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GOVERNMENT EXPENDITURE ON INFRASTRUCTURE ON ECONOMIC GROWTH IN NIGERIA

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Abstract: The main objective of this study is to analyses the effect of government expenditure on infrastructure on economic growth in Nigeria for the period 1986 to 2018. This study employed annual time –series data and employed the Fully Modified Ordinary Least Squares (FMOLS) estimation techniques. The results revealed that governments' expenditure on education and infrastructure have positive and significant effects on economic growth in Nigeria. Specifically, a unit per cent increase in expenditure on education and infrastructure will bring about 1049.956 and 296.6 per cent increase in economic growth in Nigeria. The coefficient of government spending on defense is negatively related and statistically significant at 5% level to economic growth, while expenditure on health is negative and statistically not significant, implying that government has not put sufficient funds on the health sector of Nigerian in line with the requirement of international organizations. The study concludes that economic growth is strongly influenced by education and infrastructure in Nigeria. The study, therefore, recommended that Nigeria government should increase her spending on defense, education, health, and infrastructure because they represent critical sectors of economy that require enhanced funding for robust economic growth in Nigeria.

Keywords: Government expenditure, Infrastructure, Economic growth, Fully Modified Least Square.

Introduction

Government expenditure relate to the operating cost made by the government for its upkeep and for the maintenance of the general public in terms of provision of essential services. Public expenditure has been recognized to have association with economic growth and development thus, this study is deemed appropriate for policy. The composition of government expenditure in developing economies has not been steady over some years. It is often established that there is need to appraise the relative trend in government spending across emerging economies and to assess the possible input of each sector to economic growth as this will boost allocative efficiency. For government expenditure to

be able to promote growth and development in any economy there is need for the budgeting process to be significantly evaluated to ensure that resources are allocated based on social, human and infrastructural need in the economy.

The World Bank (2013), ranked Nigeria as the 27th largest economy in the world – on par with Poland and Belgium and ahead of Argentina, Austria and Iran, in terms of nominal GDP, and the 22nd-largest in terms of purchasing power parity. Official figures for 2013, released by Nigeria's statistics bureau, put the country's GDP at $503bn (£307bn) – nearly double previous estimates and well ahead of South Africa at around $350bn. The level of Nigeria economy is by far bigger than the rest of other Africa development community and she still remains their major trading partner. The country has a population of 201,214,136 million people, a GDP (PPP) of $5315.82 billion, 2.01% annual growth rate, $2396.30 per capita, unemployment rate of 23.10% and foreign direct inflow of $1,150.51 billion. Nigeria is African's largest economy and one of the world's largest producers and exporters of crude oil, cocoa, oil seed, fertilizer etc. Mining services, manufacturing and agriculture competes with similar sectors in the developed world. Yet, many Nigerian's are poor, rates of formal sector unemployment and crime are high and the quality of public education is low. Access to infrastructure and basic services is lacking. Allegations of corruption among civil servants persist at all levels despite an excellent anti –corruption regulatory framework. The process for tendering public contract is often politically driven and dense. However, the size and structure of public expenditure will determine the pattern and form of growth in output of the economy. The structure of Nigerian public expenditure can broadly be categorized into capital and recurrent expenditure. The recurrent expenditure are government expenses on administration such as wages, salaries, interest on loans, maintenance etc., whereas expenses on capital projects like roads, airports, education, telecommunication, electricity generation etc., are referred to as capital expenditure. One of the main purposes of government expenditure is to provide infrastructural facilities and the maintenance of these facilities requires a substantial amount of spending.

The relationship between government expenditure on infrastructure and economic growth tends to be an important analysis in developing countries, most of which have experienced increasing levels of public expenditure overtime (World Development Report, 1994). Expenditure on infrastructure investment and productive activities (in State-Owned Enterprises) ought to contribute positively to growth, whereas government consumption spending is anticipated to be growth-retarding (Josaphat and Oliver, 2000).

Economists are divided on real effect of government expenditure on national productivity in developing and emerging economies. Empirical works by (Alm and Embaye, 2010; Menyah and Wolde-Rufael, 2010; Felix and Sabtis, 2014; Alimi, 2014 and Ansari, Gordon and Akuamoah, 2010), among others are not in harmony on the subject matter. The principal view among scholars as well as public policy makers is that government can contribute considerably in improving the level of economic growth via

fiscal policy as a necessary tool to reduce poverty and inequality in the economy and realize full employment among other macro-economic agenda which is in line with the Keynesian economic ideology.

Despite the increasing government expenditure on agricultural, health, road construction, power, telecommunication and transportation sectors, the significant issue remains whether public spending translates to the improvement of the lives of the ordinary citizen in Nigeria? And how far does public expenditure affect national output in Nigeria? Economists are also divided along the ideological lines of Wagner's hypothesis and Keynesian theory and the contention has remained whether public expenditure contribute to growth or hinder economic growth. There is limited combined research on the expenditure and economic growth connection and the outcome of this few empirical research are conflicting, more so the trends of public expenditure and economic growth in Nigeria is not consistent with economic theory just as incidence of poverty in the country does not reflect the consistent rise in government spending, (Alimi, 2014)

Evidence has shown that theoretical postulations sometimes conflict with economic realities in the country. Taking the case of the Wagner's law; there are instances where the value of government expenditure increased but accompanied by a negative economic growth, (Alimi, 2014). For instance, from 2016, 2017, and 2018, growth rate of GDP were,-1.62%, 0.8% and 1.9% respectively, while public expenditure growth rate were 6.9 percent, 2.4 percent and 2.8 percent for the same period. These evidences imply that the behaviour of government expenditure at times follow a conflicting trend with national output, (World Development Report, 1994).

Statement of the Problem

The causes of much of the variations in economic growth over time are not well understood. In particular, the effect of government expenditure on infrastructure on economic growth has not been explored exhaustively. Several studies have attempted to investigate the channels through which different types of government expenditure can affect growth, but the results are inconclusive in the literature. While some studies (Wagner and Weber, 1977; Al-Faris, 2002; Chang, 2002; Aregbeyen, 2006; Omoke, 2009; Abizadeh and Gray, 1985) have found support for the Wagner's Law, some other studies (Ram, 1986; Afxention and Serletis, 1996; Abizadeh and Yousefi, 1998; Burney, 2002; Huang, 2006; Ergun and Tuck, 2006; Babatunde, 2018) have found a non-existence or weak support for the Law.

More so, studies like Abu-Bader and Abu-Qarn (2003) found bidirectional causality between the public spending and economic growth. Some studies yet found no support for neither Wagner nor Keynes (e.g. Muhlis and Hakan, 2003; Singh and Sahni, 1984; Dakurah, Davies and Sampath, 2001). In Nigeria, economic growth has been fluctuating despite the government expenditure increasing over time. The Nigeria government spends substantial amounts of money annually on physical infrastructure, education, health care, economic services, public order and national security, defense and general administration.

From theory, when there is an increase in government expenditure in these sectors, it is expected that the economy will exhibit a positive economic growth, but this does not seem to happen in the case of developing countries (Nigeria inclusive). This could be due to non-growth-enhancing expenditures that crowd-out outlays that are meant to boost economic growth. Therefore, the issue of which government expenditure can foster permanent movements in economic growth becomes important.

This study on government expenditure on infrastructure on economic growth nexus is particularly important to provide further empirical evidence to Nigeria economy and it is expected that the results obtained in the context of Nigeria could be of relevance to other developing countries, or at least to those with similar economic structures or size.

The rest of the articles is structured as follows. Section 2 provides an overview of trends in government expenditure on infrastructure on economic growth indicators in Nigeria while the theoretical frame work, methodology used in study and data sourced is brief considered in Section 3. Also, Section 4 provides empirical findings of the existence of such a relationship in Nigeria over long periods (1986-2018). Section 5 provides conclusion and recommendation.

Government Expenditure on Infrastructure on Economic Growth Trends in Nigeria

Government expenditures on education, infrastructure, health and defense components are chosen as an indicator of the priorities of Nigerian government over the years. According to CBN (2015), expenditures are defined as an outflow of resources from government to

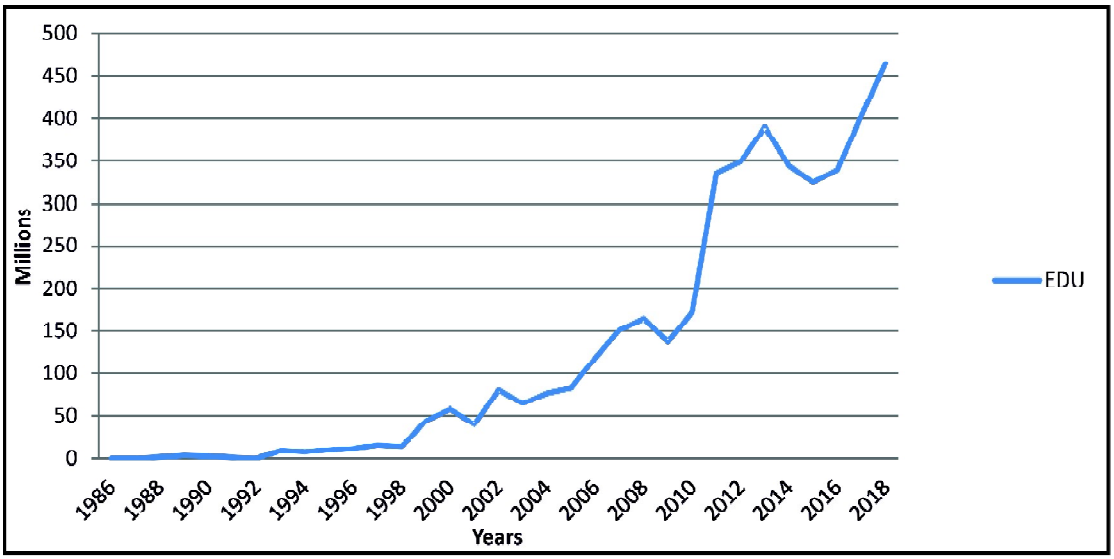

Figure 1: Trend of Government Expenditure on Education in Nigeria, 1986-2018

Source: Data, CBN, NBS and IFS, 2019

other sectors of the economy whether requited or unrequited. It is divided into recurrent and capital expenditures. While recurrent expenditures are payments from salaries and overheads, capital expenditures are payments from non-financial assets.

Figure 1 provides information on the trend of education. The trend of the expenditure on education has been cyclical in nature over the years. It was discovered that between 1986 to 1999, expenditure on education increased steadily from 0.23% to 13.59% between 1999 to 2009, expenditure on education stood between 43.61% to 137.12% between the period of 2010 to 2012, government spending increased steadily from 170.8% to 348.4% but within the period of 2013 to 2016, expenditure on education reduced a bit; and between 2017 to date, the trend of expenditure on education experienced an upward slope in Nigeria. This study, thus, reveals that expenditure on education increased steadily from one period to the other, and therefore contributed significantly to economic growth in Nigeria within the period of study.

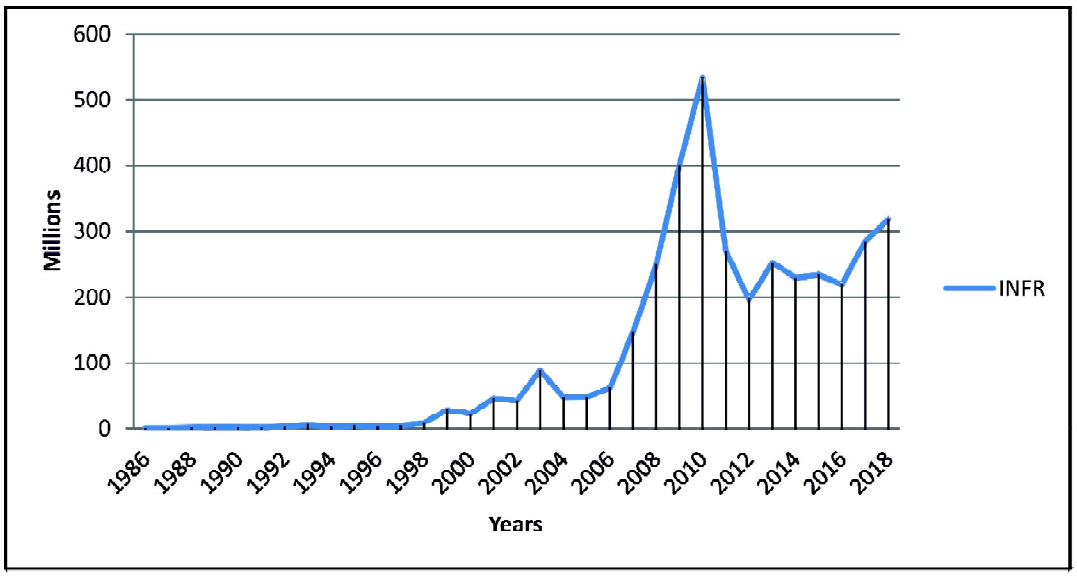

Figure 2: Trend of Government Expenditure on infrastructure in Nigeria, 1986-2018

Source: Data, CBN, NBS and IFS, 2019

Figure 2 shows the trend of government expenditure on infrastructure between 1986 to 2007, there was an up-down slope which implies that spending on infrastructure was poor while, spending between 2008 to 2011 shows a high level of improvement on infrastructure development in Nigeria. However, from 2012 to 2016, there was a decline. The study reveals that expenditure on infrastructure was a bit fair and stable between 2017 to date and shows a significance effect on economic growth in Nigeria.

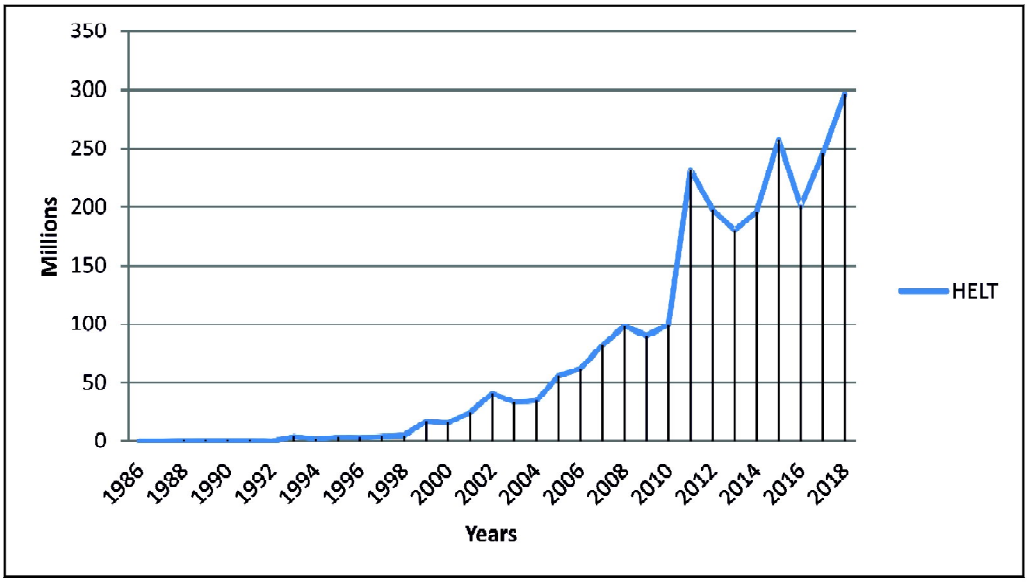

Figure 3: Trend of Government Expenditure on health in Nigeria, 1986-2018

Source: Data, CBN, NBS and IFS, 2019

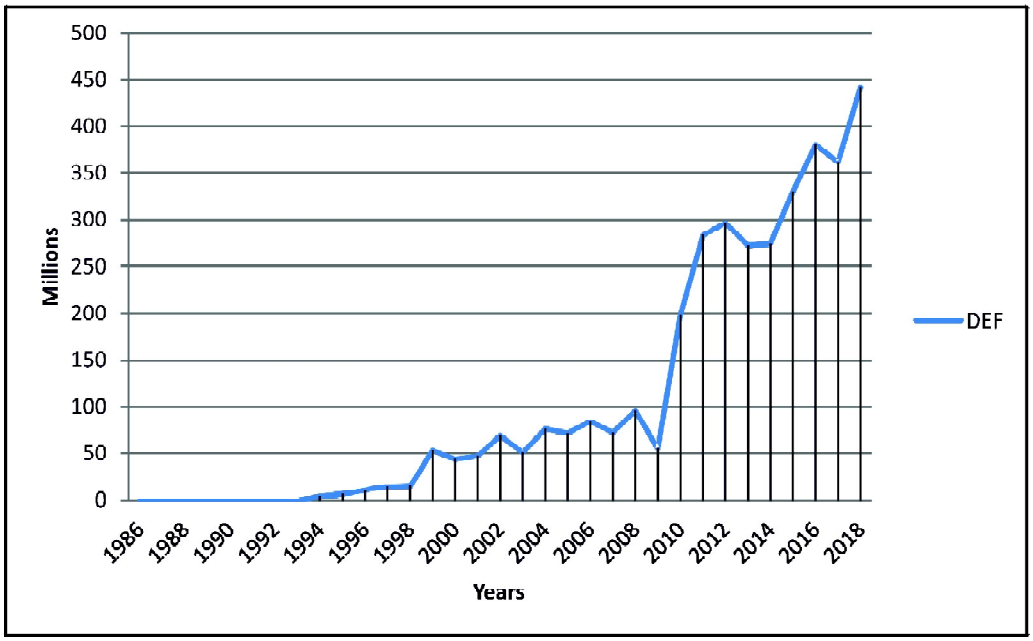

Figure4: Trend of Government Expenditure on defense in Nigeria, 1986-2018

Source: Data, CBN, NBS and IFS, 2019

Figure 3 government expenditure on health sector, shows the trend analysis for the period 1986-2018 in Nigeria. There was a slight decline in spending on health sector between 1986 and 1999 while in 2000 and 2009 there was an upward slope, but in 2010 and 2011, it steadily increased. Moreover, between 2012 and 2018, it was a bit stable and consistent.

Figure 4 shows the government expenditure on defense in Nigeria. The defense was negative from 1986 to 1994; there was a sharp increase in 1995 to 2008.The expenditure was drastically increased from 2010 to date, due to government commitment to stop Boko-Harram and Fulani herdersmen insurgency.

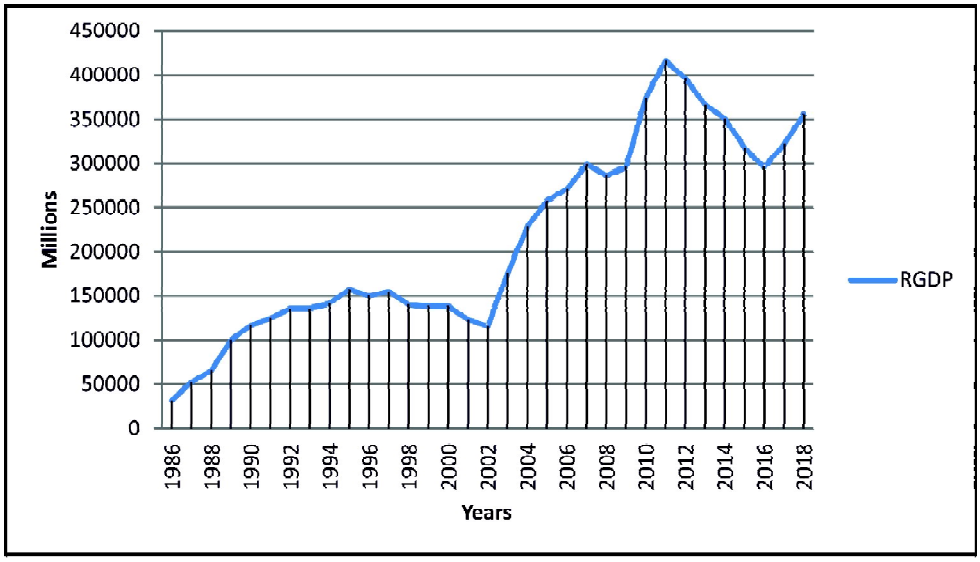

Figure 5: Trend of economic growth (RGDP) in Nigeria, 1986-2018

Source: Data, CBN, NBS and IFS, 2019

Figure 5 shows the trend of economic growth (RGDP) in Nigeria. The trend of economic growth in Nigeria has been cyclic in nature over years. The result indicated a sharp upward growth in 1986 to 1997 and sharp increased from 1998 to 2002.There sharp upward growth between 2004 and 2011 with little decreased in 2012 and 2016 and rise up again in 2015 to 2018.

Data and Methods

Theoretical framework and Model Specification

Theoretically, this study build on modified version of Ram (1986) model and it based on endogenous growth theory. This study examined government expenditure on infrastructure on economic growth nexus in Nigeria using fully modified ordinary least (FM-OLS) estimation techniques in order to analyses the effect(s) of government

expenditure on infrastructure on economic growth in Nigeria for the period of 1986-2018. This will enable us to induce flexibility by contributing the dynamics significance of the variables on economic growth in a unified manner for the period of the study. The data used for this study include real gross domestic product, education, infrastructure, health, defense and inflation.

This study followed the model of Kambua (2014) in Kenya with little modification. According to him, real gross domestic product is a function of education, infrastructure, health, defense and inflation, and they are sourced from the Central Bank of Nigeria statistical bulletin for the period of 1986-2018.

Mathematically, therefore, the equation (i) is modified and presented thus:-

$$Y = \beta_o + {}_1X_{1+2}X_2 + {}_3X_3 + {}_4X_4 + {}_5X_5 + € \quad \text{(i)}$$

Where:-

Y = RGDP, X_1= Education, X_2=Infrastructure, X3=Health, X_4= Defense, X_5= Inflation rate

β_o = Constant, β_1 = Coefficient for Education, β_2 = Coefficient for Infrastructure β_3 = Coefficient for health, β_4 = Coefficient for Defense

The theoretical expectations about the signs of the coefficients of the parameters are as follow: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$ $\beta_5 > 0$

All things being equal, a *priori* intercept and the slope of the coefficients are expected to have positive signs. The numerical values of the parameters are estimated by the use of fully modify ordinary least square (FMOLS) techniques based on econometric (e- view) computation.

Data and Sources

This study is based on annual Nigeria country-level data obtained from Central Bank of Nigeria (CBN) Statistical Bulletin, International Financial Statistics of the International Monetary Fund (IMF) and Fact Sheet of the National Bureau of Statistics (NBS) various issues. This study used an annual data series spanning long historical sample in the context of Nigeria (1986 - 2019). The real GDP growth is calculated from GDP used as dependent variable, while education, infrastructure, health, defense and inflation used as the explanatory variables in the model.

Preliminary Test

Table 1: Descriptive Statistics of Variables

	RGDP	*DEF*	*EDU*	*HELT*	*INFL*	*INFR*
Mean	213194.6	109.3864	127.7197	75.18182	35.69545	113.8540
Median	157434.0	53.16000	64.78000	33.27000	16.50000	45.94400

contd. table 1

	RGDP	DEF	EDU	HELT	INFL	INFR
Maximum	416417.0	442.1500	465.3000	296.4400	103.8200	534.5400
Minimum	32180.22	0.000000	0.230000	0.040000	5.380000	0.260000
Std.Dev	110725.5	136.1407	148.9307	93.25835	32.80652	141.0407
Skewness	0.271054	1.110866	0.950342	1.039088	0.883366	1.187858
Kurtosis	1.761816	2.764338	2.397401	2.628988	2.345536	3.646186
Jarque-Bera	2.512096	6.863486	5.466624	6.127636	4.880791	8.334674
Probability	0.284777	0.032331	0.065004	0.046709	0.087126	0.015493
Sum	7035423.	3609.750	4214.750	2481.000	1177.950	3757.182
Sum Sq.Dev.	3.92E+11	593097.7	709771.4	278307.8	34440.57	636559.3
Observations	33	33	33	33	33	33

Source: Researcher's Computation (2020), using E-view 9.

In Table 1 the descriptive statistics of the data are presented. The mean value for RGDP variable is 213194.6 with standard deviation of 110725.5. Whereas, the defense (DEF), education (EDU), health (HELT), inflation rate (INFL) and infrastructure (INFR) have the mean of 109.3864, 127.7197, 75.18182, 35.69545 and 113.8540 the standard deviation of 110725.5, 136.1407, 148.9307, 93. 25835, 32.80652 and 141.0407 respectively. From the means values of the descriptive statistics of the explanatory variables of the education (EDU) has the highest men values (127.7197) , followed by the defense (DEF) the mean value (109.3864), then the infrastructure (INFR) with the mean value of (113.8540), health (HELT) has the mean value of (75.18182) and the inflation rate (INFL) has the mean value of (35.69545).

Test of Stationarity

Table 2: Results of Unit Root Test at Level using ADF

Variables	*Test Statistics*	*5% Critical Value*	*Level*	*S/NS*
RGDP	(1.035499)	(2.963972)	1(0)	NS
DEF	(1.235224)	(2.957110)	1(0)	NS
EDU	(1.069465)	(2.957110)	1(0)	NS
HELT	(1.979068)	(2.963972)	1(0)	NS
INFL	(2.468275)	(2.957110)	1(0)	NS
INFR	(1.097321)	(2.957110)	1(0)	NS

Source: Researcher's Computation (2020), using E-view 9.
Where: S = Significance; NS = not significance; and, 1(0) = level

The results from Table 2 above reveal that the real gross domestic product (RGDP), defense (DEF) education (EDU), health (HELT) inflation rate (INFL) and infrastructure

(INFR) were not stationary at levels. This is derived by comparing the test statistics, in absolute terms, of both the ADF test statistics with the critical values, also in absolute terms, at the 5% Level of Significance.

Table 3: Results of Unit Root Test at 1st Difference

Variables	*Test Statistics*	*5% Critical Value*	*Level*	*S/NS*
RGDP	(3.950715)	(2.963972)	1(0)	S
DEF	(5.132097)	(2.960411)	1(0)	S
EDU	(4.632600)	(2.960411)	1(0)	S
HELT	(6.104579)	(2.693972)	1(0)	S
INFL	(5.746949)	(2.960411)	1(0)	S
INFR	(4.666842)	(2.9604411)	1(0)	S

Source: Researcher's Computation (2020), using E-view 9.
1(1) = 1stDifference

The results from Table 3 show that real gross domestic product (RGDP), defense (DEF), education (EDU), health (HELT), inflation rate (INFL) and infrastructure (INFR) were all stationary at 1st difference in the estimated model. This can be seen by comparing the test statistics, in absolute terms, of both the ADF test statistics with the critical values, also in absolute terms, at the 5% Level of Significance. Thus, there is need to test whether the variables were co-integrated and such there is need for a long confirmation within the variables in the model.

Results for Cointegration Tests

Table 4: Test for Johansen Co-Integration Result from the Model

Variables	*Trace Statistic*	*0.05 Critical Value*	*Hypothesized No of CE(S)*	*Prob***
RGDP	207.2567	95.75366	None *	0.0000
DEF	121.9572	69.81889	At most 1 *	0.0000
EDU	73.92178	47.85613	At most 2 *	0.0000
HELT	33.06314	29.79707	At most 3 *	0.0203
INFL	15.52305	15.49471	At most 4 *	0.0495
INFR	2.324978	3.841466	At most 5	0.1273

Source: Researcher's Computation (2020), using E-view 9.
* (**) denotes rejection of the Hypothesis at 5% significance level long run (LR) test indicates 6 co-integrating equation (s) at 5% significance-level.

The Table 4 above revealed real gross domestic product (RGDP), defense (DEF), education (EDU), health (HELT), inflation rate (INFL) and infrastructure (INFR) in Nigeria

were co-integrated in the model using unrestricted co-integration rank test (trace), with the values of unrestricted co-integration test-trace is greater than the value of critical value at 5% level of significance. The test statistics indicates that the Hypothesis of no co-integration among the variables is be rejected. Thus, the variables were co-integrated in the model for the period of study in Nigeria.

Granger Causality Test

Granger causality tests are conducted to determine the direction of influence between the variables. The empirical results of the pair wise granger causality test among real gross domestic product (RGDP), defense (DEF), education (EDU) health (HELT), inflation rate (INFL), and infrastructure ((INFR) were presented in the Table 5 below.

Table 5: The Empirical Results of Pair-Wise Granger Causality Test

Null Hypothesis:	*Lag*	*Obs*	*F-Statistic*	*Prob.*	*Granger Causality*
DEF does not Granger Cause RGDP	2	31	0.41507	0.6646	DEF RGDP
RGDP does not Granger Cause DEF			2.53420	0.0987	Uni-directional Causality
EDU does not Granger Cause RGDP	2	31	0.57029	0.5723	EDU RGDP
RGDP does not Granger Cause EDU			5.45051	0.0105	Uni-directional Causality
INFL does not Granger Cause RGDP	2	31	1.13194	0.3378	No Causality
RGDP does not Granger Cause INFL			0.57899	0.5675	
HELT does not Granger Cause RGDP	2	31	2.13753	0.1382	HELT RGDP
RGDP does not Granger Cause HELT			7.12736	0.0034	Uni-directional Causality
INFR does not Granger Cause RGDP	2	31	6.54759	0.0050	INFR RGDP
RGDP does not Granger Cause INFR			6.08203	0.0068	Bi-directional Causality
EDU does not Granger Cause DEF	2	31	1.22381	0.3105	EDU DEF
DEF does not Granger Cause EDU			8.45780	0.0015	Uni-directional Causality
HELT does not Granger Cause DEF	2	31	1.51860	0.2378	HELT DEF
DEF does not Granger Cause HELT			3.92891	0.0323	Uni-directional Causality
INFL does not Granger Cause DEF	2	31	4.28168	0.0247	INFL DEF
DEF does not Granger Cause INFL			0.19196	0.8265	Uni-directional Causality
INFR does not Granger Cause DEF	2	31	13.2208	0.0001	INFR DEF
DEF does not Granger Cause INFR			7.76066	0.0023	Bi-directional Causality
HELT does not Granger Cause EDU	2	31	3.19379	0.0575	HELT EDU
EDU does not Granger Cause HELT			1.50142	0.2415	Uni-directional Causality
INFL does not Granger Cause EDU	2	31	0.91687	0.4123	No Causality
EDU does not Granger Cause INFL			0.21787	0.8057	
INFR does not Granger Cause EDU	2	31	7.45098	0.0028	INFR EDU
EDU does not Granger Cause INFR			3.03888	0.0652	Bi-directional Causality
INFL does not Granger Cause HELT	2	31	0.57192	0.5714	No Causality
HELT does not Granger Cause INFL			0.39365	0.6785	
INFR does not Granger Cause HELT	2	31	7.76005	0.0023	INFR HELT
HELT does not Granger Cause INFR			3.51213	0.0447	Bi-directional Causality
INFR does not Granger Cause INFL	2	31	2.00950	0.1543	INFR INFL
INFL does not Granger Cause INFR			3.23379	0.0557	Uni-directional Causality

Source: Researcher's Computation (2020), using E-view 9.

Pair-wise Granger causality test helps to examine the direction of causality between two variables in the model. The causality test results were reported in Table 5 and the result shows that,bi-directional causality runs from infrastructure (INFR) to economic growth (RGDP); education (EDU) to infrastructure (INFR); health (HELT) to infrastructure (INFR) with a feedback mechanism of 5% at critical level in the estimated model. This indicate that the more volatile in government spending on defense, education, health and infrastructure is, the more positive effects it has on economic growth in Nigeria. Moreover, the result from the causality test shows that there is uni-directional causality that runs from economic growth (RGDP) to defense (DEF); economic growth (RGDP) to education (EDU); health (HELT) to economic growth (RGDP); defense (DEF) to education (EDU); defense (DEF) to health (HELT); defense (DEF).to inflation (INF); education (EDU); to health (HEALT); and inflation (INF) to infrastructure (INFR) without feedback mechanism. The empirical result on the table 5 further reveals the absence of causal link between inflation (INF) and gross domestic product (RGDP), which affirms the result of the long run relationship on table 6 and it implies that no policies in relation to inflation in Nigeria will have effect on economic growth. In a similar manner, the result shows there is no causal relationship between inflation (INF) and education (EDU) as well as inflation (INF) and health (HELT). This tends to support the neutrality hypothesis.

Long Run Coefficients Estimates

Table 6: The Empirical Results of FM-OLS Technique

Dependent Variable: RGDP
Method: Fully Modified Least Square (FMOLS)

Variable	*Coefficient*	*Std. Error*	*Prob.*
DEF	-677.5824	351.9588	0.0652*
EDU	1049.956	393.1546	0.0129*
HELT	-98.76898	639.3017	0.8784
INFL	440.9817	334.0541	0.1983
INFR	296.5999	108.8512	0.0114*
C	109115.9	15744.86	0.0000
R-Square 0.857502			
Durbin Watson stat			

Source: Researcher's Computation (2020), using E-view 9.

Table 6 shows the estimated result of fully modified least square economic growth (RGDP) and its determinants. Interestingly, all the coefficients in the model are statistically significant except health and inflation variable. The adjusted coefficient of determination R^2 of the model shows that the explanatory variables jointly account for approximately 85 per cent change in economic growth. This means that unit per cent variability in the real GDP is accounted for by defense, education, health, inflation and infrastructure over the period of 1986 to 2018. The result obtained from the above are fairly robust and satisfactory,

such that the variables in the estimation model conform largely to *a priori* expectations in terms of statistical significance, with the exception of health and inflation variables. The result reveals that the coefficient of government spending on defense is negatively related and statistically significant at 5% level to economic growth (RGDP). This suggests that, if government expenditure on defense increases by one per cent, economic growth will decrease by about -677.5824 in Nigeria.

Furthermore, the coefficients of the explanatory variables show that government expenditure on education has a positive and significant relationship with economic growth. Specifically, if other variables are held constant, a unit increase in education will bring about more proportionate increase in economic growth by about 1049.956 per cent in Nigeria. This result is in line with Amos, Jaga, Okello and Joseph, (2017) in Rwandan; Kosimbei, *et. al.*, (2013) in Kenya; Afzal and Abbas (2010) in Pakistan; Sefa, Siew and Mehimet, (2015) in Australia; Chude and Chude, (2013); Edame and Eturoma, ((2014) and Babatunde, (2018) that government expenditure on education has positive relationship with Nigeria economic growth. Government spending on infrastructure is positive and statistically significant at 5% level, this means that infrastructure exerts a positive effect on economic growth (RGDP), a unit per cent increase in infrastructure (INFR) led to about 296.6 increases in economic growth (RGDP). The result is in agreement with the *a priori* expectation and in line with Kambua, (2014) in Kenyan; Loto, (2011) and Ihenacho, (2016) that infrastructure has positive relationship with economic growth in Nigeria. The result however reveals that government expenditure on health and the inflation rate are not significant at 5% level, this means that both health and inflation does not significant in explaining economic growth in Nigeria for the period 1986 to 2018. However, if all the explanatory variables excluded from the estimated model, the value of the constant value is revealed at 109115.9 positive. This means that the intercept value ($\propto_0$) is still positive in the model over the estimated years 1986 to 2018.

Tests for the Goodness of the Model (Coefficient of Determination (R^2)

The values of R-square (R^2), are normal for the model, for example, the R square for real gross domestic product model was 85%, shows that the variables (defense (DEF); education (EDU); health (HELT); inflation rate and infrastructure (INFR)) captured in the model explained 85 per cent of the systemic variation in economic growth (RGDP) in the economy.

Post- Diagnostic Test

Table 7: Wald Test

Test Statistic	*Value*	*df*	*Prob.*
F-statistic	101.6835	(6,26)	0.0000
Chi-square	610.1013	6	0.0000

Source: Researcher's Computation (2020), using E-view 9.

The Wald Test is introduced to check if the independent variables jointly influenced the dependent variable. The F Statistic is 101.6835 and its probability value is 0.000; which showed that the probability value (0.000) is less than the 0.005 level of significance. It can be concluded that independent variables jointly influenced the dependent variable.

Coefficient of Variance Decomposition

Table 8: Coefficient of Variance Decomposition

Eigenvalues	2.48E+08	471275.3	185950.7	80530.98	13186.70	827.5046
Condition	3.34E-06	0.001756	0.004450	0.010276	0.062753	1.000000
Associated Eigenvalue						
Variable	*1*	*2*	*3*	*4*	*5*	*6*
DEF	9.66E-05	0.139318	0.839983	0.005065	0.013755	0.001782
EDU	0.062047	0.422706	0.504697	0.000274	0.008444	0.001832
HELT	0.043055	0.950367	0.005084	2.05E-05	0.001218	0.000257
INFL	0.283820	0.001539	0.013330	0.699957	0.001273	8.01E-05
INFR	0.000860	0.003150	0.027051	0.146262	0.804980	0.017696
C	1.000000	1.99E-07	2.86E-09	4.03E-08	4.77E-11	1.38E-11

Source: Researcher's Computation (2020), using E-view 9.

The coefficient variation decomposition is used to test for multicollinearity among the variables. The Column One of the Associated Eigenvalue showed that all the values are below 0.5. With result, it is concluded the variances are not perfect linearly correlated; hence, no problem of multicollinearity among the variables.

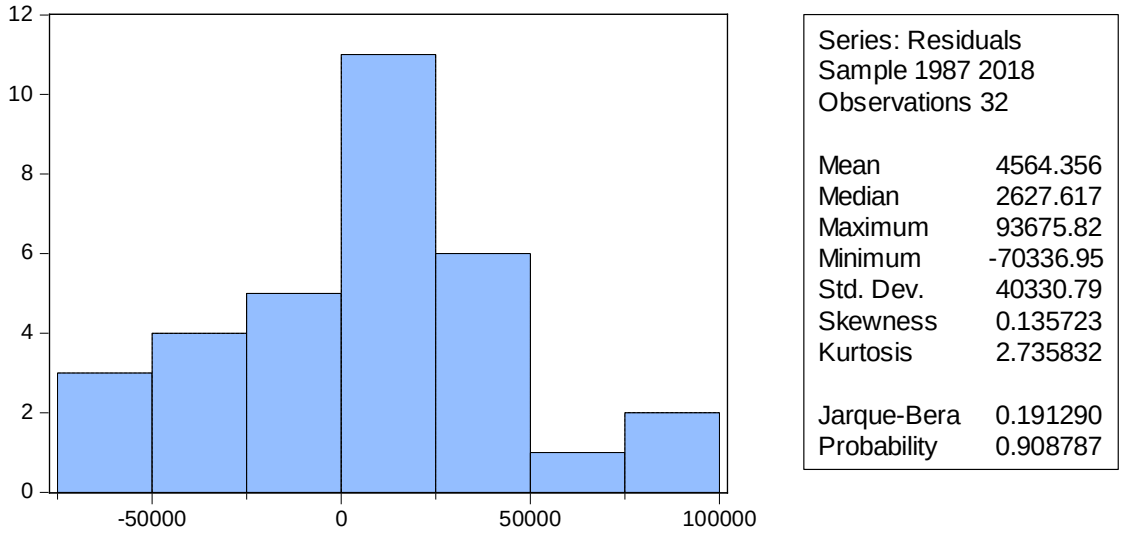

Figure 6: Normality Test

Figure 6 showed that normally test for the model. The Jarque – Bera is 0.191290 and the corresponding p- value is 0.908. Since the p- value is greater than the 0.05 level of significance, it is therefore concluded that there is no problem of normality in the residual.

Conclusion and Policy Implications

This study basically examined the effect(s) of government expenditure on infrastructure on economic growth in Nigeria during the period 1986-2018 and employed the co-integration test, granger causality test and fully modified ordinary least square (FM-OLS) estimation techniques. The co-integration test result revealed that there is a long run relationship between government expenditure on infrastructure on economic growth during the study period. Furthermore, the result from the causality test shows that there is uni-directional causality that runs from economic growth (RGDP) to defense (DEF); economic growth (RGDP) to education (EDU); health (HELT) to economic growth (RGDP); defense (DEF) to education (EDU); defense (DEF) to health (HELT); defense (DEF).to inflation (INF); education (EDU); to health (HEALT); and inflation (INF) to infrastructure (INFR) without feedback mechanism. More also, bi-directional causality runs from infrastructure (INFR) to economic growth (RGDP); education (EDU) to infrastructure (INFR); health (HELT) to infrastructure (INFR) with a feedback mechanism of 5% at critical level in the estimated model, this indicate that the more volatile in government spending on defense, education, health and infrastructure is, the more positive effects it has on economic growth in Nigeria. This finding is in line with the empirical results of the long test presented on table (FM-OLS). The empirical result on table 5 further reveals the absence of causal link between inflation and economic growth (RGDP), which affirms the result of the long run relationship on the table 6.The evidence of no causality between economic growth and inflation implies that no policies in relation to inflation in Nigeria will have any effect on economic growth. In a similar manner, the result shows there is no causal relationship between inflation (INF) and education (EDU), as well as inflation (INF) and health (HELT). This tends to support the neutrality hypothesis.

The estimation results of the regression analyses shows that expenditure on health (HELT) is negative and statistically not significant while inflation rate (INFL) also shows a positive but not significant at 5% level to economic growth (RGDP) during the study period. It was established that government expenditure on education has a negative and significant relationship with economic growth (RGDP). The findings were in support with previous studies, like Amos, *et., al,* (2017) in Rwandan; Kosimbei, *et., al* (2013) in Kenya; Afzal and Abbas (2010) in Pakistan; and Chude and Chude, (2013); and Edame and Eturoma, ((2014) in Nigeria. Also infrastructure shows a positive and statistically significant; this means that infrastructure exerts a positive impact on economic growth (RGDP). The result is in agreement with the *a priori* expectation and in line with Kambua, (2014) in Kenyan; Loto, (2011) and Ihenacho, (2016) that infrastructure has positive relationship with economic growth in Nigeria. Therefore, policies that will increase level

of education (EDU) and that of infrastructure (INFR) will also increase economic growth (RGDP) and vice versa. Finally, the study, therefore, recommended that Nigeria government should increase her spending on defense, education, health, and infrastructure because they represent critical sectors of the economy that require enhanced funding for robust economic growth in Nigeria.

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