

Original Research Article

Optimising Capacity of Nigeria Construction Sector for Socio-Economic Sustainability

ABSTRACT

Aims: The need for good economic policy has been stressed. In this period of Nigeria's economic quandary, the dearth of construction data for economic decisions has being a source of worry. This study therefore, was aimed at examining the capacity construction sector and national economy with a view of optimising its potential for socio-economic sustainability.

Study design: Electronically published data on construction sector by the National Bureau of Statistics (NBS) between 2010 and 2014 were used. 2010 was chosen as the base year in the re-basing of Nigeria economy and so also for this study.

Place and Duration of Study: Department of Building, Nnamdi Azikiwe University, Awka Nigeria between August 2015 and March, 2016.

Methodology: Regression model was used to ascertain the nature of relationship between the construction sector growth and GDP growth between 2010 and 2014 while Pearson Moment Correlation was used to correlate the degree of the relationship. A two-tailed non directional test statistic (t-test) was used to ascertain the significance of the correlation, at degree of freedom (n-2) and 5% (0.05) significance level.

Results: The study established that a unit change in growth of construction sector actually caused some changes in the total GDP growth. Though this change was not significant ($p(0.3798) > 0.05$) as a result of the influence of other real sectors of the economy on the GDP, the result was able to establish a moderate positive correlation ($\gamma = 0.62$) between the growth in construction sector and that of GDP. In this case, a unit increase in the construction sector growth would only contribute about 18% ($R^2 = 0.18$) increase in the total GDP growth.

Conclusion: The result implied that the Nigeria construction sector holds great potentials for improving the national economy through its networks of activities in collaboration with other real sectors. In this regard, the economic policy makers should closely study and monitor the construction sector because of its propensity for achieving social-economic sustainability through growth in GDP, improvement in Gross Capital Formation and employment generation.

Keywords: Capacity, Construction Sector, GDP, National Economy, Sustainability

1. INTRODUCTION

The importance and contributions of construction industry to the overall wellbeing and economic development of any nation can never be over emphasised [1,2,3,4,5]. The construction industry through its extensive forward and backward linkages with other sectors of the economy generates one of the highest multiplier [4,6]. Construction is a key sector of the national economy. Its social-economic significance also become obvious when examined in a global context. The industry is the world's largest industrial employer (111 million employees) and in most countries it accounts for more than half of capital investment and as much as 10 per cent of GNP [7].

Roodman and Lennsen [8] observe that one-tenth of global economy is dedicated to constructing, operating and equipping buildings, and this activity accounts for 40% of the material flow entering the world economy, with much of the rest destined for roads, bridges and vehicles to connect the buildings. Cochrane [3] notes that construction industry worldwide is predicted to have a total growth of 30% from 2010 to 2015, giving it an approximated total value of over \$3,000 billion (US) by 2015.

According to Ofori [9], the capacity of construction industry indicates its ability to meet the demand put to it. On the other hand, economic growth is defined as the increase of total output and to this end

gross domestic product (GDP) data which is the indicator of everyone's total income, is used [10]. Thus, the construction industry participates in every phase of the development, from investment and financing to site planning engineering, and architecture; through project execution; and even into facilities management. It is clear then, that the construction industry plays a central role in the economic development.

In Nigerian however, the construction industry is still largely dominated by international firms [11,12,13], but the local content bill for construction services which was passed into law by the act of the National Assembly in April 2014 is meant to give indigenous construction companies a level playing field as their international counterparts, as well as, making it easier for local businesses to thrive in the industry [14].

The importance of the construction industry according to Wahab [15] can then be appreciated from four major features:

1. Its contribution to Gross Domestic Product (GDP) and Gross Fixed Capital Formation;
2. The high level of employment created by the activities of the industry, which include professionals, technicians, skilled/unskilled craftsmen and artisan, and pool of labourers;
3. Many countries use the industry as leverage at the time of recession to mop up unemployment; and
4. The three liars of Government are the largest clients particularly in the developing countries.

Regrettably, the dearth of construction sector data for economic decisions in Nigeria and other developing countries has been a source concern over the years. Dlamini [16] argues that current knowledge of the importance of the construction sector in both national and world economies is poor. As a result, policy-makers may be misguided or even destructive, though the need for good economy policy has been stressed.

In this period of economic quagmire, Nigeria needs to make workable policies based on accurate information in all the sectors of the economy so as to ascertain which sector has greater potentials for liberating the economy from its current state. According to Giang and Pheng [17] the construction industry is vastly affected by the economic growth trends and the fluctuations in these trends. Because the process of the economic growth is closely related especially to the sufficiency of the public infrastructure investments even if there are fluctuations. While studying Turkey, Kargi [18] claims that the growth rate of the construction industry in the developing countries is more than the GDP growth rate, and that the percentage it takes in the GDP of developed countries relatively diminishes. Kargi [18] maintains that construction industry's growth in the economic fluctuation periods, in the aftermath of a recession, is more than the GDP.

Dlamini [16] affirms that there is not a strong relationship between the construction industry and the economic growth. He further surmises that in the short run, the construction industry has a potential of positive impact on economic growth but it's an important component in the investment programs in developing economies. In view of the foregoing, it is pertinent to examine the economic capacity of Nigeria construction sector as it affects the growth of national economy and sustainable development.

2. LITERATURE REVIEW

2.1 Size and Structure of Nigeria Construction Industry

In terms of size and structure, Nigeria construction industry consists mainly of small and medium construction organisations with very few large firms which are foreign multinationals that control about 95% of construction investment [11,12,13]. The industry consists of public and private sector clients, design, management and professionals. Its activities included the procurement of goods and services as well as the execution of a variety of physical structures and infrastructures (Building, Civil Engineering, Power and Energy, Industrial/Commercial complexes, including land improvement, etc) [14].

This industry is also dominated by the foreign multinationals [15,19,20,21], most of who came from Germany, Italy, France, Korea, Japan, Britain, America, India, China, even the Middle East Asia and Arab world, etc. They left the indigenous firms virtually with nothing. As with many other developing

countries, the fact that government is a major public sector client has a profound effect on the Nigeria construction industry, both directly and indirectly.

2.2 Contribution to Gross Domestic Product (GDP)

Notwithstanding the challenges, the Nigeria building and construction sector sustained its strong growth trend in 2009 as it registered 11.97% growth rate. This however represents a slight decline from the 13.07% growth rate recorded in the preceding year. The sector's contribution to overall GDP increased to 1.92% exceeding the 1.84% achieved in 2008. The contribution of the sector to total growth stabilised at 0.22% for 2008 and 2009 [22,23].

The building and construction sector registered strong growth, standing at 12.09 per cent in 2010, compared to 11.97 per cent in 2009, reflecting greater investments in both residential and non-residential building and other construction activities. Growth in land improvement related activities rose by 12.24 per cent in 2010 as against 11.97 per cent in 2009. Some major projects that were executed in 2010 impacted the sector's performance include: national roads rehabilitation totalling 1,975 km; Presidential Initiative Projects adding up to 853.82 km of roads; PPP projects; several housing unit types, dredging of River Niger and railway lines[24].

The nominal value of activity in the sector amounted to ₦393.53 billion in 2010 or equivalent of 2.0 per cent of overall real GDP, as against ₦347.69 billion, or 1.92 per cent in 2009 while the sector's share of GDP growth declined from 3.16 per cent in 2009 to 2.95 per cent in 2010. Going forward, the execution of several infrastructural projects outlined in NV20:2020 will likely impact on the sector in a positive way [24,25].

2.3 Employment in the Nigerian Construction Industry

Out of 47.33 million labour force estimated in 2009 in Nigeria, industry sector which construction belongs contributes 10%; Agriculture 70%; and service 20% [26]. This estimate does not include the number of casual and temporary construction workers. For example, in terms of new job, the construction sector accounted for 0.79% of the new jobs in the formal sector in the fourth quarter of 2014 [27].

Nigeria Construction Industry's workforce is male dominated. It has a very low literacy rate (limited to reading and writing abilities); has low pay with long working hours, has poor working environment, and indulge in dangerous manual work. These workers are of transitory nature (either casual or temporary), usually migrating from rural areas to urban centres. The employment within the construction industry is often for the short-term, intermittent, and generally involves living away from home for months on end.

In Nigeria, females have much less or limited involvement in construction works, though things have started changing due to globalisation and socio-economic and political situation of the country. Interestingly, some areas in Nigeria are famous for their workforce in procuring specialty work on projects. For examples, the general un-skilled and skilled labours from the western part of the country (precisely the Yorubas) are always considered a reliable workforce for masonry work and other specialist, works like roofing.

In order to bridge the shortage of skilled manpower, the Nigeria construction has over the years embarked on importation skills for specialist works from her neighbouring West African countries such as Benin Republic and Togo. This unfortunate trend has questioned the skill development programme of the industry.

2.4 Contribution to Gross Capital Formation (GCF)

The concept of capital formation in construction relates to all kinds of building and civil engineering construction works. Capital formation in construction is the total value of all new construction and all capital alternatives or extensions that significantly improve upon the utility or extend the life of the projects and therefore add to the productive capacity (improvement) of the economy. It includes expenditure for reclamation and improvement of land and for the development and extension of

mines, plantations, and all kinds of agricultural purposes [14]. Olatunji and Bashorun, [28] report that in 2006, the construction industry is responsible for an average of 5-7% improvement of the GDP growth and over 42% of the fixed capital formation over the last four (4) decades.

3. METHODOLOGY

This study was mainly a survey research. Data for this study were sourced from the secondary sources. Electronically published data on construction from various reports of the National Bureau of Statistics (NBS) formed the basis for data generation.

The data were presented in tables, line and charts, from where descriptive analysis was made. To establish the effect of construction sector on the economy; regression analysis was deployed where the growth in the construction sector was compared against that of the real GDP from 2010 to 2014. This is because, 2010 was chosen as the base year in the latest re-basing exercise of Nigerian economy.

Regression analysis is a statistical tool used to investigate the nature of relationship between two or more variables, where one of the variables depends on the other variable(s). In this case, the real GDP growth is the dependent variable while construction sector growth is the independent variable. Statistically, Real GDP growth (Y) is a function construction sector growth (X). In statistics however, this exact relationship may not exist. It is believed that for every happening, there is an element of chance. So models are constructed to allow for random error.

When the above component is incorporated into the exact equation, the resulting equation is known as probabilistic model. This is given thus:

$$Y = \alpha + \beta x + e \quad (1)$$

Where Y is the dependent variable
x is the independent variable
e is the random error
 α is the intercept of the line with y-axis
 β is the gradient.

Meanwhile, T statistic was used to test the significance of the relation at confidence interval of $\alpha = \beta_0$. Then (1- α) 100% confidence interval of β_0 is given as:

$$\left(\beta_0 = \hat{\beta}_o \pm t_{\frac{\alpha}{2}, n-2} Se \hat{\beta}_o \right) \quad (2)$$

Thereafter, the model was subjected to statistical hypothesis test to confirm if the model is good. If the model is good, β will be statistically different from zero, otherwise.

i.e. $H_0: \beta = 0$ vs $H_1: \beta \neq 0$

Decision: Reject H_0 if t is greater than $t_{\alpha/2, n-2}$

To determine the degree to which the construction sector growth induces the overall GDP, the two variables were correlated using the Pearson Product Moment Correlation. In this case, the correlation is closely associated with the regression. However, the correlation coefficient (γ) was computed while a two-tailed non directional test statistic (t-test) was used to ascertain the significance of the correlation, at degree of freedom (n-2) and 5% (0.05) significance level.

Decision: Reject H_0 if t calculated > t critical at df (n -2) and at 5% (0.05) significance level otherwise accept H_0 and conclude.

4. RESULTS AND DISCUSSION

4.1 Contribution to Gross Domestic Product (GDP)

Table 1 presented the real GDP and total output contribution of construction sector to GDP at 2010 constant basic price year on year from 2010 to 2014. It also shows the GDP growth rate, the percentage contribution of the construction sector and the construction sector growth rate for the period [14].

Table 1. Real GDP and Construction sector contribution to GDP at constant basic price y/y

Year	Real GDP		Construction sector contribution to GDP		
	Total GDP (₦ Million)	Real GDP Growth (%)	Total output Contribution (₦ Million)	% Contribution to GDP	Real Construction Growth (%)
2010	54,612,264.18		1,570,973.47	2.88	
2011	57,511,041.77	5.31	1,905,574.90	3.31	15.71
2012	59,929,893.04	4.21	2,188,718.59	3.05	9.44
2013	63,218,721.73	5.49	2,272,376.69	3.59	14.22
2014	67,157,384.39	6.23	2,568,464.75	3.82	13.03

Source: [14,29]

From fig. 1, the revised and final GDP re-basing results by output approach at 2010 constant basic prices stood at ₦54,612,264.18 million in 2010; ₦57,511,041.77 million in 2011; ₦59,929,893.04 million in 2012; ₦63,218,721.73 million in 2013; ₦67,157,384.39 million in 2014.

Meanwhile, the total output contribution of construction sector to GDP at 2010 constant basic price year on year stood at ₦1,570,973.47 million in 2010; ₦1,905,574.90 million in 2011; ₦2,188,718.59 million in 2012; ₦2,272,376.69 million in 2013; and ₦2,568,464.75 million in 2014.

According to NBS report [14], part of the reason for the increase in the contribution of the construction sector to GDP was the better capturing of all the economic activities in the construction sector. Prior to re-basing, construction data was mainly sourced from construction of buildings and construction of roads and railways activities. Now, construction activity has been broken down into 11 different activities, bringing the total for the construction sector to 13 [14].

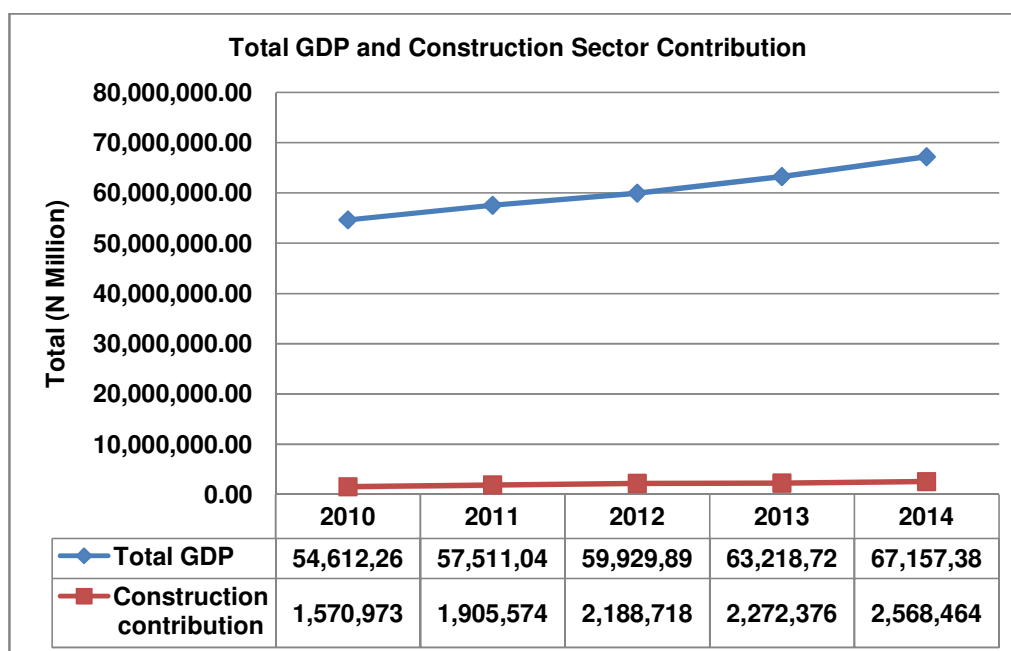


Fig. 1. Total Real GDP and Construction Sector Total Output at constant basic price y/y 2010 – 2014. Source: [14,29]

Fig. 2 indicated that the real growth in GDP for the years 2011, 2012, 2013 and 2014 were 5.31%, 4.21%, 5.49% and 6.23% respectively. However, the real growth in construction sector for the years 2011, 2012, 2013 and 2014 were 15.71%, 9.44%, 14.22% and 13.03% respectively. This showed that construction sector grows at a higher rate, though fluctuating, compared to the overall GDP growth for the years under review. The growth in the overall GDP also fluctuates but was more progressively stable.

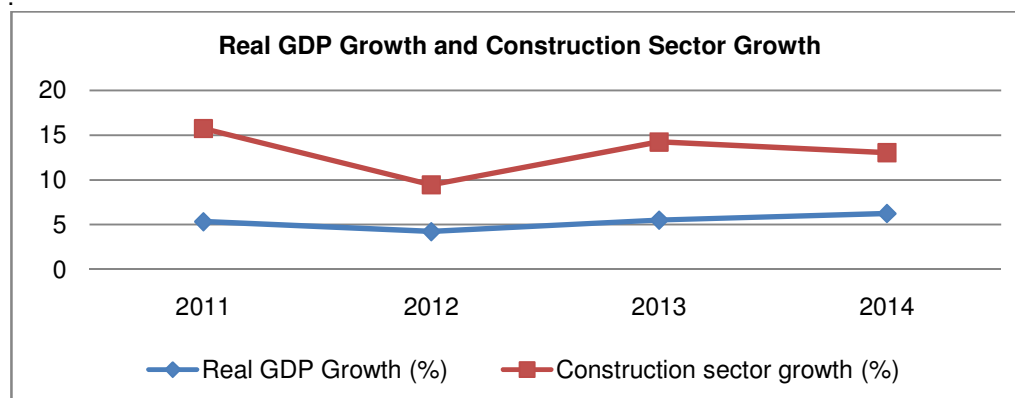


Fig.2. Real GDP Growth Rate and Construction Sector Growth Rate at constant basic price y/y 2010 – 2014. Source: [14,29]

Fig. 3 showed an increase in the percentage contribution of construction sector to the GDP from 2.88% to 3.31% in 2010 and 2011 respectively. However, there was a drop to 3.05% in 2012 and a sustained increase to 3.59% in 2013 and further increase to 3.82% in 2014.

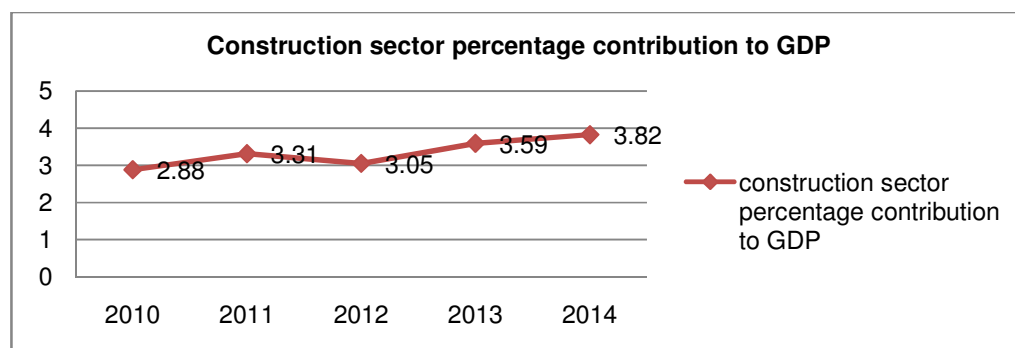


Fig. 3. Percentage Contribution of Construction Sector to Real GDP 2010 – 2014. Source: [14,29]

On quarter-on-quarter basis, fig. 4 revealed that in 2014, the output of construction was ₦627, 286.61 million or 14.85% of the total in Q1, ₦695, 565.83 million, 16.66% of the total in Q2 and ₦579, 913.75 million or 13.71% of the total in Q3. Construction was also a significant driver of growth, with high rates of 17.88% year on year in quarter one, declining to 10.70% in Q2, and 1.32% in Q3 of 2014 [27].

Real growth recorded in the Construction sector stood at 12.66 percent (year-on-year) in the Fourth quarter of 2014. This was lower by 2.47 percentage points from the growth rate recorded in the Fourth Quarter of 2013 and 1.34 percentage points higher than the Third Quarter of 2014. The contribution of Construction to Real GDP was 3.67 percent in the Four Quarter of 2014, up from 3.45 percent in the corresponding Quarter of 2013 and 3.32 percent from the Third Quarter of 2014 [29].

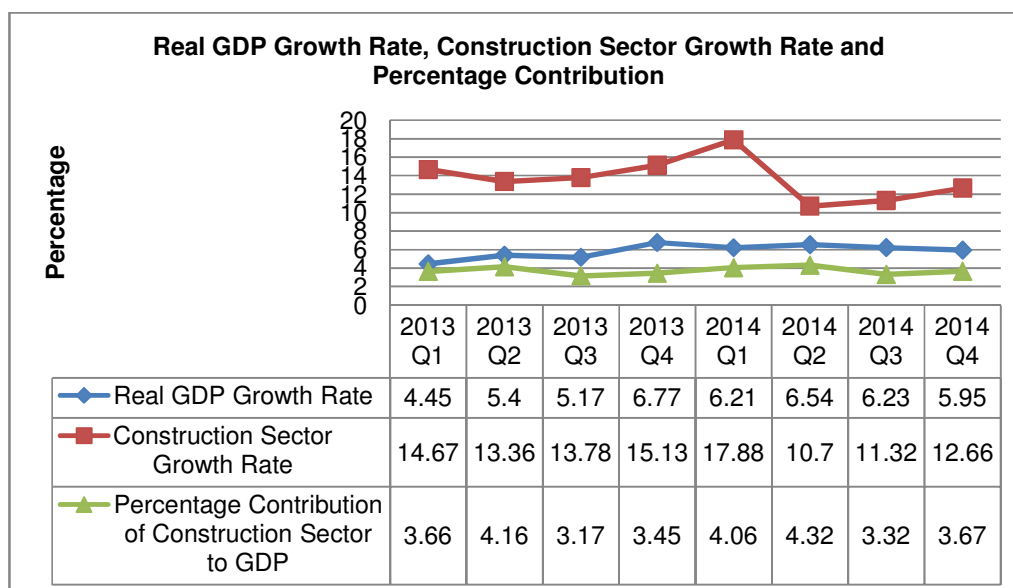


Fig. 4. Real GDP Growth Rate and Construction Sector Growth Rate and Percentage Contribution to GDP at constant basic price quarter on quarter 2013 – 2014. Source: [29].

4.2 Employment Generation

From table 2 the total number of persons engaged in construction's formal sector was 6,415,082 persons engaged in 2010, the total number of persons increased by 3.21% or 205,760 to reach 6,620,842 in 2011 and it also increased by 4.42% or 292,694 to reach 6,913,536 in 2012. The Nigerian male employee constitutes a very large portion of the total number of persons employed in the sector with a percentage share of 91.38% in 2010, 91.61% in 2011 and 91.52% in 2012.

The Nigerian female employee stood at 398,403 in 2010, 396,602 in 2011 and 420,779 in 2012. While there was a steady increase in the number Nigerian male employees for all three years, the females saw a decline in their numbers by 0.45% between 2010 and 2011, but an increase by 6.10% for 2012 [14].

Table 2. Employment Size by Gender (Nigerian and Non Nigerian) 2010-2012

EMPLOYMENT SIZE	2010	2011	2012
Nigerian male	5,861,845	6,065,033	6,327,377
Nigerian female	398,403	396,602	420,779
Non Nigerian male	147,633	150,719	157,664
Non Nigerian female	7,202	8,488	7,716
TOTAL	6,415,082	6,620,842	6,913,536

Source: [14]

It was revealed from table 3 that the total number of paid employees in the construction sector for the year 2010 stood at 6,276,452, and increased by 3.40% or 212, 961 to reach 6,489,413 in 2011 but had a decline of 20.94% or 1,358,787 to reach 5,130,626 in 2012. The number of paid female employees in 2010 was 383,485 and it increased by 1.14 % or 4,373 to reach 387,858 in 2011 and had a further increase of 6.84 % or 26,234 to reach 414,092 in 2012. Furthermore, the total number of paid female employees increased by 1.46% from 388,115 in 2010 to 393,773 in 2011. Growth slowed

down with an increase of 6.53% or 25,720 to a total of 419,493 paid female employees in 2012 in the constructions sector [14].

Table 3. Number of paid Employee by Gender 2010-2012

NO. OF PAID EMPLOYEES	2010	2011	2012
Nigerian male	5,746,620	5,953,151	4,560,413
Nigerian female	383,485	387,858	414,092
Non Nigerian male	141,717	142,489	150,719
Non Nigerian female	4,630	5,916	5,401
TOTAL	6,276,452	6,489,413	5,130,626

Source [14]

4.3 Contribution to Gross Capital Formation (GCF)

Table 4 showed that the Gross Capital Formation (GCF) saw a decline by 8.91% from ₦204, 665.57 million in 2010 to ₦186, 439.63 million in 2011. GCF in 2012 saw an even greater decline by ₦64, 538.77 million to ₦121, 900.86 million [14]. Though there was a continued decline in the contribution of the construction sector to the GCF between 2010 and 2012, construction sector still holds an appreciable proportion of Nigerian GCF.

More so, the Nigeria construction industry when viewed holistically controls and drives all other sectors of the economic through its forward and backward linkages. Interestingly, the recent re-basing of Nigeria economic at 2010 base year puts the construction industry at higher pedestals with greater responsibilities.

Table 4: Gross Capital Formation (Naira million) (from 2010 - 2012)

	2010	2011	2012
BUILDING			
Purchase or construction of residential building	1,994.95	3,465.26	4,137.30
Purchase or construction of non-residential building	2,258.78	2,824.89	3,353.06
Purchase or construction of other building structure	1,822.73	2,308.10	2,828.17
Major repairs and renovations	1,825.15	2,579.58	2,976.34
EQUIPMENT			
Purchase of machinery and equipment	190,227.59	168,769.17	103,327.66
Purchase of office furniture and equipment	718.07	1,381.98	911.60
TRANSPORT			
Purchase of transport equipment	5,818.31	5,110.66	4,366.72
TOTAL GROSS CAPITAL FORMATION	204,665.57	186,439.63	121,900.86

Source [14]

4.4 Test of Hypothesis

H₀: Growth in the construction sector does not significantly induce growth in the total GDP in Nigeria.

H₁: Growth in the construction sector does significantly induce growth in the total GDP in Nigeria.

From table 1, table 5 was constructed to show growth in real GDP and construction sector from 2010 to 2014 where 2010 is the base year. These values were fitted into a regression model and the result is presented in table 6.

Table 5. Computation of Real Construction Growth and GDP Growth

Year	Real Construction Growth (%) X	Real GDP Growth (%) Y	xy	x ²	y ²
2010	Base Year				
2011	15.71	5.31	83.4201	246.8041	28.1961
2012	9.44	4.21	39.7424	89.1136	17.7241
2013	14.22	5.49	78.0678	202.2084	30.1401
2014	13.03	6.23	81.1769	169.7809	38.8129
Total	52.40	21.24	282.4072	707.9070	114.8732

From table 6, the result of regression analysis for Real Construction Growth and GDP Growth gave the model as: $Y = 2.77 + 0.19x$. The model showed that we can fit the line of best fit into the scatter diagram of y and x . This implied that the GDP Growth (y) is related to the Construction Growth (x) and that the model can predict the values of y for a given value of x . Since $t_{cal} (2.77) > t_{0.05/2, n-2} (4.303)$, α is significantly different from zero ($\alpha \neq 0$) and H_0 is rejected. The result therefore implied that an increase in construction growth would certainly cause a change in the growth of total GDP.

Although there would be change in y for any change in x , the change was not significant. The result further revealed that the model was not good and adequate enough for the relationship. Thus, $t_{cal} (1.093) < t_{0.05/2, n-2} (4.303)$, and since $t_{cal} (1.093) < t_{0.05/2, n-2} (4.303)$, H_0 is accepted and conclude that β is significantly not different from zero ($\beta = 0$). This situation was confirmed by the value of R^2 (0.18) which represents that a unit increase change in the construction sector growth would only contribute about 18% increase in the total GDP growth. This implied that there are other sectors of the economy such as telecommunication and post, Wholesale and Retail Trade, real estate, manufacturing, etc which collectively contribute to the growth of the total GDP.

To further establish the extent of the relationship between the construction sector growth and the total GDP growth, the variables were correlated. The result was presented in table 7.

Table 6: Result of Regression Analysis for Real Construction Growth and GDP Growth

$\hat{\beta}$	$\hat{\alpha}$	$\hat{\sigma}^2$	$t_{cal} H_0:$ ($\alpha = 0$)	MSE	SSR	SSE	R ²	$t_{cal} H_0:$ ($\beta = 0$)	$t_{\alpha/2, v}$
0.19	2.77	1.1905	5.077	0.6489	0.791	1.2978	0.18	1.093	4.303

The result of the correlation in table 7 confirmed that there was a moderate positive relationship ($\gamma = 0.62$) which implied that any increase in growth of construction sector would certainly cause an increase in the overall GDP and vice versa. However, the induced change was not significant since the T-test value (1.118) < $T_{critical} (2, 0.05)$ (2.920) and the P-value (0.380) > 0.05. Thus, increase in construction sector growth does not significantly increase the growth of GDP at 5% significant difference. It is a confirmation of the influence of other real sectors of the economy on the GDP. In this case, H_0 can not be rejected.

Table 7: Correlation of Real Construction Sector Growth and GDP Growth

Correlation Coefficient (γ)	Degree of Association	T-test value	$T_{critical}(2,0.05)$	P-value	Decision
0.62	Moderate +ve correlation	1.118	2.920	0.380	Accept H_0

df = 2; $\alpha = 0.05$, $P > 0.05$.

5. CONCLUSION

The significance of the construction industry is no longer in doubt. Through its networks of activities, it connects all the sectors of the economy. Thus, this study has examined the contributions of the growth in the construction sector to the total Gross Domestic Product (GDP) in Nigeria. It has successfully demonstrated that relationship existed between the growth in the construction sector and total GDP through the regression model.

Although the adequacy or otherwise of the models was statistically confirmed not to be good and adequate for the purpose. The study established that a unit increase in construction sector growth would certainly cause a change in the growth of total GDP. It further confirmed that a moderate positive correlation existed between the variables of consideration. Through this model therefore, the growth in the total GDP could be predicted with minimal certainty.

It is of the view that the result of this study would be a veritable tool in the hands of economic planners and policy makers. This is because it would inform them on where to place more emphasis in terms of growing the GDP and national economy. It also revealed the contribution of the construction sector in the area of Gross Capital Formation and Employment generation which are vital economic indices. More importantly, investors in the construction sector would see the need to invest more in the sector, since it holds greater share of investment opportunity. This study will also be a guide for government interventions in the sector.

Since the current knowledge of the relationship between the construction sector and national and world economy is still very poor, the study has added to the growing body of knowledge. This will serve as a research tool to the construction, business and economic researchers.

Based on the facts above, this study recommended that economic policy makers should examine the construction sector closely as it has the potentials for improving the overall wellbeing of the economy. More emphasis should be placed on this sector in terms of increase in construction inputs, favourable policies and programmes, human capital development and capacity building. It also recommended increase collaboration between the foreign and indigenous firm in the areas of knowledge sharing and transfer; and increased foreign direct investments in the sector.

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