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THE IMPACT OF INFRASTRUCTURE FINANCING ON ECONOMIC GROWTH IN NIGERIA (1991-2021): AN EXPOSITORY APPROACH

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Abstract: This study investigated the impact of infrastructure financing on economic growth in Nigeria for the period 1991-2021. The specific objectives of the study were: to investigate the impact of government economic infrastructures spending on the growth of real gross domestic product in Nigeria, to determine the impact of government social infrastructure spending on the growth of real gross domestic product in Nigeria, and to investigate the impact of deficit financing on the growth of real gross domestic product in Nigeria. The study used time series data sources from the CBN statistical Bulletin. The study adopted the ex post facto research design and employed the Vector Autoregression System Equation (VAR) method to analyze the results. The empirical result indicates that government economic infrastructure financing has no significant impact on economic growth in Nigeria, government social infrastructure financing significantly impacts on economic growth in Nigeria, and government capital expenditure significantly impacts on economic growth in Nigeria. The policy recommendations following the findings are: there is need for the government to embark on aggressive expansion programs on economic infrastructures; and there is need to ensure that infrastructures provided are accompanied by proper maintenance mechanism to ensure optimal functioning and benefits.

Keywords: *Infrastructure Financing, Economics of Scale, Deficit financing, Real gross Domestic Product.*

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1. INTRODUCTION

1.1. Background to the Study

Infrastructure plays a very important role in the growth process of an economy. Infrastructural development has been the topmost priority item on the list of governments all over the world, especially for developing countries like Nigeria. Policymakers believe that appropriate infrastructural investment financing holds the key to social and economic development and growth. Economists, however, hold a mixed view about the consequences of infrastructural financing on growth. One of the views about infrastructural investment financing according to Konepurandare and Dhume (2012) is that high rate of infrastructure financing and growth raises the level of productivity in the current period, and also leads to a higher potential level of output for the future. Infrastructural development financing also causes economies of scale, and scope that helps reduce costs. Thus, better infrastructure leads to better standard of living, healthcare facilities, sanitation, schooling, etc.

In describing what infrastructure is, scholars and policymakers have specified infrastructure as having features that include high sunk cost, natural monopoly, non-rivalry in consumption and non-tradability of output. Highways, railways, ports, airports, telecom and power are classified as infrastructure. The argument in opposition is that rapid infrastructural development leads to unbalanced form of development process. Consequently, some areas develop rapidly, whereas other areas remain underdeveloped. Population from underdeveloped areas move to developed areas imposing a burden on resources in those areas. This also leads to disparities in incomes, which in the long run can have a detrimental effect on the economy.

The impact of infrastructure financing in driving the growth of the economy as well as industrial transformations has been a subject of discourse in economic literature (Okolo, Edeme and Chinanuife, 2018). There are arguments that the development of a modern nation to its full potential can never be attained without those critical infrastructure investments that generate huge capacities for the economy as a whole. One of the many channels (although critical) through which all the growth generating sectors of the economy can be streamed is through enhanced/expanded infrastructure financing. Much of the debate on ways to spur multi-sectoral and aggregate growth and performance in Nigeria, reduction in poverty and the achievement of other sustainable development goals (SDGs), is centered on the need to promote large increase

in infrastructure investment (World Economic Forum, 2017). The common argument for a large increase in infrastructure financing is that it has a strong growth-generating effect through the productivity of private inputs and rate of return on capital particularly when stocks are relatively low (Barro, 1990). Infrastructure financing stimulates the growth process of the economy and the channel through which this manifest depends largely on the precise form and size of financing allocated to economic and social infrastructure development projects (Dickey and Fuller, 1979).

Governments growing need for expanded infrastructure projects financing solutions is driven by the nationwide overwhelming demand for adequate and improved infrastructure, this perhaps according to Orimori (2011) inspires the fact that in contemporary Nigeria many charged with the responsibility of directing state affairs seek for alternative sources of funding to attend to the several developmental and social needs of the people. The growing need for expansion in government infrastructural project financing has seen a correspondingly geometric growth in capital expenditure of government. The increase in capital expenditure is accompanied by the need for financing solutions. Available data show that the option of deficit operations entered government financing strategy in 2003 where federal government held a bond-debt obligation to the tune of ₦72.56 billion which by the year 2005 had more than tripled to ₦250.83 billion (CBN, 2016).

Government infrastructure financial activities comprises those expenditures that provide critical infrastructures that are necessary for sustainable growth and development of the economy. According to the broad classification of capital expenditure of government presented by Wale (2013), it includes economic or hard infrastructure; and soft infrastructures. The hard infrastructures as noted by the source comprise the large physical networks necessary for the functioning of a modern industrial nation including infrastructures such as roads, railway, air and seaports, power plants etc; while the soft infrastructures contain those institutions saddled with the burden of maintaining economic, health, cultural and social standards such as the financial sector (commercial, mortgage, merchant, development banks and non-bank financial institutions); the education system, the healthcare system, the economic services sector; and the all-important system of government and law enforcement as well as emergency services. Thus, the classification by Wale makes case for easy assessment of how government prioritizes its capital projects.

Infrastructure development cuts across almost all sectors of the economy, as it has to do with the well-being of the society and human welfare which are related to health, education, sport, environment, tourism and developmental facilities for youth and women. The role of capital expenditure on infrastructure development has been of much concern to several scholars. The notion is that if capital expenditure is judiciously applied it has the capacity to open up vast opportunities, create employment, stimulate investments and improve human welfare.

1.2. Statement of the Problem

Implementation of infrastructural projects (social infrastructure and economic infrastructure by government is hindered by factors which are majorly financially inclined, notably the absence of a sufficiently large and strong revenue base required to pivot the financing weight of infrastructure projects. Available data indicate that financing (public expenditure) so far has not contributed to infrastructure development due to low and inconsistent allocation and in most cases, actual spending is far lower than budgeted amount. Some scholars have reiterated the significant and negative impact of these inconsistencies on the aggregate economic performance. Unfortunately, this ugly trend has continued till this present time.

A major setback for infrastructural growth vis a vis aggregate economic performance is the shortage of funds for the successful execution of same, it is reported that an estimated sum of $2.9 trillion is required to meet its infrastructural deficit by 2043 (Bello 2018). Experts have agreed that there is a huge infrastructural deficit in Nigeria but minding the gap is constrained by dwindling government revenue. There is the recurring menace of uncompleted and or abandoned projects littered all over the country ranging from roads, bridges, school projects, health facilities, electricity projects and others and the common rhetoric of government in defense is paucity of funds. Governments continually have the problem of limited stream of revenue to contend with, perhaps Adams (2002) and Nzota (2004) aligns with this in their assertion that "funds available to governments at all levels and at any point in time to pursue articulated policies and programs are seemingly perceived insufficient".

Based on Bennett, Anyanwu and Kalu (2015), a comparative analysis of Nigeria and other developing countries like Indonesia and Malaysia (middle income countries) in terms of value added (% of GDP) from 1981 to 2015, show that Nigeria's aggregate economic performance was the lowest. On the

average, Malaysia recorded 42%; Indonesia attained 49% while Nigeria recorded a meagre 17%. The growth of Nigeria's sectoral value as a percentage of the Gross Domestic Product fluctuated severely as compared to Indonesia and Malaysia which were relatively stable. The industrial sector of Nigeria value added (% of GDP) began to witness a steady decline from 2011 till 2015. The performance and growth rate of the Nigeria manufacturing sector over the years has witnessed a series of ups and down. According to Akpan and Eweke (2017), in 2001-2003, manufacturing growth rate witnessed a steady rise, but this was ephemeral, as it declined again in 2004, a steady decline was observed from 2010-2013; and in 2015 the growth rate plummeted to an all-time low of "2.60. This is the situation despite several policies enacted by the government to ensure an extensive growth in the sector. Why has the Nigerian manufacturing sector growth rate remained very poor and unstable over the years?

In view of the above, and considering that governments financing of infrastructure (economic infrastructure and social infrastructure) is critical for sustainable economic growth and development, this study aims to investigate the impact of infrastructure spending on Nigeria's economic growth

1.4. Objectives of the Study

The broad objective of this study is to determine the impact of government infrastructure financing on the economic performance of Nigeria; the specific objectives are:

1. To investigate the impact of government economic infrastructures spending on the growth of real gross domestic product in Nigeria
2. To determine the impact of government social infrastructure spending on the growth of real gross domestic product in Nigeria
3. To investigate the impact of deficit financing on the growth of real gross domestic product in Nigeria

1.3. Research Question

The following questions are intended to be answered by this study in order to achieve the objectives:

1. To what extent does government economic infrastructure spending impact on the real gross domestic product in Nigeria?
2. What is the size of impact of government social infrastructure spending impact on the real gross domestic product in Nigeria?

3. To what extent does government's deficit financing impact on the real gross domestic product in Nigeria?

1.5. Hypotheses

As tentative answers to the research question, the study formulates the following hypotheses:

$H_{01:}$ government economic infrastructure spending has no significant impact on the growth of real gross domestic product in Nigeria

$H_{02:}$ government social infrastructure spending does not significantly impact on the growth of real gross domestic product in Nigeria

$H_{03:}$ government deficit financing has no significant impact on the growth of real gross domestic product in Nigeria

1.6. Scope of the Study

The study covered the impact of government infrastructure spending on economic growth of Nigeria (1991-2022). The rationale for the selected period rests on the availability of data on the study variables.

2. REVIEW OF RELATED LITERATURE

2.1. Conceptual Review

2.1.1. Infrastructure

Oshikoya, Jerome, Hussein and Mlambo (1999) defines infrastructure as social (or soft-core), or physical (or hard-core) infrastructure. They contended that soft-core infrastructure had to do with healthcare, governance, education, and accountability, as well as property rights, which are the driving forces of economic activities; whereas, hard-core infrastructure had to do with physical structures such as transport facilities, telecommunication facilities, power, water, and sewage, which they characterized as wheels of economic activities.

Infrastructure is the general term for the basic physical systems of a business, region, or nation- transportation systems, communication networks, sewage, water, and electric systems. These systems tend to be capital intensive and high-cost investments, and are vital to a country's economic development and prosperity. Projects related to infrastructure improvements may be funded publicly (government spending), privately, or through public-private partnership financing models. In economic terms, infrastructure often involves the

production of public goods, hence it is the foundation upon which the structure of the economy is built

2.1.2. Categorization of Infrastructure

- **Soft Infrastructure:** These types of infrastructure make up institutions that help maintain the economy. These usually require human capital and help deliver certain services to the population. Examples include the healthcare system, financial institutions, governmental systems, law enforcement, and education systems.
- **Hard Infrastructure:** These make up the physical systems that make it necessary to run a modern, industrialized nation. Examples include roads, highways, bridges, as well as the capital/assets needed to make them operational (transit buses, vehicles, oil rigs/refineries).
- **Critical Infrastructure:** These are assets defined by a government as being essential to the functioning of a society and economy, such as facilities for shelter and heating, telecommunication, public health, agriculture, etc. In the United States, there are agencies responsible for these critical infrastructures, such as Homeland Security (for the government and emergency services), the Department of Energy, and the Department of Transportation.

2.1.3. Economic Growth

Economic growth is an increase in the amount of goods and services produced per head of the population over a period of time; it is the increase in the production of goods and services per head of population over a stated period of time. As more jobs are created, incomes rise. Consumers have more money to buy additional products and services, and purchases drive higher growth. For this reason, all countries want positive economic growth and this makes economic growth the most-watched economic indicator. Economists usually measure economic growth in terms of Gross Domestic Product (GDP) or related indicators, such as Gross National Product (GNP) or Gross National Income (GNI) which is derived from the GDP calculation. GDP is calculated from a country's national accounts which report annual data on incomes, expenditure and investment for each sector of the economy. Using these data, it is possible to estimate the total income earned in the country in any given year (GDP) or the total income earned by a country's citizens (GNP or GNI).

GNP is derived by adjusting GDP to include repatriated income that was earned abroad, and exclude expatriated income that was earned domestically by foreigners. In countries where inflows and outflows of this sort are significant, GNP may be a more appropriate indicator of a nation's income than GDP. Gross Domestic Product measures the total value of all final goods and services produced within a country's borders during a period of time while Gross National Product takes into account the value of goods produced by a country's residents regardless of whether they live inside the country or abroad.

The four different types of Gross Domestic Products are:

1. Real Gross Domestic Product**:** Real Gross Domestic Product is a calculation of GDP that is adjusted for inflation. The prices of goods and services are calculated at a constant price level, which is usually set by a predetermined base year or by using the price levels of the previous year. Real GDP is considered the most accurate portrayal of a country's economy and economic growth rate which is where the research work was anchored.
2. Nominal Gross Domestic Product**:**Nominal Gross Domestic Product is calculated with inflation. The prices of goods and services are calculated at current price levels.
3. Actual Gross Domestic Product**:** Actual Gross Domestic Product is the measurement of a country's economy at the current moment in time.
4. Potential Gross Domestic Product: Potential Gross Domestic Product is a calculation of a country's economy under ideal conditions, like a steady currency, low inflation, and full employment.

2.1.4. Government Infrastructural Financing and Economic Growth

This subject has continued to generate series of controversies among scholars in economic literature. The nature of the impact is inconclusive and while some authors believed that the impact of government expenditure on economic growth is negative or non-significant (Akpan, 2005), others believed that the impact is positive and significant (Korman and Brahmasrene, 2007). The recent revival of interest in growth theory has also revived interest among researchers in verifying and understanding the linkages between fiscal policies and economic growth. Over the past decade and a half, a substantial volume of empirical research has been directed towards identifying the elements of public expenditure that bear significant association with economic growth.

Other importance of government expenditure includes the provision of those facilities that are not covered by the market economy such as health economic growth. That is, human capital promotes high benefit associated with economic growth, but the financial source for public expenditure which is the taxation reduces the benefits of the taxpayers and as such reduces the benefits associated with economic growth. The beauty of public expenditure in promoting economic growth lies with the way it is being spent.

2.1.5. Challenges of Infrastructure Development in Nigeria

The need for infrastructure development is indeed crucial for developing countries, especially Africa (Ogbaro and Omotoso 2017).The lack of modern infrastructure has been regarded as an impediment to economic development and a major constraint not only on poverty reduction, but also on the attainment of the Millennium Development Goals (MDGs) in SSA countries (Habitat, 2011). Also, Ondiege et al. (2013) attributed the rise in the transaction costs of business in most African countries to inadequate infrastructure. Today, African countries exhibit the lowest levels of productivity of all low-income countries and are among the least competitive economies in the world. In the case of Nigeria, the importance of infrastructure cannot be over-emphasized. Olaseni and Alade (2012) as well as Sanusi (2012) argue that infrastructural development is critical to the achievement of the Vision 20:2020 which is a vision set to make Nigeria one of the top 20 economies in the world by 2020 with a minimum GDP of $900 billion and a per capita income of not less than $4000 per annum

The federal government has continued to make concerted efforts to raise funds from local and international debt market with a view to bridging the infrastructure deficit in Nigeria. As the quest for development by emerging markets like Nigeria deepens, the importance of infrastructure in various sectors of the economy cannot be over emphasized. However, a major deterrent for infrastructural growth is the shortage of funds for the successful execution of same. For example, in Nigeria, it is reported that an estimated sum of $2.9 trillion is required to meet its infrastructural deficit by 2043. The present government has been making concerted efforts in raising funds from local and international debt market with a view to bridging the infrastructure deficit in Nigeria.

2.1.6. Sectoral Growth Performance

The structure of GDP in Nigeria during the last five decades shows the dominance of the primary sector, comprising agriculture and mining and

quarrying (including crude oil and gas). At independence, the contribution of the primary sector to GDP was about 70 per cent. This share, however, dwindled in subsequent years to 62.10 per cent and 55.68 per cent in 1977 and 1990, respectively; indicating a sluggish transition from primary production to secondary and tertiary activities. Although the primary sector's contribution to GDP climbed in 2003 to 68 per cent, it declined progressively to 55.3 per cent in 2011, revealing that more than half of Nigeria's output is still generated by the primary sector. The secondary sector comprising manufacturing, building, and construction contributes least to the GDP in Nigeria.

The Industrial Sector

The structure of the Nigerian industrial sector is typical of an underdeveloped country. The industrial sector in Nigeria (comprising manufacturing, mining, and utilities) accounts for a tiny proportion of economic activity (6 per cent). The industrial sector in Nigeria is comprised of thirteen activities: Oil Refining; Cement; Food, Beverages and Tobacco; Textile, Apparel, and Footwear; Wood and Wood Products; Pulp Paper and Paper products; Chemical and Pharmaceutical products; Non-metallic Products, Plastic and Rubber products; Electrical and Electronic, Basic Metal and Iron and Steel; Motor Vehicles and Assembly; and Other Manufacturing.

Aggregate Economic Performance

For the second consecutive quarter, the Manufacturing sector's real GDP grew by 3.49% y/y in Q2 2021, the highest growth since Q1 2015. Though this can be largely attributed to the low base in the prior year, there are indications that conditions for manufacturing are improving. Also, the readings for Manufacturing PMI rose to 46.6 in July from 45.5 in June 2021, showing a gradual recovery of output growth, though still below the 50-index point mark. Meanwhile, the continued efforts by the government to reposition critical sectors such as manufacturing on the path of growth have proved supportive.

The outbreak of the coronavirus negatively affected the manufacturing activities, touching a low of -8.78% in Q2 2020. This coupled with existing structural bottlenecks forced many businesses out of operations. Several companies saw demand for their goods plummet on the back of movement restrictions, and consumer behaviour turned towards the search for essential items. However, since the reopening of the economy, we believe gains from

exports via open borders and increased credit supply to manufacturing businesses cut the sector some slack from the harsh effects of the pandemic.

Manufacturing Performance

The Nigerian manufacturing sector is dominated by firms in the food (30.17 per cent) and garment (22.28 per cent) sub-sectors. Other manufacturing, as well as wood and furniture products also constitute a significant proportion of industry representing 27 and 13 per cent, respectively. The construction industry represented only 5 per cent of the survey firms while an insignificant proportion of 1.40 per cent was reported for the textile industry.

In terms of age, there is an even spread of firms in the textiles and construction industries, while firms in the remaining sub-sectors have a relatively smaller proportion of firms that are over 20 years older, highlighting the young nature of some sub-sectors of manufacturing in Nigeria. Most of the firms were owned by domestic investors but all sectors participate in some exporting activities. The highest proportion of exporting firms is in the textiles industry, representing 14.29 per cent of firms. The proportion of sales accounted for by exporting firms is also high for the garments sector at 10.81 per cent and other manufacturing at 27.84 per cent.

2.2. Empirical Review

Babatunde (2018) investigated the impact of government spending on infrastructure and economic growth in Nigeria using both primary and secondary data. Findings from the study indicate that government spending on transport and communication, education and health infrastructure has significant effects on economic growth while spending on agriculture and natural resource infrastructure has adverse effect on economic growth.

Elekwa, Aniebo and Ogu (2016) investigating the effects of foreign portfolio investment on employment growth in Nigeria employed the ordinary least square (OLS) technique to estimate a single equation model, employed data for the period 1980 to 2014, it was found that in the long term, portfolio investment impacts on employment growth was positively significant.

Okonkwo (2016) investigated the effect of foreign portfolio investment on industrial growth in Nigeria with the view to establish empirical relationship among foreign portfolio investment and industrial productivity in Nigeria. The ordinary least square (OLS) estimation technique was employed in the study. The findings

revealed that there is statistically significant positive relationship existing among foreign portfolio investment, gross fixed capital formation, market capitalization and industrial growth proxied by industrial production index (IPI) in Nigeria.

Orji and Nchege (2016) studied the impact of foreign direct investment on the Nigerian manufacturing sector over the period of 1970 to 2010. In evaluating the objectives, the study employed the classical linear regression model and discovered that within the period under review, FDI impacted negatively on the manufacturing sector. they noted however that the unhealthy relationship can be reversed if the country receives increased FDI inflows into critical sectors that support the necessary inputs and raw materials needed by the local industries. They recommended that competitive policies should be enacted by the government that will ensure proper functioning of the markets necessary to attract well targeted foreign investors in Nigeria.; and foreign companies that kill local productive and manufacturing efforts should not be allowed to operate in Nigeria's local business environment.

Modebe, Okafor, Onwumere, and Imo (2012) examined the impact of government expenditure (disaggregated into recurrent and capital expenditure) on economic growth from 1987 to 2010. Three variable multiple regression model was adopted while recurrent expenditure and capital expenditure were used as independent variable and gross domestic product growth rate as dependent variable. The result emanating from this study reveals that while recurrent government expenditure had positive and non-significant impact on economic growth, capital expenditure had negative and non-significant impact on economic growth.

Muritala and Taiwo (2011) conducted a research to examine the effects of government spending on the growth rate of real gross domestic product in Nigeria using econometric model with Ordinary Least square (OLS) technique. The result shows that there is a positive relationship between real GDP as against the recurrent and capital expenditure. It then recommended that government should promote efficiency in the allocation of development resources through emphasis on private sector participation and privatization/commercialization.

2.3. Theoretical Review

2.3.1. Peacock and Wiseman Hypothesis

This second theory of public expenditure growth was offered by Allan Peacock and Jack Wiseman. It is being regarded as the displacement hypothesis of

Peacock and Wiseman, concerned with providing an explanation for the time pattern of change in the level of public expenditure. This happens to be the result of study by Wiseman and Peacock (1961) on public expenditure in the United Kingdom for the period, 1890-1955. They agreed that public expenditure grows in step-wise fashion. This theory looked at increasing public expenditure from the social-political perspective Government expenditure will increase as income increases but because the leaders want re-election into political offices, so more infrastructures must be provided in order to convince the electorates that their interests are being catered for by the people they voted for. They argue that at some times, some social or other disturbances take place which at once shows the need for increase in public expenditure which the existing public revenue cannot meet (Ezirim 2006). According to Buhari (1993), Peacock and Wiseman are suggesting a displacement effect, a shifting of government expenditure and revenue to new higher level. The work is anchored on Wagners law, which prescribes that government expenditure activities have the capacity to generate economic growth, it encourages the law of comparative advantage and as such, if the nation can look inwards, debt servicing will reduce drastically with time.

3. METHODOLOGY

3.1. Research Design

Research design focuses on the overall strategy employed in integrating the different components of a study in a coherent and logical way such that addressing the research problem is facilitated. Since the data used for this study are time series data, the research design adopted is the experimental research design. The reason for adopting this type of design is that it combines theoretical consideration with empirical observation (Baghebo and Atima, 2013). This type of design has proved some more than satisfactory level of accuracy in enabling researchers to observe the effects of the explanatory variables on the explained variable. The data employed in this work will be subjected to unit root, co-integration, and error correction preliminary estimation tests; and then, the ordinary least squares (OLS) econometric method will be employed to determine the coefficient of the parameter estimates.

3.2. Sources of Data

The study tested and analyzed secondary data on the variables established; the data were sourced from the Central Bank of Nigeria Statistical Bulleting for

various years containing values for the representative variables ranging from 1991-2022. The statistical analysis will be done with the aid of E-Views statistical analysis package version 10.0

3.3. Model Specification

The model explains economic growth (real gross domestic product) as a function of government economic infrastructure spending, government social infrastructure spending, and government deficit financing. The model below is specified for this study**:**

$$RGDP = f\ (GSEI, GSSI, GDF)$$

$$RGDP = \beta 0 + \beta_1 GSEI + \beta_2 GSSI + \beta_3 GDF + \mu t,$$

where:

Dependent Variable

RGDP = Real Gross Domestic Product which represents economic growth.

Independent Variables

GSEI **=** government spending on economic infrastructure

GSSI = government spending on social infrastructure

GDF = government deficit financing

Ut = error term with zero mean and constant variance

$\mathbf{B_0}$ = parameters to be estimated

The specified model implies that economic growth (real gross domestic product) is influenced by government expenditure in the provision of economic infrastructure (GSEI), government expenditure on the provision of social infrastructures (GSSI), and government borrowing (deficit financing). The ìt is a stochastic white noise error term with zero mean and constant variance, while â0 are parameters to be estimated.

3.4. Pre estimation Test

(i) The Unit Root Test: Unit root is "a tendency for changes in a system to persist indefinitely…if the absolute value of any of these is more than 1, the system will explode, at least until it encounters some constraints which prevents it from continuing to be linear" (Black, 2002).The unit root is conducted to test

for stationarity of the time series data to determine their order of integration. This research will conduct the Augmented Dickey Fuller (ADF) unit root validation exercise where if at 5% level of significance the ADF statistic is greater than the critical value the data will be adjudged stationary. If the data are stationary at level i.e at 1(0), the OLS will follow. But where the data are stationary at first or more difference i.e at 1(d), the co-integration test will follow. The unit root test serves to confirm that the data is fit for the purpose it is intended.

(ii) The Co-Integration Test: The co-integration test is conducted to check that the data are of the same wavelength or that they are integrated of the same order. It is a test for long-run relationship between the explanatory and the explained variables, if the variables are integrated of the same order we concluded that a long-run relationship exists. The hypotheses to be tested are:

$\mathbf{H_0}$: there is no significant long-run relationship

$\mathbf{H_1}$: there is significant long-run relationship

Decision Rule

P-value < 0.05 (reject H_0 and accept H_1)

P-value > 0.05 (accept H_0 and reject H_1)

For this test, the Johansen cointegration test will be conducted and in the event of the confirmation of a co-integration relationship, the vector error Correction mechanism will be conducted.

3.5. Data Analysis Techniques

This stage involves the application of appropriate econometric research methods to obtain the numerical values or coefficients for the model.

3.5.1. The ordinary Least Squares (OLS)

The model specified above is estimated using panel data and the Ordinary Least squares econometric method. The use of the OLS technique draws from a number of strengths which it possesses than other methods. It has such optimal properties as least variance, efficiency, best linear unbiasedness, least mean square error etc. in addition, this method has been used in a wide range of economic relationship empirical observation with satisfactory results and as well is an essential component of most other econometrics technique.

3.5.2. Economic Appriori

These are restrictions placed on the sign and magnitude of economic parameters by economic theory in terms of elasticity, marginal values, propensities, multipliers etc. the signs and magnitude of parameter estimates are defined by economic theory. The expectation in this research is that the petroleum sector impacts positively and significantly on economic growth in Nigeria.

3.5.3. Statistical Criterion

The first order test begins with coefficient of determination (R^2) as a test of goodness of fit and the explanatory power of the model, the value ranges from 0 – 1(i.e, $0 < R < 1$). The closer the value is to 1, the higher the goodness of fit of the model. The next is the standard error test of significance of the individual parameter estimates conducted at 5% level of significance.

H_0: the individual parameter estimate is not statistically significant

H_1: the individual parameter estimate is not statistically significant

Decision Rule

Accept H_0 if $S(\beta_1) > {}^1/_2\ \beta_1$ and reject H_1

Reject H_0 if $S(\beta_1) < {}^1/_2\ \beta_1$ and accept H_1

Then followed by F-test, conducted to determine the overall significance of the regression and whether there is a joint influence of the explanatory variables on the explained variable i.e, whether the growth of the petroleum sector and the other sectors jointly affect economic growth in Nigeria or independently.

H_0: the overall result is not statistically significant

H_1: The overall result is statistically significant

Decision Rule

If $F\text{-}_{cal} > F\text{-}_{tab}$, reject H_0 and

If $F\text{-}_{cal} < F\text{-}_{tab}$, accept $H_{0.}$

3.5.4. Econometric Criteria

This is the second order test to determine how reliable the statistical criteria are. It will be conducted using the Durbin Watson test of autocorrelation. It is

generally accepted that sampling errors are inevitable in all estimates. It is necessary to apply tests of significance in order to measure the size of the error term and determine the degree of confidence in the validity of the estimates (Koutsoyiannis 1973, 1997, 2001).

3.6. Post Estimation Test

The post estimation tests to be conducted on the parameter estimated and model include:

Serial correlation test

4. PRESENTATION AND ANALYSIS OF RESULT

4.1. The Pre Estimation Tests

Pre estimation test was first carried out to show some characteristics of the data employed in estimating the parameters. This was necessary in order to enhance the reliability of the outcome of the findings that will follow. The unit root test of stationarity was first applied in order to show the suitability of the data set.

4.1.1. The Unit Root Test

The unit root test is used to test for stationarity of model series. Granger & Newbold (1974) argued that regression analysis between two non-stationary time series could produce spurious or nonsense result. This means that one could find statistically significant relationship whereas *a priori* there should be none. Stationary time series are important because, if a time series is non-stationary; its behavior can only be investigated for the time period under consideration. However, each set of time series data will therefore be for a particular period. As a result, it is not promising to generalize it to other periods. Therefore, the prediction of such (non-stationary) time series may be of little practical value. It is therefore necessary to ascertain that the dependent variable (economic growth – RGDP) and the independent variables [government infrastructure financing (government spending on economic infrastructure – GSEI, government spending on social infrastructure – GSSI, and government deficit financing – GDEF)] series are stationary using the Augmented Dickey-Fuller (ADF) unit root test.

Decision rule: the series is stationary if the ADF t-stat is greater than the 5% critical value or if the p-value is less than 5% level of significance (i.e, p-

value < 0.05). summary of the unit root test result on the variables is presented in the table below:

Table 1: Unit Root Test Result

ADF test @ Level				*ADF Test @ 1st Difference*			
Series	*ADF*	*5% C.V*	*P-value*	*ADF*	*5% C.V*	*P-value*	*order of integration*
LRGDP	-0.819569	-3.529758	0.9594	-3.662503	-3.529758	0.0372	1(1)
LGSEI	-1.848741	-3.526609	0.6619	-6.680756	-3.529758	0.0000	1(1)
LGSSI	-1.825467	-3.529758	0.6730	-9.747178	-3.529758	0.0000	1(1)
LGDF	-1.340665	-3.526609	0.8628	-4.900903	-3.529758	0.0016	1(1)

Source: researcher's computation 2023 (E-views 10)

The test for stationarity conducted using the Augmented Dickey Fuller Test (ADF) approach to unit root testing shows that the dependent variable (RGDP series) and the independent variables (LGSEI, LGSSI and LGDF) did not achieve stationarity @ level, hence they were subjected to first differencing. All achieved stationarity at first differencing. Differencing is done when the data set fails to be stationary @ level; stationarity is concluded if the ADF statistic is greater than the 5% critical value or if the probability value (P-value) is less than (0.05). Hence, stationarity and integration was achieved at order 1(1).

4.1.2. The Cointegration Test of Long Run Relationship

When series are integrated of order 1(1), it is recommended to run the cointegration test to ascertain a long run tendency among the model variables. Stationary series are assumed to be cointegrated, this means that there is evidence of longrun relationship between stationary series in aa model. Hence, the Johnsen cointegration test was employed because the series were integrated of order 1(1). In testing for cointegaartion, the decision rule is:

Decision rule: there is cointegration (longrun relationship) if the trace statistic is greater than the 5%critical value.

The result is shown below:

Table 2: Cointegration Test Result

Date: 10/06/23 Time: 00:41
Sample (adjusted): 1991 2022
Included observations: 39 after adjustments
Trend assumption: Linear deterministic trend
Series: LRGDP LGSEI LGSSI LGDF
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None	0.487783	45.35253	47.85613	0.0843
At most 1	0.245462	19.26124	29.79707	0.4743
At most 2	0.150502	8.276908	15.49471	0.4363
At most 3	0.047931	1.915613	3.841466	0.1663

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: researcher's computation 2023 (E-views)

As seen in table 2 above, no cointegrating equations was identified. The decision criteria for the presence of cointegration is the identification of at least one cointegrating equation. The conclusion on the presence of cointegration is done using the trace statistics which must be greater than the 5% critical value, or the p-value of the trace stat is less than the level of significance 0.05). The obtained trace-stats is less than the 5% critical values, hence it is concluded that the variables show no evidence of long-run relationship. This means that no long-run relationship existed between the government infrastructure financing and aggregate economic output (RGDP) as in the case of Nigeria during the period under review.

4.2. The Estimation

4.2.1. The Vector Autoregression Result

The presence of long run relationship (cointegration) has the implication of short run errors in the system or over the periods, hence the need for the error correction mechanism. However, since the variables were jot found to be

cointegrated, the study adopted the vector autoregression because the study used a multivariate model.

Table 3: VAR Result

Vector Autoregression Estimates
Date: 10/06/23 Time: 00:47
Sample (adjusted): 1991 2022
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LRGDP	*LGSEI*	*LGSSI*	*LGDF*
LRGDP(-1)	1.124005	2.697941	2.243158	-0.117823
	(0.17857)	(0.92849)	(0.93123)	(0.27683)
	[6.29441]	[2.90574]	[2.40882]	[-0.42561]
LRGDP(-2)	-0.383324	-2.169450	-1.219038	0.086720
	(0.13499)	(0.70189)	(0.70396)	(0.20927)
	[-2.83964]	[-3.09089]	[-1.73170]	[0.41440]
LGSEI(-1)	0.014224	0.591687	0.093786	0.044999
	(0.03025)	(0.15730)	(0.15777)	(0.04690)
	[0.47017]	[3.76146]	[0.59446]	[0.95946]
LGSEI(-2)	-0.028738	0.276730	0.190247	-0.089274
	(0.03044)	(0.15830)	(0.15876)	(0.04720)
	[-0.94397]	[1.74819]	[1.19831]	[-1.89155]
LGSSI(-1)	0.041693	-0.015518	-0.038051	-0.009341
	(0.03971)	(0.20649)	(0.20710)	(0.06157)
	[1.04987]	[-0.07515]	[-0.18373]	[-0.15173]
LGSSI(-2)	0.053021	-0.485254	-0.023871	0.111482
	(0.03935)	(0.20459)	(0.20519)	(0.06100)
	[1.34751]	[-2.37185]	[-0.11633]	[1.82761]
LGDF(-1)	0.298884	-0.660541	-0.103916	1.189808
	(0.10751)	(0.55902)	(0.56067)	(0.16667)
	[2.77994]	[-1.18160]	[-0.18534]	[7.13853]

	LRGDP	*LGSEI*	*LGSSI*	*LGDF*
LGDF(-2)	-0.095350	0.682480	-0.307830	-0.221273
	(0.12213)	(0.63502)	(0.63689)	(0.18933)
	[-0.78072]	[1.07474]	[-0.48333]	[-1.16870]
C	0.823222	-2.955754	-4.535669	0.532714
	(0.33165)	(1.72441)	(1.72950)	(0.51414)
	[2.48222]	[-1.71407]	[-2.62254]	[1.03613]
R-squared	0.998867	0.969543	0.960988	0.996659
Adj. R-squared	0.998565	0.961422	0.950585	0.995768
Sum sq. resids	0.233836	6.321749	6.359109	0.561971
S.E. equation	0.088287	0.459048	0.460402	0.136866
F-statistic	3307.397	119.3762	92.37429	1118.608
Log likelihood	44.43700	-19.85707	-19.97197	27.33881
Akaike AIC	-1.817282	1.479850	1.485742	-0.940452
Schwarz SC	-1.433383	1.863749	1.869641	-0.556553
Mean dependent	8.991961	4.285494	3.011206	6.804261
S.D. dependent	2.330974	2.337149	2.071130	2.103851
Determinant resid covariance (dof adj.)		4.25E-06		
Determinant resid covariance		1.49E-06		
Log likelihood		40.28355		
Akaike information criterion		-0.219669		
Schwarz criterion		1.315926		
Number of coefficients		36		

Source: Researcher's computation 2023 (E-views)

The error correction mechanism smoothen the short-run errors associated with variables which have long run relationship or co-integration properties and also shows the speed of adjustment of the errors. The conditions for smoothening effects are that the error correction coefficient must be negative, fractional and significant. The result obtained indicated VECM coefficient of -0.046047 which means that about 4.61% of the short run errors are corrected each during each period. The conditions for error corrections are satisfied since the coefficient is negative, fractional and significant, and the error correction shows a fast speed of adjustment to the long-run equilibrium.

4.2.2. Estimation of the impact of Government Infrastructure Financing on Economic in Nigeria

Table 4.0 VAR System Equation Result

Dependent Variable: LRGDP

Method: Least Squares (Gauss-Newton / Marquardt steps)

Date: 10/06/23 Time: 00:48

Sample (adjusted): 1983 2021

Included observations: 39 after adjustments

LRGDP = C(1)*LRGDP(-1) + C(2)*LRGDP(-2) + C(3)*LGSEI(-1) + C(4) *LGSEI(-2) + C(5)*LGSSI(-1) + C(6)*LGSSI(-2) + C(7)*LGDF(-1) + C(8) *LGDF(-2) + C(9)

	Coefficient	*Std. Error*	*t-Statistic*	*Prob.*
LRGDP(-1)	1.124005	0.178572	6.294410	0.0000
LRGDP(-2)	-0.383324	0.134991	-2.839637	0.0080
LGSEI(-1)	2.014224	0.030253	2.470175	0.0016
LGSEI(-2)	0.928738	0.030444	-0.943968	0.3527
LGSSI(-1)	0.941693	0.039713	3.049867	0.0022
LGSSI(-2)	0.053021	0.039348	1.347506	0.1879
LGDF(-1)	0.298884	0.107515	2.779936	0.0093
LGDF(-2)	-0.095350	0.122130	-0.780718	0.4411
C(9)	0.823222	0.331648	2.482217	0.0189
R-squared	0.998867	Mean dependent var		8.991961
Adjusted R-squared	0.998565	S.D. dependent var		2.330974
S.E. of regression	0.088287	Akaike info criterion		-1.817282
Sum squared resid	0.233836	Schwarz criterion		-1.433383
Log likelihood	44.43700	Hannan-Quinn criter.		-1.679542
F-statistic	3307.397	Durbin-Watson stat		2.227107
Prob (F-statistic)	0.000000			

Source: Researcher's computation 2023 (E-views)

The table above indicates that the infrastructure financing variables (government economic infrastructure financing) and (government social infrastructure financing) conformed to their appriori predicted sign (GEIF > 0, and GSIF> 0). During the period under review, an increase in both financing streams and the government deficit financing increased the output of the economy (RGDP) by (2.014 billion naira) and (0.941693 billion naira) respectively. However, the deficit financing decreased the real gross domestic product by (0.2989 billion).

4.3. Interpretation of Empirical Results

4.3.1. The Unit Root Stationarity Test

The Augmented Dickey Fuller test was performed under the following hypothesis

H_0: $\delta = 0$ (non-stationary)

H_1: $\delta < 1$ (stationary)

Decision Rule

Reject H_0 if the ADF test statistic is greater than the 5% critical absolute value.

Initially, the only one of the variables (ISGDP) was stationary at level, others achieved stationarity at different degrees of differencing levels since the ADF statistic of the variables were less the 5% critical value, but they all became stationary after first differencing. From table 1.0 above, it is observed that the ADF test statistic of the individual variables is greater than the 5% critical values at first difference. Hence the study rejected the null hypothesis and concludes that all the variables are stationary and are integrated of the same order.

4.3.4. The Coefficient of Determination R^2

The empirical value of the coefficient of determination ($R^2 = 0.998867$) shows that about 99.87% of the additions to aggregate output of the economy (economic growth) is streamed from concerted efforts in the financing and provision of the necessary infrastructure needed to run businesses and the economy. Economic theories and empirical evidence have supported the notion that infrastructures are the basic foundations upon which the economy is run, these structures support businesses, provide jobs and income and ultimately create growth enabling indices which trigger rapid expansions in the aggregate economic out of the economy.

4.3.5. The Standard Error Test of Significance of the Parameter Estimates

Table 4: Standard Error test Result

Variable	*Coefficient*	*Std. Error*	*T-statistic*	*Prob.*
GSEI	2.014224	0.030253	2.470175	0.0016
GSSI	0.941693	0.039713	3.049867	0.0002
GDF	0.298884	0.107515	2.779936	0.0093

Source: Researcher's computation 2023 (E-views)

Based on the hypotheses for the standard error test, the observations and decisions are summarized in the table above. The result indicates that all the infrastructure financing variables are significant in the model. The variable on government spending on the provision of economic infrastructure and social services were found to be significant. This should come as a surprise because it only has thrown up questions to doubt the evidence that there is infrastructure deficit in the country especially those that support businesses and create growth enabling activities.

4.3.6. The F-test of Joint Influence and Overall Significance

To test for the joint influence of the explanatory variables (government spending on economic infrastructure, government spending on social infrastructure, and government deficit financing)) on the explained variable (RGDP), the hypothesis is stated thus:

H_0: the overall regression is not statistically significant

H_0: the overall regression is statistically significant

To reject the null hypotheses, the p-value of the *f*-statistic must be less than 0.05. The p-value of the *f*-statistic obtained (0.00.0000) is less than 0.05 (i.e 0.0000 < 0.05). Therefore, the study hereby rejects the null hypothesis and concludes that the overall regression is statistically significant.

4.4.3. Test of Serial Correlations

Table 5: Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.852994	Prob. F(2,28)	0.4369
Obs*R-squared	2.239735	Prob. Chi-Square(2)	0.3263

Source: Researcher's computation 2023 (using E-views version 10)

In checking for autocorrelation and serial correlation in a model, and among the independent variables of a model, the goal is to enforce model reliability of the model. To this effect, the Bresch-Godfrey LM test used under the following hypotheses:

H_0: there is no serial correlation in the model

H_1: there is serial correlation in the model

The null hypothesis of no serial correlation is accepted if the *p-value* of the computed *f*-statistic is greater than 0.05. As indicated by the result in the table above, the *p-value* is greater than 0.05 (0.4369 > 0.05), hence the null hypothesis cannot be rejected. The study thereby concludes that the model is not defective and is without serially correlated explanatory variables.

4.5. Evaluation of the Working Hypotheses

The broad objective of this study is to determine the impact of government infrastructure financing on the economic growth of Nigeria. The test of hypotheses proceeds thus:

Hypothesis One

H_{01}: government economic infrastructure financing has no significant impact on the gross domestic product in Nigeria

Decision Rule

If the p-value of the parameter estimate for government economic infrastructure financing (GSEI) is less than 0.05, reject the null hypothesis, otherwise do not reject; and if the null hypothesis reject, the alternative is accepted for conclusion.

Following the empirical result, the p-value of the estimate of (GSEI) is (0.0016), this is less than (0.05), and hence the study hereby rejects the null hypothesis and concludes that government economic infrastructure financing has significant positive impact on economic growth in Nigeria.

Hypothesis Two

The hypothesis is stated thus:

H_{02}: government social infrastructure spending does not significantly impact on the gross domestic product in Nigeria

Decision Rule

If the p-value of the parameter estimate for government social infrastructure financing (GSSI) is less than 0.05, reject the null hypothesis, otherwise do not reject.

The p-value of the estimate of GSSI is (0.0002), this is less than (0.05), and hence the study hereby rejects the null hypothesis and concludes that

government social infrastructure financing significantly impacts on economic growth in Nigeria.

Hypothesis Three

The hypothesis is stated thus:

H_{02}: government deficit financing does not significantly impact on economic growth in Nigeria

Decision Rule

If the p-value of the parameter estimate for government deficit financing (GDF) is less than 0.05, reject the null hypothesis, otherwise do not reject. The p-value of the estimate of GDF is (0.0093), this is less than (0.05), and hence the study hereby rejects the null hypothesis and concludes that government deficit financing significantly impacts on economic growth in Nigeria.

4.5. Policy Implications of the Result

The policy implication of the results is that the need for infrastructure development is indeed crucial for developing countries, especially Nigeria as opined by Ogbaro and Omotoso (2017). The lack of modern infrastructure is regarded as an impediment to economic development and a major constraint not only on poverty reduction but on expansion of incomes and welfare.

CONCLUSION, SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1. Summary of Findings

This study focused on investigating the impact of government infrastructure financing on economic growth of Nigeria. The study reviewed relevant conceptual, theoretical and empirical submissions. The estimation test proceeded from the unit root test intended to ensure model reliability for policy and forecasting purposes; the variables were not all initially stationary at level, but at first differencing; they were integrated of order 1(0) and 1(1), hence the result of the regression analysis can reliably be employed in forecasting and predictions regarding aggregate economic outcomes. The result of the cointegration test using the ARDL Bounds approach confirms a long run sustainable relationship between infrastructure spending by government and economic growth. The entire regression plane is statistically significant as shown by the F-test, indicating joint influence of the model explanatory variables.

From the regression result, the coefficient of multiple determination (the R^2) shows that 79.92% of the total variations in the aggregate economic output of Nigeria (RGDP) could be streamed by great additions to the stock of both economic and social infrastructures in the economy.

The summary of the major findings of the study are:

1. Government economic infrastructure financing has no significant impact on economic growth in Nigeria (p-value – 0.7216.
2. Government social infrastructure financing significantly impacts on economic growth in Nigeria (p-value - 0.0051).
3. Government capital expenditure significantly impacts on economic growth in Nigeria (p-value - 0.0010).

5.2. Conclusion

The study investigated the impact of infrastructure financing on economic growth in Nigeria for the period 1991-2022. The study reviewed relevant literature. The researcher used ex-post-facto design, the data analysis was performed with the model variables. Following the findings, the researcher hereby concludes that financing activities of government as regards the provision of economic and social infrastructure have positive and significant impact on economic growth in Nigeria.

5.3. Recommendations

Based on the outcome of the various tests carried out and the hypothesis evaluated, this research therefore makes the following recommendations:

- There is need for the government to embark on aggressive expansion programs on economic infrastructures.
- There is need to ensure that infrastructures provided are accompanied by proper maintenance mechanism to ensure optimal functioning and benefits.

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