consequences.

Lending Rate

Lending rate is commonly expressed in terms of percentage of the size of loan per unit time. As evidenced from literature, money market response to regular shocks stemming out from procyclicality in oil price equates to devaluation of local currency and high interest rates (Olatunji, 2010). Average lending rate was about 35% until CBN set a fixed rate of 24% per annum (Amaefule, 2009). Muhammad et al. (2013) establish the link between investment and lending rate in Pakistan from 1964 – 2012. The study shows that investment and lending rate directly correspond to each other, movements in lending rate alters pattern of investment and saving of the economy. Bader and Malawi (2010) pointed out that fluctuations in interest rate are negatively linked with the investment sector in Jordan. The study also revealed that for every 0.44% decrease in investment, there was a 1% increase in interest rate. As interest rate relates to investment, investment positively associates with economic growth.

Gross Domestic Product (GDP)

Gross Domestic Product (GDP) can be defined as the market value of all finished goods and services produced in a country during a period. The Nigerian economy has remained weak since independence in 1960, with primary activities (quarrying, mining and agriculture) accounting for approximately 65% of the GDP and constituting over 80% of government revenue. These activities also contribute over 75% of employment and 90% of foreign exchange (NBS, 2011). During prosperity (expansion) period, the GDP increases to peak, while the GDP decreases during the period of recession with a negative growth rate as reflected in the economic report for first quarter (-0.36%) and second quarter (-2.06%) of 2016. Ahungwa et al. (2014), examined trend of Agriculture contribution to GDP between 1960 to 2012 using multiple regression found out that there is a significant relationship between GDP and both industrial and agricultural sector.

Macroeconomic Policy Objectives in Nigeria

Measurement of the Nigerian economy performance is a difficult task simply because of paucity of data and ineffective institutions. The extreme impact of the global crisis shows the level of connectivity of different economy in the world as the effect of economic forces in another country can be felt in nation thousands of miles apart (Ojo, 2008). Variation occurs in economic growth rates and productivity as standard of living varies from one county to another (Alege, 2009). Nigeria operates a mono – economy that is solely based on crude oil. In view of this, it is important to review macroeconomic policies as it affects the economy. To ensure stability of macroeconomic variables, a mix of internal and external balance would ascertain a low inflation rate, sustainable economic growth and full employment. Gross National Product (GNP) is the most common tool for measuring economic performance. GNP per capita is the average income of a citizen in a country; it is calculated by dividing the GNP with the population. GNP includes income of citizens earned abroad and excludes income of non – citizens earned within the country. Economic adjustment programme consists of two crucial components which are: Structural adjustment programme (SAP) and Macroeconomic adjustment programme (MAP). The SAP is specially designed to be a long – term solution to problems and influence the supply side of the economy while the demand side is influenced by the MAP which is a short – term relieve of problems (Obasaju et al., 2014). Examples of these programme may include; government financing through the market, reduction of wages, exchange rate devaluation, removal of subsidies, cut in government expenditure and domestic credit restriction (Obasaju et al., 2014).

Determining Factor of Construction Costs in Nigeria

Many researchers have developed numerous predictive models to explain the key components of construction cost in Nigeria and different parts of the world. Crude oil being the backbone of Nigerian economy has a lot of implication on the macroeconomic factors. Olatunji (2010) modelled the cost of construction using macroeconomic variables, crude oil price and some selected materials. Similarly, Gambo and Ashen (2012) developed a predictive model that can be used to predict construction cost escalation for residential building using crucial macroeconomic variables. Baba et al. (2013) also modelled the link between construction price and some selected macroeconomic variables. However, many of these models require update with current trends of the variables used to ensure accurate output.

Construction projects risks are inevitable and it forms an important component of construction cost. Some risk components in estimating processes was modelled by Abdou et al. (2004). Furthermore, Nigeria construction industry

business environment resources concur that project management and organization strategies forms risk factors in cost estimates (Ngoka, 2003).

Odeyinka et al. (2008) also pointed out the dependence between macrovariability and cash flow as important ingredient of construction cost estimate in Nigeria. Project cost, cost of finance, execution cost, organization cost, latent cost variables and cost of unvitiated risks are the key ingredients of construction cost estimation in Nigeria. Structure models of different organization structure in construction (divisional, network, matrix and functional structures) was outlined by (Price, 2007). Evidently, the pattern at which the models react to government policies, macroeconomic variability and market shocks are different (Olatunji, 2010). Furthermore, establishment cost is required for selection of appropriate models for construction firms.

Finance cost is another determinant of construction cost. The susceptibility of the industry to market volatility has caused constructor to jack up their charges on construction cost due to high rate of interest on loan (Olatunji, 2010). Additionally, there are instances when project finance is controlled by unvitiated risks. Aside cost of putting the building back to shape, other construction cost escalator includes; multiple taxation, social unrest, work contingencies, frequent force majeure, abduction and industrial strife (Olatunji, 2010).

Research methodology

As indicated in Figure 1, the research process for this study is divided into four distinctive processes namely; literature survey, secondary data collection, data analysis, and presentation of result and discussion as adapted from a recent research by Okorie and Olanrewaju (2019). This is illustrated diagrammatically in Figure 1. To achieve the objectives of this study, literature survey was conducted on economic recession and building construction costs. This approach was adopted to simplify the entire research processes.

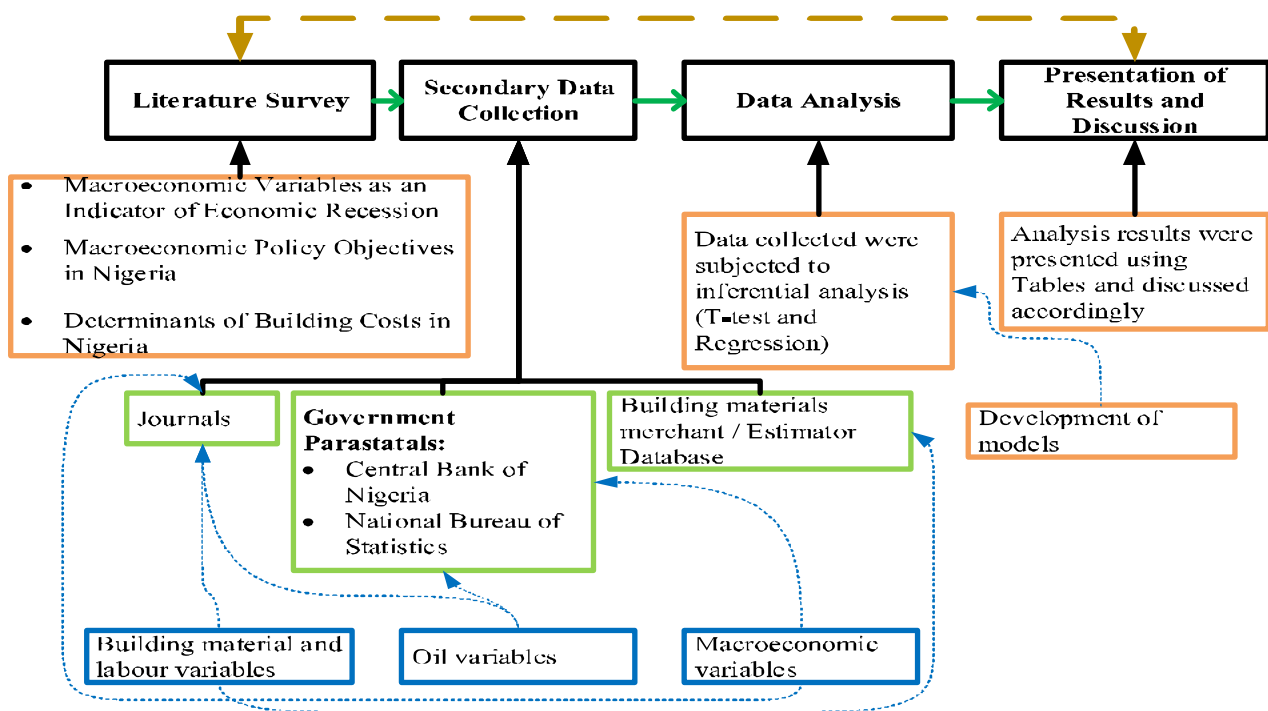


Figure 1: Research Processes

Quantitative research approach was adopted for this study. It involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion (Kothari, 2004). Historical data on macroeconomic variables were collected from government parastatals (Central Bank of Nigeria and National Bureau of Statistics) and journals and while unit cost of construction (two storey) between the first quarter (Q1) of 2001 and the fourth quarter (Q4) of 2016 were sourced from past construction projects and journals within the year under review as shown in Table 4. Building material prices were obtained from selected merchant record. The variables to be considered for this study are itemized in Table 1.

Table 1: Variables and their Sources

S/N	Model Variable (Independent)	Sources of Adopted Variable
1.	Average labour rate ^a	Windapo and Iyagba (2007), Eshofonie (2008), Memon <i>et al</i> (2010), Olatunji (2010), Ujene and Idoro (2015)
2.	Cement price ^a	Oyediran (2006), Eshofonic (2008), Memon <i>et al.</i> (2010), Olatunji (2010), Amusan (2011), Baba <i>et al.</i> (2013)
3.	Washed gravel ^a	Oyediran (2006), Eshofonie (2008), Memon <i>et al.</i> (2010), Amusan (2011)
4.	Emulsion paint (Nigerlux - 4litre) ^a	Oyediran (2006), Eshofonie (2008), Memon <i>et al.</i> (2010), Amusan (2011), Baba <i>et al.</i> (2013), Shittu <i>et al.</i> (2013), Shittu <i>et al.</i> (2015)
5.	Gloss paint (Dulux - 4litre) ^a	Oyediran (2006), Eshofonic (2008), Memon <i>et al.</i> (2010), Amusan (2011), Shittu <i>et al.</i> (2013), Shittu <i>et al.</i> (2015)
6.	Crude oil price ^b	Olatunji (2010), Abubakar (2015), Iheanacho (2016)
7.	Petrol price ^b	Olatunji (2010), Shittu <i>et al.</i> (2013)
8.	Prime foreign exchange rate ^c	Windapo and Iyagba (2007), Eshofonie (2008), Memon <i>et al.</i> (2010), Olatunji (2010), Gambo (2012), Oladipo and Oni (2012), Adeniran <i>et al.</i> (2014), Ujene and Idoro (2015), Iheanacho (2016)
9.	Prime lending rate ^c	Eshofonie (2008), Nnanna (2010), Ojo and Awodele (2013), Ujene and Idoro (2015)
10.	Inflation rate ^c	Memon <i>et al.</i> (2010), Gambo (2012), Oladipo and Oni (2012), Ojo and Awodele (2013), Ujene and Idor (2015)
11.	Real gross domestic product growth rate ^c	Oladipo and Oni (2012), Ujene and Idoro (2015)
12.	225mm hollow sandcrete block ^a	Oyediran (2006), Baba <i>et al.</i> (2013)
13.	Reinforcement ^a	Oyediran (2006), Baba <i>et al.</i> (2013)

^a Building material and labour variables; ^b Oil variables; ^c Macroeconomic variables

Two pair samples t-test was adopted in order to determine changes in some of the selected macroeconomic variables between 2001 – 2008 and 2009 – 2016. The result of the test would tell if there is a statistically significant difference in the macroeconomic variables between the groups (Pallant, 2013).

Regression was used to develop predictive models for forecasting construction cost by regressing construction cost and some selected independent variables using hierarchical regression method.

The general formula is given below as:

$$Y = a - bx$$

Where; **Y** – Dependent variable, **a** – constant, **x** – independent variable and **b** – coefficient of x

The decision rules used for this study given below:

Rule 1: If $P - \text{value} > 0.05$; then there is no significant relationship.

Rule 2: If $P - \text{value} < 0.05$; then there is significant relationship.

Findings and discussion

Changes in Macroeconomic Variables within 2001 – 2008 and 2009 – 2016

T – test analysis was used to check whether there is significant difference in the selected macroeconomic variables used in this research between 2001 – 2008 and 2009 – 2016. The selected macroeconomic variables are prime lending rate, GDP growth rate, inflation rate and prime exchange rate. Table 2 shows the results of T – test. The results of paired-samples t-test show that mean prime lending rate differs between 2001 – 2008 (M = 19.13, SD = 3.34) and 2009 – 2016 (M = 17.03, SD = 1.02) at the .05 level of significance (t = 3.73, df = 31, n = 32, p < .05, 95% CI for mean difference 0.95 to 3.24, r = 0.31). Similarly, changes were observed in prime exchange rate between 2001 – 2008 (M = 125.83, SD = 6.97) and 2009 – 2016 (M = 175.78, SD = 39.07) at the .05 level of significance (t = -7.07, df = 31, n = 32, p < .05, 95% CI for mean difference -64.33 to -35.53, r = -0.04). On average, prime lending rate decrease by about 2.1% between 2001 – 2008 and 2009 – 2016 while prime exchange rate increased by 49.95 naira between 2001 – 2008 and 2009 – 2016 which makes both statistically significant.

On the other hand, the results also revealed that the magnitude of difference in GDP growth rate between 2001 – 2008 (M = 6.03, SD = 2.71) and 2009 – 2016 (M = 6.28, SD = 3.79) at the .05 level of significance (t = -0.30, df = 31, n = 32, p > .05, 95% CI for mean difference -1.96 to 1.46, r = -0.04) is negligible. Similarly, changes in inflation rate between 2001 – 2008 (M = 12.61, SD = 4.36) and 2009 – 2016 (M = 11.68, SD = 2.65) at the .05 level of significance (t = 1.03, df = 31, n = 32, p > .05, 95% CI for mean difference -0.90 to 2.74, r = 0.02) is negligible. GDP growth rate increased by about 0.25% between 2001 – 2008 and 2009 – 2016 while inflation rate decreased by 0.93% between 2001 – 2008 and 2009 – 2016 which makes both not significant.

On average, prime lending rate decreased by about 2.1% between 2001 – 2008 and 2009 – 2016 while prime exchange rate increased by 49.95 naira between 2001 – 2008 and 2009 – 2016. This indicates that the changes in prime lending rate and prime exchange rate are significant. However, this validates the findings made in Ozturk et al. (2008) that changes in the real price of crude oil causes variations in the real exchange rate. On the other side, GDP growth rate increased by about 0.25% between 2001 – 2008 and 2009 – 2016 while inflation rate decreased by 0.93% between 2001 – 2008 and 2009 – 2016. This shows that changes in GDP growth rate and inflation rate are not significant. This result corresponds with the findings of Olomola and Adejumo (2006) that shocks in oil price impacted substantially on the real exchange rate and money supply in the long run, with fewer effects on output and inflation.

Table 2: T - test Analysis

S/N	Variables	Year Span		n	95% CI for Mean Difference	R	t	df	Remarks	
		2001 - 2008	2009 - 2016							
		M	SD	M	SD					
1	Prime lending rate	19.13	3.34	17.03	1.02	3	0.95, 3.24	3.73*	31	SS
2	GDP growth rate	6.03	2.71	6.28	3.79	3	-1.96, 1.46	-0.30**	31	NS
3	Inflation rate	12.61	4.36	11.68	2.65	3	-0.90, 2.74	1.03**	31	NS
4	Prime exchange rate	125.83	6.97	175.78	39.07	3	-64.33, -35.53	-7.07*	31	SS

Note: * p < .05 and ** p > .05.

Relationship Between Construction Cost and Some Selected Variables

Table 3 shows the results of hierarchical multiple regression employed to explore the relationship between construction cost and some selected variables (petrol price, average crude oil price, cement (50kg), gloss paint Dulux (4litres), emulsion paint Nigerlux (4litres), washed gravel, reinforcement bar per tonne (1ligh tensile), 225mm sandercrete hollow block and average labour rate per day). The models are presented in Table 3. The first hierarchy which is model 1 test the degree to which petrol price predicted construction cost, the model has a predictive ability of 73.9% (R = 0.860; R² = 0.739; F-model = 187.057 [with p < 0.001]). The results of model show that petrol price had positive significant relationship with construction cost. Similarly, model 2 had a predictive reliability of 74.1% (R = 0.861; R² = 0.741; F-model = 0.398

[with $p > 0.50$] while model 3 had a predictive reliability of 75.8% ($R = 0.870$; $R^2 = 0.758$; $F\text{-model} = 4.428$ [with $p < 0.05$]). In same vein, model 4 had a predictive reliability of 91.0% ($R = 0.954$; $R^2 = 0.910$; $F\text{-model} = 106.658$ [with $p < 0.001$]) while model 5 had a predictive reliability of 93.8% ($R = 0.968$; $R^2 = 0.938$; $F\text{-model} = 27.410$ [with $p < 0.001$]), and model 6 had a predictive reliability of 95.3% ($R = 0.976$; $R^2 = 0.953$; $F\text{-model} = 19.295$ [with $p < 0.001$]). Model 7 had a predictive reliability of 95.5% ($R = 0.977$; $R^2 = 0.955$; $F\text{-model} = 3.187$ [with $p > 0.10$]) while model 8 had a predictive reliability of 95.5% ($R = 0.977$; $R^2 = 0.955$; $F\text{-model} = 0.448$ [with $p > 0.50$]).

Furthermore, model 9 indicated construction cost and the selected variables. The model has a predictive reliability of 97.6% ($R = 0.988$; $R^2 = 0.976$; $F\text{-model} = 52.146$ [with $p < 0.001$]) which was considered appropriate when compared with a recent research conducted by Olatunji (2010). Analysis output shows that average crude oil price, gloss paint Dulux (4 litres), emulsion paint Nigerlux (4litres), reinforcement bar per tonne (High tensile) and average labour rate per day have a significant relationship with construction cost while petrol price, cement, washed gravel and 225mm sandcrete hollow block have insignificant relationship with construction cost. The model below was generated;

$$\gamma(CGFA) = \beta_0^{CGFA} + \beta_{PETR}^{CGFA}(PETR) + \beta_{AVCR}^{CGFA}(AVCR) + \beta_{CEM}^{CGFA}(CEM) + \beta_{GLOPD}^{CGFA}(GLOPD) \\ + \beta_{EMUPN}^{CGFA}(EMUPN) + \beta_{WG}^{CGFA}(WG) + \beta_{REIN}^{CGFA}(REIN) + \beta_{SHB}^{CGFA}(SHB) + \beta_{ALRPD}^{CGFA}(ALRPD)$$

Where; CGFA = construction cost (GFA), PETR = petrol price, AVCR = Average crude oil price, CEM = cement (50kg), GLOPD = gloss paint Dulux (4litres), EMUPN = emulsion paint Nigerlux (4litres), WG = washed gravel, REIN = reinforcement bar per tonne (High tensile), SHB = 225mm sandcrete hollow block and ALRPD = average labour rate per day.

It was observed from the analysis that there exists a significant relationship between construction cost and all the selected variables except petrol price, cement (50kg), washed gravel and 225mm sandcrete hollow block. However, the coefficient of determination (R^2) value observed was 98% implying a very strong relationship and the correlation coefficient (R) observed was 99% indicating very strong degree of association between the variables. The positive correlation observed between the variables indicates a tendency that an increase in the selected variables will be followed by a corresponding increase in the construction cost and vice versa. The value of the R^2 implies that 98% increase in the value of the construction cost is accounted for by changes in the value of the selected variables while only 2% is as a result of other factors not considered in this study. This corroborates the findings of Tehranchian and Scyyedkolace (2017); Okoye and Igbo (2018) where it was expressed that an increase in the oil revenue is expected to increase the government economic investment through expenditures in construction and infrastructural projects and in turn leads to positive economic growth.

Relationship Between Construction Cost and Indicators of Economic Recession

Table 4 shows the hierarchical multiple regression analysis results of the relationship between construction cost and indicators of economic recession. The models are presented in Table 4. The research model 1 test the degree to which prime lending rate predicted construction cost, the model has a low predictive ability of 26.8% ($R = 0.158$; $R^2 = 0.268$; $F\text{-model} = 24.177$ [with $p < 0.001$]). The results of model show that prime lending rate has a negative significant relationship with construction cost. Furthermore, model 2 to 3 have a predictive reliability of 38.5% ($R = 0.621$; $R^2 = 0.385$; $F\text{-model} = 12.398$ [with $p < 0.01$]) and 39.1% ($R = 0.625$; $R^2 = 0.391$; $F\text{-model} = 0.548$ [with $p < 0.50$]) respectively. Model 4 shows the last hierarchy of regressing construction cost and selected indicators of economic recession (prime lending rate, GDP growth rate, inflation rate and prime exchange rate). The model has a predictive reliability of 83.9% ($R = 0.916$; $R^2 = 0.839$; $F\text{-model} = 174.976$ [with $p < 0.001$]). It was evidenced from the model that prime lending rate; inflation rate and prime exchange rate have significant relationship with construction cost while GDP growth rate have an insignificant relationship with construction cost. This shows that GDP growth rate does not contribute to construction cost variability.

The model below was generated;

$$\gamma(CGFA) = \beta_0^{CGFA} - \beta_{PLR}^{CGFA}(PLR) + \beta_{GDPGR}^{CGFA}(GDPGR) + \beta_{IR}^{CGFA}(IR) + \beta_{PER}^{CGFA}(PER)$$

Where; CGFA – construction cost (GFA), PLR – prime lending rate, GDPGR – GDP growth rate, IR – inflation rate, PER – prime exchange rate.

The analysis indicated that there is a significant relationship between construction cost and indicators of economic recession. Furthermore, the coefficient of determination (R^2) value observed was 84% implying a strong relationship and the correlation coefficient (R) observed was 92% indicating very strong degree of association between the variables. The correlation observed between the variables indicates a tendency that an increase in the indicators of economic recession will be followed by a corresponding increase in the construction cost and vice versa. The value of the R^2 implies that 84% increase in the value of the construction cost is accounted for by changes in the value of the indicators of economic recession while only 16% is as a result of other economic recession indicators not considered in this study. The findings were found to be in line with Olatunji (2010).

Table 4: Construction Cost and Indicators of Economic Recession

Independent Variables	Dependent Variable			
	Construction cost (GFA)			
	Model 1	Model 2	Model 3	Model 4
Prime lending rate	-0.518****	-0.619****	-0.568****	-0.167**
GDP growth rate		-0.357***	-0.375***	0.012
Inflation rate			-0.083	-0.215***
Prime exchange rate				0.825****
R	0.158	0.621	0.625	0.916
R²	0.268	0.385	0.391	0.839
ΔF	24.177****	12.398***	0.548	174.976****

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$

Table 3: Construction Cost and Some Selected Variables
Dependent Variable

Independent Variables	Construction cost (GFA)								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Petrol price	0.860***	0.892***	0.698***	0.242***	0.242***	0.120*	0.090	0.099	0.049
Average Crude oil price		-0.051	-0.209*	-0.023	-0.182***	-0.116*	-0.126**	-0.134**	-0.169***
Cement (50kg)			0.342**	0.152	0.034	0.110	0.049	0.084	-0.047
Gloss paint Dulux (4litres)				0.644***	0.440***	0.252***	0.219***	0.229***	0.135**
Limulision paint Nigrlux (4litres)					0.444***	0.393***	0.333***	0.334***	0.328***
Washed gravel						0.284***	0.241***	0.261***	0.075
Reinforcement bar per tonne (High tensile)							0.217*	0.364	-0.395*
225mm sandcrete hollow block								-0.209	0.326
Average labour rate per day									0.665***
R	0.860	0.861	0.870	0.954	0.968	0.976	0.977	0.977	0.988
R²	0.739	0.741	0.758	0.910	0.938	0.953	0.955	0.955	0.976
Δ F	187.057***	0.398	4.428**	106.658***	27.410***	19.295***	3.187*	0.448	52.146***

Note: *p<0.10; **p<0.05; ***p<0.01; ****p<0.001

Conclusion, recommendation and future research

Economic recession affects every sector of an economy which include the construction industry. Inferential statistics (t-test and regression) were used to explore the selected variables. The results of this study contribute to a better understanding of impact of economic recession on building construction cost in Nigeria. It also revealed the interrelationship between economic recession and macroeconomic variables i.e. they are indicators of economic recession. It was affirmed that macroeconomic variables remained unstable during economic recession. Petrol pump price was discovered to have serious impact on building materials and the overall construction cost of a project because the it is used to fuel vehicles and machines used in building materials and project logistics.

Conclusively, economic recession has negative impacts on building construction costs which thus affects its components (material, labour, and plant) but it is disheartening that the Nigerian government has not developed effective strategies for tackling economic recession and its residual effects. Although this study has generated important findings on economic recession in relation to building construction cost, its design is not without flaws. Based on the limitation of not being able to capture all building types and complex construction projects. This study was limited to two storey building residential projects only. In addition, to quantitative research approach used, a qualitative study of the impact of economic recession on building construction cost should be conducted using qualitative means such as focus group. Also, a study could be conducted to test the developed models and explore the impact of economic recession on civil and heavy engineering construction projects. Hence, this study recommends the following:

1. Government agencies responsible for regulating petrol price should constantly develop strategies to combat unnecessary increase in price.
2. Government should invest more money into the economy during economic recession to boost the macroeconomic variables.
3. Prices of construction materials such as cement, gloss paint Dulux (4 litre), emulsion paint Nigirlux (4 litre), washed gravel, reinforcement, 225mm hollow sandcrete block and others should be regulated.
4. Government should develop strong relationship with labour unions so as to enable them control their charges.
5. Government should introduce policies that will stabilize macroeconomic variables during economic recession such as lowering lending rate.

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