

GOVERNMENT CAPITAL INVESTMENTS AND NIGERIA'S ECONOMIC GROWTH: A GRANGER CAUSALITY APPROACH

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Abstract

This study examined the prevailing causal interrelationships between disaggregated elements of government capital investments and Nigeria's economic growth. The study covered the period 1981 to 2019. It employed time series secondary data obtained from Central Bank of Nigeria's Statistical Bulletin. Stationarity and granger causality tests were employed. The findings revealed prevalence of unidirectional causalities between Nigeria's gross domestic product and each of government's capital investments in education, other social and community services, agriculture, construction and other economic services. In all cases, causality flows from Nigeria's gross domestic product to government capital investments in education, other social and community services, agriculture, construction and other economic activities. Further, bi-directional causality prevails between Nigeria's gross domestic product and government's capital investment in transport. In addition, these results revealed the absence of causality between Nigeria's gross domestic product and government capital investments in health, as they seem to operate independent of each other. The public investment in health failed to promote Nigeria's economic growth and vice-versa. Unidirectional causalities prevail between Nigeria's gross domestic product and each of government's capital investments in education, other social and community services, agriculture, construction and other economic services. In all of these cases, causalities flow from gross domestic product to each of public capital investment in education, other social services, agriculture, construction and other economic services, affirming that as the economic grows, activities in each of these sectors are promoted, reinforced and invigorated. Further, prevalence of bi-directional causality exists between Nigeria's GDP and investment by government in transportation/communication. However, no causality was found between capital investment on health and gross domestic product. In the light of the results, the study recommends that: (i). The government should increase capital investments in education for enhanced human capital development to promote economic growth. (ii). More funds should be channelled to construction as well as agricultural development as it shows potentials to generate massive employment in the country. (iii). The government should step up in health sector budget. (iv). Proper project monitoring by the executive to safeguard this huge investments and avoid project abandonment.

Key Words: Human Capital, Material capital, Economic Growth, Expenditure, Investment

Introduction

Investments by government contribute to the economic growth of countries. The quantity of public expenditure on the human and material capital is crucial in promotion of the performance of the economy (Olulu, Erhieyovwe & Andrew, 2014; De long & Summers, 1991). Public capital investment on projects especially construction of roads, building of schools, health facilities including training and retraining of personnel have been highlighted as basic ingredients for the stimulation of national economic activities in less-developed countries (Rosenstein-Rodan, 1943; Nurkse, 1953).

The ultimate expectation of continued government investment still remain in the desire to create robust capital formation for improved economic potential of the country (Owolabi-Merus, 2015; Nnamdi, Akinpelumi & Onugha, 2018). The resultant effect of these economic investments in both human and material capital add to the viability of the country's economic growth.

For the avoidance of the tendency to completely consume all products created by a country, Nurkse (1953) asserted that nations should ordinarily be frugal and keep aside a sizeable quota of wealth for investment in capital goods for further reinvestment purposes to create future returns. According to Olulu et al. (2004), increased public expenditure on human capital formation and material capital investments will consequently drive economic growth. In specific terms, Olulu et al. (2004) affirmed that investments in health and education support labour productivity and economic growth.

Investment in human intellectual development generates a competent workforce to man and service the capital investments to better the productive capacity to strengthen national economic growth (Ranjan, 2008).

Capital formation is not limited to physical infrastructure like equipment and industrial consumables, but extends to training of competent manpower to take charge of the health and educational facilities, will resultantly increase the available health care and social benefit schemes (Kuznets, 1961).

According to Bhatia (2002), developing economies invest in viable projects to promote regional economic parity. Accordingly, Barro & Sula-i-Martin (1992) opined that public investment programmes give direction and interest area of government in apportionment of those investments to uplift the output of the developing countries.

The sustenance of national economic growth can be possible if countries invest massively in production of home-made goods (Owolabi-Merus, 2015). This can be gotten when a reasonable level of funds is devoted to training of capacity of human resources as well as procurement of fixed/material capital infrastructure, thereby creating enabling environment for national economic prosperity. In period of recession, a reasonable quantum of public investment has the potential to quickly spin the economy to recovery (De long & Summers, 1991). Laudau (1983) noted the existence of positive influence occurring between economic growth and public investment on education.

It is an affirmation of the effectiveness and extent to which educational investment influences the quality of workers in the labour market. The highly skilled workforce earn better pay package and consequently set aside a reasonable proportion in saving for further investment in productive ventures. This standpoint aligns with the assertions of Nurkse (1953), Rommer (1986), Meier (1976) as well as Lucas (1988). These studies affirmed that economic growth is a direct product of public capital investment in education.

To unbundle the dimensions of public capital investments, Bowman (1961), Kuznets (1961, 1971) as well as Schultz (1962) assert a comprehensive set of physical and human capital investments, taking into account, the non-physical products including education expenditure, health, research and recreational spending of the nation. The human competencies developed due to increased funding is a strong evidence that optimum mix of human and material capital ultimately promote national economic growth.

Several studies to investigate the interrelationships between public capital investments and economic growth abound globally. They include but not limited to Laudau (1986), Haque and Kim (2003), Kelly (1997), Akpolat (2014), Bleaney, Gemmel and Kneller (2001), mainly aggregated into human and physical capital, all showing conflicting results and some country specifics.

However, they do not unbundle material and human investments into the composite variables like health, education, social services, transport, construction, agriculture and other economic services.

In Nigeria, studies like Usman and Agbede (2015), Vincent, Nwosu and Okonma (2013), Ogiogio (1995), Nnamdi et al. (2018), Shuiab and Ndidi (2015), Olulu et al (2014) as well as Werigbelegha and Peter (2018) took the aggregated approach into the mainly human and material investments. These studies did not decompose investments in their specifics/components. The aforesaid studies also adopted varying methodologies and found conflicting results.

In Dike-ogu, Ohale and Otto (2016), the study employed both aggregated and disaggregated methods. The aggregated approach found no significant influence on economic growth while the disaggregated public investments indicated significant relationships with economic growth. In all, data employed were below year 2016 and studies employed diverse and varied methodologies that occasioned the conflicting findings.

Considering recent reforms and public sector developments currently experienced in Nigeria, it is expedient to re-evaluate the prevailing realities to assess the causal relationships between government capital investments and economic growth in Nigeria in the light of recent data specifically in disaggregated dimension. This will foster and bring to the fore, the extent to which public investments components promote, reinforce as well as support the country's economic growth. Therefore, a resolution of the above constitute the core problems of this study.

Having dealt with the introductory part, the rest of this study is divided into four sections. Section 2 provides the theoretical framework and literature review while section 3 deals with the materials and methods. Section 4 presents the results and analysis of same, while section 5 deals with

the discussions, conclusions and policy recommendations.

Theoretical Framework and Literature Review

Theoretical Link between Public Capital Investments and Economic Growth:

The following theories underpinned the study of public capital investment and economic growth:

The Balance Growth Theory

The balance growth theory was developed by Nurske (1953). It states that for investments to be achievable and feasible in less-developed countries, massive investments should occur concurrently in different sectors. When it happens, achievement of large scale market especially in size, productivity increase, purchasing power, increased domestic demand as well as provision of favourable business environment for private investments entrepreneurial activities for economic growth. the investments that can prompt such massive economic growth can only be undertaken by government due to the risks inherent in such investments outlay. This resultantly becomes the limitation excluding the private sector from participating in such massive investment (Ray, 2010).

The Theory of Human Capital Investments

A number of studies have been conducted in respect of the influence of human capital investment on economic growth. Meier (1976) affirmed that strategic policy decision levels have given increased attention to material investments compared to human capital investment. The theory of human capital investments states that increased expenditures on human capital will resultantly bring about national economic growth. Meier (1976) evidently affirmed the fact that commensurate

investments are crucially needed in order to advance the contributions of human capital investments to national progress. As observed, an optimal mix of material and human capital investments is obviously needed for sustained economic growth. It is therefore worthy of note that human capital investments contribute meaningfully to the economic performance of nations like material capital investments.

Prominent observations by Myint (1954,1962) suggested that the poor state of less developed countries is partly attributed to prevailing low level of human investments. It was further observed that until these less-developed countries change the trend, they will continue to suffer untold backwardness in economic productivity. To further emphasize the significance of investments in human capital, Lewis (1962) as well as Musgrave (1966) ascribed greater importance to investment in education as key to development of less developed countries. In this regard, it is also asserted that education expenditures have some associated externalities. To enhance the benefits elucidated, it was argued that social infrastructural investments equally compliment human capital investments in economic growth process (Myint, 1963; Harbison, 1962). In a later study, Robert (1991) developed a workable human capital model which showed that education together with the advancement of human capital was responsible for both the variations in the productivity of labour and the changes in technological levels of the global economies.

Wagner's Law of Public Expenditure

According to Jhinghan (2011), Wagner (1893) argued that there are inherent tendencies for the activities of different levels of government to promote

output level. The study asserted that there exist functional relationships between economic growth and government activities. Wagner basically argued that government's investment spendings increase more than proportionately with income. The responsiveness of income due to changes in demand for government services is always found to be positive and greater. A positive relationship prevails between government's investment spendings and output. The study proposes a unidirectional causality running from government spending to income. It was argued that the driving force for state intervention includes increasing demand for public goods by the population and provision of public goods for effective and efficient functioning of the private sector. Further, Magazzino, Giolli and Mele (2015) were of the opinion that Wagner's Law strongly affirmed the fact that the share/proportion of government capital spending to the GDP tends to increase in a developed economy. The size of national income relatively determined the quantum of public expenditure of the country. Thus, the cause of increase in public investments is assumed to be the level of progress in the overall economy. This theory is applicable to other countries (both developed and less-developed).

Keynes' Theory of Public Investment

Keynes (1936) assumed that changes in public expenditures will promote to a large extent, short-term economic stability and engender higher long-run national growth. Keynes posited that public expenditures contribute positively to economic growth. Increasing government consumption will lead to increased employment, profitability and investment through multiplier effects on aggregate demand. These multiplier effects

demonstrate the causality between public expenditure and national growth in income. Public investments resultantly contribute positively and in no small measure to all sectoral economic growths such as agriculture, manufacturing, construction, services etc.

Accordingly, the Keynesian theory further stated that increased public spending spines an economy out of depression. Short run government intervention is consequently, the cure for a recessed economy. When government spends, individuals are given purchasing power and producers will invariably increase production thus, creating more employment. Keynes's General theory of employment, interest and money provides theoretical bases for some empirical studies in Nigeria including Ighodaro and Oriakhi (2010), Njoku *et al.* (2014) and Adigun (2017).

The Wiseman-Peacock hypothesis of Public Investment

Peacock and Wiseman (1961) set up this theory for public capital investments. The Wiseman-Peacock postulation was founded on the political theory of public determination. The basic assumption asserts that government expenditure evolves as an impulse to social unrest such as wars. The Wiseman-Peacock theory further disaggregated the effects of growth in public expenditure into displacement, inspection and concentration effects. The displacement effect is concerned with fluctuations in public expenditure between times of peace and social displacement while inspection effects involve efforts geared towards achieving fiscal balance. The concentration effect encompasses the stabilization of public revenue and expenditure to new levels in order to boost economic prosperity.

Musgrave's Theory of Public Expenditure Growth

Musgrave (1959) proposed the theory of public expenditure growth which assumes that increases in government expenditure tend to emerge from the expansion of the economy overtime. According to the theory, at low level of per capita income, the demand for public services becomes low. As such, public expenditure remains low. However, rising levels of per capita income causes public expenditure on public services to increase following the increasing demand for public goods.

Empirical Review

Ndubuisi (2018) examined the influence of government's sectoral expenditures on Nigeria's economic growth. The study spanned the period 1982 to 2015. Data were sourced from the Central Bank of Nigeria' Statistical Bulletin over the duration. The Dickey-Fuller's Unit root, Johansen's cointegration and Vector Error Correction Tests were utilized. Results affirmed prevalence of stationarity of the variables. There exists long-run relationships between the variables and economic growth. Further, public capital investment spendings on administrative consumption and transfers indicated significant influence on national economic growth. On the other hand, government capital investments in economic services, social, as well as community services showed prevailing insignificant impact on Nigeria's economic growth. The results indicated that in the long-run, recurrent expenditures across the sectors, were significant in promoting economic growth in Nigeria. In this respect, strengthening of government sectoral financial management was recommended to

enhance transparency in government spendings and resource allocations.

Egbo *et al.* (2016) in their study examined the relationships that prevail between disaggregated public investments and gross domestic product over the duration of 1970 to 2014. Employing sophisticated econometrics, a positively significant short dated mutual relationship was found between gross domestic product and budgetary administratively recurrent expenditure like social services, virement/transfers and administration expenses. Economic services was at variance with negative but significant interaction with gross domestic product in Nigeria's economic ecosystem. Unidirectional Granger resulted between gross domestic product and service of economic nature with flow of causality moving from gross domestic product towards economic service.

Loto (2011) studied the prevailing relationships between government capital investments in education, health, security and transport and Nigeria's economic growth. The findings showed that public investments in education had a negatively insignificant relationship with economic growth, health expenditure was positively significant in relation to economic growth. Government capital investments in security and transport/communication were positively insignificant in relation to national output growth. Government's investments in agriculture was significant with negative relationship with economic growth.

Olulu *et al.* (2014) evaluated the relationship that exists between public expenditure and Nigeria's economic growth over 1984 to 2012. To ascertain the specific influence of the variables of government investments, aggregate public expenditures, public debt including health and educational expenditures were tested in separate

relationships with gross domestic product. The multiple regression technique as well as unit root estimation with co-integration and error correction model were carried out in the tests. The results provided substantial evidence that health expenditures was inversely related with gross domestic product. Education expenditure by the government was found to be grossly insignificant to propel economic growth. Further, public expenditures induce international as well as national investments. In the regard, it was strongly recommended that there is urgent need for increased public spending in the health sector, power infrastructure and other critical public projects to stimulate economic growth of Nigeria.

Awolaja *et al.* (2015) investigated the effect of government investment expenditures on private sector investment potentials. To achieve empirical evidence, the sourced data set gotten from the Statistical Bulletin of Nigeria's Central Bank was subjected to error correction techniques analysis. Results provide genuine justification for the expansion of government fiscal spending especially in respect of human and material public investments. The study recommends among others, the prioritization of public sectoral expenditures in health, education defence as well as transport sectors to stimulate private capital stock formation in Nigeria.

Fan and Rao (2003) examined the interrelationships between government investment expenditures and economic growth in forty-three (43) emerging economies spanning 1980 to 1998. utilizing Ordinary Least Squares technique, mix results indicate that government's investments in agriculture and health care strongly promote economic growth in Africa. Government's investment expenditures in

education, agriculture, and defense made positive contributions to GDP growth in Asian nations. In the case of Latin America, investments in health positively promote economic growth. The structural adjustment programmes promoted growth in Asia as well as Latin America, while the beneficial effects were not felt by African countries.

Godwin and William (2010) examined the relationship between government capital spendings, money supply, prices and output in Nigeria, using two-stage least squares model. They found that the decision to invest by the government is significantly influenced by government income (revenue) and one-year lag of government expenditure. However, government expenditure did not catalyze the growth of the economy. Findings revealed that money supply was a positive and significant function of prices and also promoted prices with no reverse (feedback) effect. Further, money stock have a positively significant power on economic growth while prices were found to have a significant diminishing effect on the output of goods and services.

Oni *et al.* (2014) evaluated the contribution of intellectual capital to the national economic growth of Nigeria. Secondary data were collected over the duration of 1981 to 2011 for the purpose of the study. To achieve the results, unit root, co-integration including error correction modelling analysis was implemented. Public investments in intellectual/human capital infrastructure maintain positive relationships with output growth in the economy. Further, enrolments in schools together with physical capital infrastructural investments indicated negative relationships with the country's economic growth (GDP) in the long-run. It was recommended that: (i) increased allocation and disbursed funds should be invested on education annually; (ii) school

admission enrolments should be in the ratio of the country's population and (iii) adequate capital investments assets should be acquired for stimulation of the productive sector and resultantly promote economic growth across the territorial boundary of Nigeria.

In a global development research, Baladacci *et al.* (2018) ascertained a very crucial resultant positive relationship between government spending on education career development and gross domestic product in terms of fostering economic growth. In agreement with the above assertion, Dauda (2012) evaluated the effectiveness of government spending on education in the promotion of the economic growth of Nigeria. The study sampled 31 years data covering 1977 to 2007. The study utilized co-integration and error correction models in carrying out the analysis. Results gotten evidenced a long-run interrelation between educational investment spending and national economic growth. The Gross fixed investments (capital formation) as well as educational infrastructural spending reflected statistical significance in Nigeria's economy. Considering the gravity of the findings, the researcher recommended deliberate policy improvement in favour of increased funding of school infrastructure and investments in human capital development and resultantly promote economic growth of the country.

Loening (2002) in a study of the Guatemala economy took an empirical view at the effect of public investment in education/human capital spending on the country's economic growth. The study adopted the methodology of error correction and found the relevance and/or importance of an enlightened/ educated labour in driving the growth of any economy. A positively significant relationship exists

between education spending and growth of the national economy in terms of factor accumulation and improvement of total factor productivity.

Babatunde and Adefabi (2005) embarked on the long-run dimension in relating investment in education with Nigeria's economic performance spanning 1970 to 2003. They applied the Johansen's co-integration together with vector ECM techniques to analyse the relationships between the choice variables. The study elucidated two avenues through which investments in education can foster genuine economic growth in the nation particularly on the long-run. The one concerns the introduction of human capital into production function directly to boost productivity of labour and the next channel relates to the instance where human capital investments have direct bearing on technological adoption. The results reveal public spending on education establishing long-run influence on the overall economic growth. Further, the vector ECM indicated a positive interaction between human capital otherwise called intellectual capital and output growth and productive economy.

Shuaib and Ndidi (2015) evaluated the effect of physical capital stock (capital formation) on Nigeria's economic development. Time series annualized data were collected from Central Bank Of Nigeria's Statistical Bulletin covering the period 1960 to 2013. The study adopted the Harrod-Domar development model to verify the nature of interrelationships between the variables under study. Stationarity, variance ratio test, as well as T-statistics were executed. The results showed a positive and significant relationship between material/physical capital investment expenditure and economic advancement of Nigeria. Consequently, the study

recommended that government at all levels should devote a significant proportion of their funds to the improvement and acquisition of infrastructures, encourage savings as well as create conducive environment for investments thereby, promoting economic growth sustainability.

Ugwuegbe and Uruakpa (2013) studied the impact of capital formation on the growth of Nigeria's economy. Secondary data were sourced from the apex bank's Statistical Bulletin for the period 2011. The stock of capital and other macroeconomic variables were employed. The findings confirmed that capital investment expenditure (capital formation) exhibits substantial and significantly positive long-run relationship with economic growth in Nigeria. It was therefore recommended that efforts should be in place for accelerated accumulation of capital investment as it has potentials to fast track Nigeria's economic growth. The findings further reveal that inflationary trend and interest rate show negative influence on national growth. This is a strong reflection of the adverse effect of inflation/interest cost on economic growth of Nigeria.

Nwaolisa and Chinelo (2017) examined the impact of government expenditure on Nigeria's economic growth. Secondary data was obtained spanning the period 1983 to 2016 from Central Bank of Nigeria's Statistical Bulletin. Government expenditure was disaggregated into general administration, defense, education and health while gross domestic product was proxy for Nigeria's economic growth. Ordinary least squares technique was utilized in the analysis. Findings revealed that general administration and education had positively significant relationships with economic growth (GDP). Further, defense has a negatively significant relationship with

economic growth, while health investment showed a positive and insignificant influence on gross domestic product. Among all the explanatory variables, education investment was highly significant in relation to GDP.

Chude and Chude (2013) studied the influential features of government capital investments on Nigeria's economic growth. The study covered the period 1977 to 2012. It employed both disaggregated and sectoral spending patterns. The error correction estimates together with the time series data used provided strong evidence to conclude that aggregate government expenditure in education proved beyond doubt, a strongly significant variable in promoting economic growth.

Gukat and Ogboru (2017) investigated the efficacy of the influence of government's capital investments on Nigeria's economic growth over the period 1982-2016. The OLS and ECM estimates were applied to analyze the time series data. The findings from the first model revealed that social and economic services had negatively significant relationships with Nigeria's GDP while administration spending showed a negative and significant influence on GDP. The second model showed that administration and social services having negative and insignificant coefficients while economic services showed positively insignificant relationship with GDP. The study therefore, recommended increased capital investment as well as enhanced budgetary allocations, to prompt the desired economic growth in real terms.

In another development, Calderon, Moral-Benito and Serven (2011) evaluated the long-run elasticity of Production of public infrastructure in eighty-eight (88) nations over the period 1960 to 2000. Gross domestic product was regressed with human/intellectual capital, material capital

and other critical infrastructure. The results revealed a significant relationship between the indicator of economic growth (GDP) and both human capital and material capital investments. This positive relationship was also observed between GDP and other critical public infrastructures.

In a different but related study, Canning and Bennathan (2000) utilized panel data sourced from 62 nations spanning 1960 to 1990. Through the application of constant returns to scale, the total output elasticity of government investment spendings especially in physical infrastructures like roads construction and electricity provision was significant at an elasticity of 0.09. The study consequently observed that the findings demonstrated in strong terms, the contributions of public investment expenditure on physical infrastructures in the advancement of economic growth of these nations.

Canning, Fay and Perotti (1994) evaluated the interrelationships between physical infrastructural investments and economic growth in 98 countries covering the period 1960 to 1985. The data collected for the study included values of public expenditure on roads, railways, telecommunication, electricity and utilities (all representing public investments in physical infrastructures). The growth of output for these 98 economies were empirically verified. The findings underscore the prominence of telecommunication and electricity utilities in contributing positively and significantly to national economic growth and increased output. Roads and Railways infrastructure did not show any clear relationship with economic performance of those nations under consideration in the duration of the study.

Garcia-Mila, McGuire and Porter (1996) took a cross-sectional data relating to

highways, water connections and various other government material infrastructures investment to ascertain their effects on the output of forty-eight (48) states in the United States of America. The data for this study covered the period 1970 to 1983. Negatively insignificant coefficients were realized. To this end, the study concluded that the stage of physical development in a nation determines materially, the sensitivities of the country's economy to some public investment spending.

In a study on the Chinese economy, Nannan and Jianing (2012) evaluated the effectiveness of public investment expenditure in promoting the country's economic growth rate especially in the long-term. The study employed data covering the period 1988 to 2007. The findings revealed that a percentage change in public capital infrastructure investments is associated with 0.3 percent change in the Chinese economy.

Roller and Waverman (2001) studied twenty-one (21) OECD countries over the period 1971 to 1990. The Cobb-Douglas production function was including the infrastructure penetration measurement parameter operationalized by main lines per capita to proxy public infrastructure. The results provided evidence to assert that substantial increase in national economic growth (GDP) emanates from public infrastructural investment expenditures. A non-linearity trend was observed in the growth impacting characteristics of public spending in relation to the countries' economic growth. This indicates that public investment enlarges when the threshold of the expected universe of service delivery is exceeded.

Egert et al. (2009) attempted an endogenous growth modelling technique in which case expenses on roads, rail lines electricity and telecommunication

infrastructures were proxied for public expenses on physical material infrastructure. Twenty-four (24) OECD economies/countries were empirically analyzed on basis of econometric tools. The study covered 1960 to 2005. Although the findings did not show any significant relationship between public capital investments and gross domestic product however, the spendings on electricity delivery indicate a significant and positive result with respect to economic growth during the period. The results thus, stress the usefulness and prominence of electricity especially in revamping national economy on the part of overall economic growth.

Broyer and Gareis (2013) undertook an elasticity analysis of the output of public infrastructural investments relating to France, Italy, Spain and Germany. Utilizing quarterly data which covered the 1995 to 2011 quarterly periods, they conducted a vector autoregression (VAR) modelling technique. The findings reveal that investments by the public authorities largely have potentials to turn around the national economic fortune in periods of recession and economic down-turn. However, the study observed that when the economy is stable and normal, it may not be able to drive the expected growth. To this end, public infrastructure spending is vital in ensuring the restoration of the economic prosperity of nations whether in developed or under developed economies as recognized by this outstanding empirical study.

Aschauer (1989) investigated the productivity enhancement effects of government's capital infrastructure investments in the USA. The findings indicate significant returns due mainly to the effect of government infrastructure investments in that country. The study conclude that the decline in productivity of the US economy in

the 1970's was attributable to the declining public investments in critical infrastructures. In view of the above, Munnel (1992) also concurred that public investment in capital infrastructures stimulate growth of privately owned investment, productivity and further generates substantial employment opportunities for effective economic growth.

The effective utilization of public capital investments in any country has been confirmed empirically as essential for rapid economic growth. Hulten (1996) observed that about 25% of the variations in national economic growth between the Eastern Asia countries and African countries could be traced to inefficient utilization of public capital infrastructure spending. Proper financial management of public funds together with the financing of these infrastructure capital by national government creates genuine economic condition for productivity growth and national prosperity.

In a notable study, Aschauer and Lachler (1998) found evidence from a study of forty-six (46) developing economies between 1970 and 1990 to assert that reduction in public debt profile of nations can be achieved through massive public capital investments. The study concludes that a sustainable public expenditure in infrastructures and public goods which bear direct impact on the country's populace will in no small measure, diversify the economic fortune of the nation thereby, discouraging public debt and its attendant costs.

Materials and Methods

For proper understanding of the contents, this section is split into the following sub-sections:

Data/Variables Description

This study employed published annual data on gross domestic product

(GDP), government human capital investment expenditures which comprised all capital expenditures on education, health, social and other community services as they relate to government's capital outlays. On the other hand, government's material capital investments include capital investments in agriculture, construction, transport/communications, economic services and others. The data were gotten from Nigeria's Central Bank Statistical Bulletin spanning the period 1981-2019. Nigeria's GDP will be carried at current prices since it is historical in nature in order to have the same base with overall government's material and human capital investment expenditures over the period of study. Based on the foregoing, the variables will not be deflated in any way for the purpose of consistency.

Model Specification

Since government's capital investment outlays in the form of human and material capital investments theoretically induce some multiplier effects on the economy, the generalized form of the model adopted for this study following Kelly (1997), Usman and Agbede (2016) as well as Dike-ogu et al. (2016) is modified and specified as follows;

$$GDP = f(EDU, HEH, OSC, AGR, CON, TRC, OES.....)(1)$$

Where:

- GDP = Gross domestic product,
- EDU = Government capital investments on education,
- HEH = Government capital investments on health,
- OSC = Government capital investments on other social and community services,
- AGR = Government capital investments on agriculture,

CON = Government capital investments on construction,

TRC = Government capital investments on transportation and communication

OES = Government capital investments on other economic services.

For estimation purposes, equation (1) is re-written as follows;

$$GDP_t = \beta_0 + \beta_1EDU + \beta_2HEH+ \beta_3OSC+ \beta_4AGR+ \beta_5CON + \beta_6TRC + \beta_7OES + \mu_t.....(2)$$

Where

β_0 = Constant/intercept, β_1 to β_7 are coefficients of the independent variables respectively

While

μ_t is the stochastic term.

Apriori Expectations

Theoretically, increased government's capital investments directly boost the level of economic growth in the country. This will certainly promote the national output. Accordingly, a positive relationship is theoretically expected between government's capital investments and Nigeria's gross domestic product.

In accordance with multiplier theory, government's material investments in construction, agriculture, transport/communication, as well as other economic services are expected to enhance national economic progress. The multiplier effects all constitute a boost and promote the businesses activities in the real sector for increased national outputs respectively. On this note, positive relationships are expected between these variables and economic growth in Nigeria. Given that increases in government's human and material capital investments would theoretically be expected to induce some multiplier effects on Nigeria's economy, it is correspondingly

expected that sensitivities of Nigeria's GDP to increases in those capital investments components will each be greater than zero. In summary, it is expected that;

$\beta_1 > 0$; $\beta_2 > 0$; $\beta_3 > 0$; $\beta_4 > 0$; $\beta_5 > 0$; $\beta_6 > 0$; $\beta_7 > 0$.

Specification of Analytical Tools and Tests

This study intends to ascertain the extent to which government's capital investments promote as well as support economic growth and vice-versa in Nigeria. For better comprehension, following tests will be considered:

Stationarity (Unit Root) Tests:

As a pre-condition for analysis of time series data, unit root tests are employed to ascertain whether or not unit roots prevail. The prevalence of unit roots implies that the data set is non-stationary and its use for estimation would result in spurious estimates. The decision rule requires that the Augmented Dickey-Fuller (ADF) test statistic for the observed variables

Presentation of Stationarity (Unit Root) Tests:

Table 4.1: Presentation of Results of Unit Root Tests: (Augmented Dickey Fuller) at First Difference.

Variable	ADF T-statistics	Mackinnon's test critical values @			Probability Level	Order of Integration	Decision
	1st difference	1%	5%	10%			
D(GDP)	-5.468656***	-3.621023	-2.943427	-2.610263	0.0001	I(1)	Stationary
D(EDU)	-4.704018***	-3.689194	-2.971853	-2.625121	0.0004	I(1)	Stationary
D(HEH)	-5.696654***	-4.262735	-3.552973	-3.209642	0.0017	I(1)	Stationary
D(OSC)	-5.907754***	-4.226815	-3.536601	-3.200320	0.0001	I(1)	Stationary
D(AGR)	-6.879551***	-3.626784	-2.945842	-2.611531	0.0000	I(1)	Stationary
D(CON)	-5.631244***	-4.323979	-3.580623	-3.225334	0.0003	I(1)	Stationary
D(TRC)	-4.960637***	-3.621023	-2.943427	-2.610263	0.0003	I(1)	Stationary
D(OES)	-6.557400***	-3.626784	-2.945842	-2.611531	0.0000	I(1)	Stationary

Source: Extracts from E-Views 10.0 output.

From the unit root results presented in table 4.1, all the study variables are

in absolute terms, must be higher than the MacKinnon's critical values at 1%, 5% and 10% levels respectively according to Gujarati et al. (2009), Brooks (2009), and Maddala (2007).

Granger Causality Tests

Following Brooks (2009), PairWise-Granger Causality was employed to evaluate the extent to which variations in a given set of independent variables tend to support changes in the dependent variable as well as the extent to which inclusion of the lagged values of the variables can improve the explanation and vice versa. In essence, Granger Causality analysis seeks to ascertain the extent to which changes in a particular set of paired variables do support, promote and also re-inforce themselves in the process of economic and financial growth.

Presentation of Results

The results of this section are presented as indicated below:

observed to be stationary at first difference. In essence, the Augmented Dickey-Fuller

(ADF) statistics for the study variables are all greater than their respective MacKinnon's critical values at 1%, 5% and 10% levels. Their accompanying level of significance are all higher than 0.05, the preferred level of significance. Consequently, all the study data

are acceptable for further estimations procedure in the study.

Pairwise Granger Causality Test

The results of the Granger's Causality tests for the model employed are presented in table 4.8 below:

Table 4.2: Results of Pairwise Granger Causality tests

Pairwise Granger Causality Tests

Date: 11/15/20 Time: 11:17

Sample: 1981 2019

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(EDU) does not Granger Cause D(GDP)	37	0.19792	0.8214
D(GDP) does not Granger Cause D(EDU)		3.57511	0.0397
D(HEH) does not Granger Cause D(GDP)	37	1.42903	0.2544
D(GDP) does not Granger Cause D(HEH)		2.02596	0.1484
D(OSC) does not Granger Cause D(GDP)	37	1.33154	0.2783
D(GDP) does not Granger Cause D(OSC)		4.39554	0.0206
D(AGR) does not Granger Cause D(GDP)	37	2.34934	0.1117
D(GDP) does not Granger Cause D(AGR)		7.64306	0.0019
D(CON) does not Granger Cause D(GDP)	37	0.20399	0.8165
D(GDP) does not Granger Cause D(CON)		7.98502	0.0015
D(TRC) does not Granger Cause D(GDP)	37	5.17418	0.0113
D(GDP) does not Granger Cause D(TRC)		3.61765	0.0383
D(OES) does not Granger Cause D(GDP)	37	0.36575	0.6965
D(GDP) does not Granger Cause D(OES)		5.03982	0.0125

Source: output extract from E-Views 10.0

The results of the pair-wise Granger Causality tests shown in table 4.8 above reveal prevalence of unidirectional causalities between Nigeria's gross domestic product and each of government's capital investments in education, other social and community services, agriculture, construction and other economic services. In all cases, causality flows from Nigeria's gross domestic product to government capital investments in education, other social and

community services, agriculture, construction and other economic services at 0.05 level of significance. Further, bi-directional causality prevails between Nigeria's gross domestic product and government's capital investment in transport.

In addition, these results revealed the absence of causality between Nigeria's gross domestic product and government capital investments in health, as they seem

to operate independent of each other (Schumpeterian independent hypothesis). The public investment in health failed to promote Nigeria's economic growth and vice-versa.

Unidirectional causalities prevail between Nigeria's gross domestic product and each of government's capital investments in education, other social and community services, agriculture, construction and other economic services. In all of these cases, causalities flow from gross domestic product to each of public capital investment in education, other social services, agriculture, construction and other economic services, affirming that as the economic grows, activities in each of these sectors are promoted, reinforced and invigorated. Further, prevalence of bi-directional causality exists between Nigeria's GDP and investment by government in transportation/communication. However, no causality was found between capital investment on health and gross domestic product.

Discussions, Conclusions and Policy Recommendations

The results obtained from the study reveal that public capital investments have significant influence on the nation's gross domestic product. This depicts that government's capital investments have the potential to re-invigorate the economy to perform creditably.

In the light of the above conclusions, the study recommends as follows:

- i. The government should increase capital investments in education for enhanced human capital development to promote economic growth.
- ii. More funds should be channelled to construction as well as agricultural

development as it shows potentials to generate massive employment in the country.

- iii. The government should step up health sector budgetary allocation.
- iv. Proper project monitoring by the executive to safeguard this huge investments and avoid project abandonment.

References

- Adekunle, S. A., & Aghedo, E. M. (2015). Human capital development and productivity growth in Nigeria. *Management Sciences Review*, 6(12), 286-308.
- Adelakun, O. J. (2011). Human capital development and economic growth in Nigeria. *European Journal of Business and Management*, 3(9), 29-38.
- Adigun, I. (2017). Is Nigerian growth public spending-spurred? *Asian Journal of Economic Modelling*, 5(3), 354-363.
- Akpolat, A.G. (2014). The long term impact of human capital investment on GDP: A panel cointegrated regression analysis. *Economic Research International*, 1-10.
- Aschauer, D. A. (2000). Public capital and economic growth: Issues of quantity, finance, and efficiency. *Economic Development and Cultural Change*, 48(2), 391-406.
- Aschauer, D. A. (1989). Is public expenditure productive? *Journal of Monetary Economics*, 23, 177-200.
- Aschauer, D.A. & Lachler, U. (1998). Public investment and economic growth in Mexico. *Policy Research Working Paper No. 1964*, Washington, DC: The World Bank.

- Awolaja, G., Oluwalaiye, O.B. & Lawal, E. (2015). The effect of sectoral public investment expenditure on private investment in Nigeria: An error correction analysis. *European Journal of Business and Social Sciences*, 4(4), 87-104.
- Babatunde, M. A. & Adefabi, R. A. (2005). Long run relationship between education and economic growth in Nigeria: Evidence from the Johansen's cointegration approach. Paper presented at the Regional Conference on Education in West Africa: constraints and opportunities, Dakar, Senegal, November 1st - 2nd. Cornell University / CREA / Ministère de l'Éducation du Sénégal.
- Barro, R. J. (1991). Economic growth in a cross section of countries, *The Quarterly Journal of Economics*, 106(2), 407-443.
- Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5), 103-125.
- Barro, R.J. & Sala-i-Martin, X. (1992). Public finance in models of economic growth. *Review of Economic Studies*, 59, 645-661.
- Bhatia, H. L. (2008). *Public Finance* (26 ed.). Vikas Publishing House, PVT Ltd, New Delhi.
- Bleaney, M., Gemmel, N. & Kneller, R. (2001). Testing the endogenous growth model: Public expenditure, taxation, and growth. *Canadian Journal of Economics*.
- Brooks, C. (2009). *Introductory econometrics for Finance*, Cambridge university press. 337-339.
- Broyer, S. & Gareis, J. (2013). How large is the infrastructure multiplier in the euro area? *Natixis Flash Economics*, No. 227.
- Canning, D. & Bennathan, E. (2000). The social rate of return on infrastructure investments. *World Bank Working Paper*, WPS2390, World Bank, Washington DC.
- Canning, D., Fay, M. & Perotti, R. (1994). Infrastructure and growth in Baldassarri, M., Paganetto, L and Phelps, E. (eds), *International differences in growth rates: Market globalization and economic areas. Central Issues in Contemporary Economic Theory and Policy Series*, St. Martin's Press, New York.
- Chude, N. P. & Chude, D. I. (2013). Impact of government expenditure on economic growth in Nigeria. *International Journal of Business and Management Review*,
- De Long, J.B. & Summers, L.H. (1991). Equipment investment and economic growth. *Quarterly Journal of Economics*, 106, 445-502.
- Dike-ogu, C. N., Ohale, L. & Otto, G. (2016). Public expenditure and economic growth in Nigeria. *International Journal of Advanced Academic Research/Social and Management Sciences*, 2(12), 23-40.
- Ditimi, A. & Nwosa, P.I. (2011). Investment in human capital and economic growth in Nigeria: Using a causality approach. *Journal of Canadian Social Science*, 7(4), 114-120.

- Ditimi, A., Nwosa, P. & Adebayo, A.R. (2011). Components of government spending and economic growth in Nigeria: An error correction modelling. *Journal of Economics and Sustainable Development*, 2(4), 219-237.
- Donald, N.B. & Shuanglin, L. (1993). The differential effect on economic of government expenditure on education, welfare and defense. *Journal of Economic Development*. 18 (1).
- Egbo, O., Nwankwo, E., & Okoye, N. F. (2016). Analysis of government disaggregated expenditures and growth of Nigerian economy. *Journal of Internet Banking and Commerce*, 1(1), 1-15.
- Égert, B., Kozluk, T. J. & Sutherland, D. (2009). Infrastructure investment: links to growth and the role of public policies. OECD Economics Department Working Papers, No. 686.
- Fan, S. & Rao, N. (2003). Public spending in developing countries: Trend, determination and impact. *EPTD Discussion Paper No. 99*, Washington, D.C.
- Garcia-Mila, T., McGuire, T.J. & Porter, R. (1996). The effect of public capital in state-level production functions reconsidered. *Review of Economics and Statistics*, 78(1), 177-180.
- Godwin, C. O. & William, C. N. (2012). Government expenditure, money supply, prices and output relationship in Nigeria: An econometric analysis. *International Research Journal of Finance and Economics*, 54, 125-135.
- Gujarati, D. N., Porter, D. C., & Gunasekar, S. (2009). *Basic econometrics* (5th ed.), New Delhi, Tata McGraw-Hill, 689-691.
- Gukat, B. T. & Ogboru, I. (2017). An empirical analysis of government expenditure and economic growth in Nigeria. *Journal of Economics and Development Studies*, 5(4), 122-134.
- Harbison, F. H. (1962). Human resources development planning in modernizing economies. *International Labor Review*, 85(5), 1-23.
- Haque, M. E., & Kim, D. H. (2003). Public investment in transportation and communication and growth: A dynamic panel approach. *The School of Economics Discussion Paper Series 0324*, University of Manchester.
- Hulten, C. R. (1996). Infrastructure capital and economic growth: How well you use it may be more important than how much you have., *NBER Working Paper No. 5847*, Cambridge, MA: NBER.
- Ighodaro, C.A.U. & Oriakhi, D. E. (2010). Does the relationship between government expenditure and economic growth follow Wagner's law in Nigeria. *Annals of University of Petrosani Economics* 10,(2), 185-198.
- Isola, W. A. & Alani, R. A. (2017). Human capital development and economic growth: Empirical evidence from Nigeria. *Asian Economic and Financial Review*, 2(7), 813-827.
- Jhingan, M. L. (2011). *The economics of development and planning*. Delhi: Vrinda Publication Ltd.

- Kelly, T. (1997). Public expenditures and growth. *The Journal of Development Studies*, 34(1), 60-84.
- Keynes, J.M. (1936). *The general Theory of Employment, Interest and Money*. SHarcourt: Brace and Co, New York.
- Kneller, R., Bleaney, M. & Gemmell, N. (1999). Fiscal policy and growth: evidence from OECD countries. *Journal of Public Economics*, 74,171-190.
- Kuznets, S. (1961). Long-term trends in capital formation proportions. *Economic Development and Cultural Change*, 9(4), Part II.
- Kuznets, S. (1971). Population, capital and growth, New York, W. W. Norton & Coy Inc.
- Landau, D. (1983). Government expenditure and economic growth: A cross-country study. *Southern Economic Journal* (January).
- Landau, D. (1986). Government and economic growth in the less developed countries: An empirical study for 1960-1980. *Economic Development and Cultural Change*, 35(1), 35-75.
- Lewis, W.A. (1962). Education and economic development. *Caribbean Quarterly*, 7(4), 171-184.
- Loening, L. J. (2002). The impact of education on economic growth in Guatemala. *Ibero-America Institute for Economic Research (IAI)*, Geor- August-Universitat Gottingen.
- Loto. M. A. (2011). Impact of government sectoral expenditure on economic growth. *Journal of Economics and International Finance*, 3(11), 646-652.
- Lucas, S.R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22 : 3-42.
- Maddala, G. S. (1992). Introduction to Econometrics, New Delhi, Willey-India, 127-192,543-570.
- Magazzino, C., Giolli, L. & Mele, M. (2015). Wagner's law and Peacock and Wiseman's displacement effect in European Union countries: A Panel data study. *International Journal of Economics and Financial Issues*, 5(3),812-819.
- Meier, G. M. (1976). Education: Investment in Human Capital-Note, *Leading Issues in Economic Development*, New York, Oxford University Press, 519-523.
- Musgrave, R. A. (1959). *Theory of Public Finance*. New York : McGraw-Hill.
- Musgrave, R. A. (1966). Notes on education investment in developing nations. *OECD study group on the economics of education: financing education for economic growth, Paris*, 31-39.
- Myint, H. (1954). An Interpretation of economic backwardness, *Oxford Economic Papers*, 6(2), 132-163.
- Myint, H. (1962). The Universities of Southeast Asia and economic development, *Pacific Affairs*, 35(2), 116-127.
- Myint, H. (1963). Social flexibility, social discipline and economic growth. Paper Presented to UNESCO Expert Working Group on Social Prerequisites to Economic Growth, Kyrenia Cyprus, (April).

- Nannan, Y. & Jianing, M. (2012). Public infrastructure investment, economic growth and policy choice: Evidence from China. *Crisis Management in the Time of Changing World*.
- Narayan, S. (2006). Estimating income and public expenditure in a co-integration framework. *Economic Modeling*, 22, 423-438.
- Ndubuisi, P. (2018). The role of government sectoral spending on productivity in Nigeria: Error correction analysis. *Journal of Emerging Trends in Economics and Management Sciences*, 9(1):1-11.
- Njoku, A. C., Okezie A. I., & Idika, N. (2014). Is government capital expenditure productive? Evidence from Nigerian manufacturing sector (1971-2012). *Journal of Educational and Social Research* 4(5), 143.
- Nnamdi, I. S., Omotayo, A. F. & Onugha, P. (2018). Public sector human and material capital investments in Nigeria's economic growth process: evidence and insights. *European Journal of Business and Management*, 10(6), 92-103.
- Nurkse, R. (1953). Problems of capital formation in developing countries, *New York: Oxford University Press*, 97-116.
- Nwaolisa, E. F. & Amakor, C. I. (2017). The impact of government expenditure on Nigeria economic growth: A further disaggregated approach. *NG-Journal of Social Development*, 6(3), 34-48.
- Ogboru, I. (2006). *Readings in economic development and planning*. Ilorin: University of Ilorin Press.
- Ogiogio, G. O. (1995). Government expenditure and economic growth in Nigeria. *Journal of Economic Management*, 2(1), Retrieved from <http://astonjournals.com/bes10> on 2/8/17.
- Olulu, R.M., Erhieyovwe, E.K. & Andrew, U. (2014). Government expenditures and economic growth: The Nigerian experience. *Mediterranean Journal of Social Sciences*, 5(10), 89-94.
- Oluwatobi, S.O., & Ogunrinola, O.I. (2011). government expenditure on human capital development: Implications for economic growth in Nigeria. *Journal of Sustainable Development*, 4(3), 72-80.
- Oni, L.B., Akinsanya, T.A. & Aninkan, O.O. (2014). Intellectual capital formation and economic growth in Nigeria. *Journal of Economics and Sustainable Development*, 5(6), 1-8.
- Owolabi-Merus, O. (2015). Infrastructure development and economic growth nexus in Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 5(1), 376-382.
- Peacock, A. T. & Wiseman, J. (1961). Front matter, the growth of public expenditure in the United Kingdom. In *The growth of public expenditure in the United Kingdom*, 32-40. Princeton University Press.
- Ray, S. (2013). An empirical investigation into causal relationship between gross fixed capital formation and stock price in India. *American Journal of Business, Economics and Management*. 1(1), 1-8.

- Robert, B. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), 407-414.
- Roller, L.H. & Waverman, L. (2001). Telecommunications infrastructure and economic development: A simultaneous approach. *American Economic Review*, 91(4), 909–923.
- Romer, P. (1986). Increasing returns and long run growth. *Journal of political Economy*, 94(5), 1002-1039.
- Rosenstein-Rodan, P. N. (1943). Problems of industrialization of Eastern and South-Eastern Europe. *The Economic Journal*, 53(210/211), 202-211.
- Schultz, T.W. (1961). Investment in human capital. *The American Economic Review*, 51,1-17.
- Schultz, T.W. (1962). Investment in human capital in poor countries. *Foreign Trade and Human Capital*, (9), 3-12.
- Shaheen, S., Ali, M.M., Kauser, A., & Ahmed, F.B. (2013). Measuring the dynamic effects of fiscal policy shocks in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, 5(5), 228-240.
- Shuaib, I.M. & Ndidi, D.E. (2015). Capital formation: Impact on the economic development of Nigeria 1960-2013. *European Journal of Business, Economics and Accountancy*, 3(3), 23-40.
- Simon-Oke, O.O. (2012). Human capital investment and industrial productivity in Nigeria. *International Journal of Humanities and Social Science*, 2(16), 298-307.
- Singh, R.J. & Weber, R. (1997). The composition of public expenditure and economic growth: Can anything be learned from Swiss data? *Journal of Economics and Statistics*, 133(3), 617-634.
- Todaro, M. P. & Smith, S. C. (2005). *Economic development*. 9th ed. Pearson Educational Ltd, England.
- Ugwuegbe, S.U. & Uruakpa, P.C. (2013). The impact of capital formation on the growth of Nigerian economy. *Research Journal of Finance and Accounting*, 4(9), 36-42.
- Usman, A.O. & Agbede, E.A. (2015). Government expenditure and economic growth in Nigeria: A cointegration and error correction modelling, Munich Personal (RePEc) Archive, MPRA Paper No. 69814.
- Vincent, M. O., Nwosu, D. C. & Okonma, C. M. (2013). Investment in human capital and growth in Nigeria (1980-2012). *IOSR Journal of Economics and Finance*, 2(2), 41-50.
- Wagner, A. (1890). *Grundlegung des Politician Okonomie Leipzig*. Germany: C.F Winter.
- Werigbelegba, A.P. & Peter, E.G. (2018). Empirical investigation of human capital investments and its effect on economic growth in Nigeria (1990-2017). *European Journal of Business and Innovation Research*, 6(6), 73-80.