

EVALUATION OF AGRICULTURAL INFRASTRUCTURE EXPENDITURE FOR ECONOMIC GROWTH BY THE NIGERIAN GOVERNMENT

Rufus, Emmanuel-Ubong Ita

Department of Accounting,
Faculty of Administration and Management Sciences,
University of Calabar.
emmanuelrufus86@gmail.com

Utibe, Oliver Bassey

Department of Banking and Finance,
Faculty of Administration and Management Sciences,
University of Calabar.
utibe_bassey@outlook.com

Abstract

The development of agricultural infrastructure is widely recognized as a critical factor in fostering economic transformation and sustainable national growth. As a productive sector, agriculture contributes significantly to both microeconomic activities and broader macroeconomic performance. This study examined the effect of public expenditure on agricultural infrastructure on economic growth in Nigeria. Specifically, it investigated whether government spending on agricultural infrastructure has contributed meaningfully to the country's economic performance. The study utilized annual time-series data covering the period 1999–2022, obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, CBN Annual Reports and Statements of Accounts, and the National Bureau of Statistics (NBS). Data analysis was conducted using descriptive statistics, the Augmented Dickey-Fuller unit root test, Johansen co-integration technique, and the Error Correction Model (ECM). The empirical findings revealed that government expenditure on agricultural infrastructure exerted a negative but statistically insignificant influence on economic growth during the period under review. Based on the findings, the study recommends the formulation and implementation of policies aimed at increasing the efficiency and effectiveness of agricultural infrastructure spending. Enhanced investment in rural infrastructure, irrigation facilities, storage systems, and agricultural support services is also advocated to strengthen the sector's contribution to long-term economic growth and development in Nigeria.

Keywords: Agricultural Infrastructure, Public Expenditure, Economic Growth, Government Investment, Nigeria.

1.1 Introduction

Government involvement remains essential for achieving socioeconomic and developmental objectives. Public authorities coordinate economic activities, provide public services, and create conditions necessary for sustainable growth. Government intervention is often justified by the inability of market forces alone to allocate resources efficiently and equitably, particularly in sectors requiring large-scale social and infrastructural investments (Agbonkhese & Asekhome, 2014). Consequently, governments are responsible for ensuring security, protecting property rights, maintaining law and order, and providing critical public goods such as transportation, education, healthcare, energy, and agricultural support services (Eneyo et al., 2022; Sunday,

2025). Public expenditure therefore serves as a major policy instrument through which governments influence economic performance and social welfare (Okoro, 2015).

A central objective of economic policy is sustained economic growth, which improves living standards, creates employment, and supports long-term development. Economic growth reflects an expansion in productive capacity and is commonly measured by changes in Gross Domestic Product (GDP). According to Inah et al. (2022), it represents a nation's ability to generate higher levels of output over time. For developing countries such as Nigeria, economic growth is vital for addressing poverty, unemployment, and structural underdevelopment. Government expenditure is therefore regarded as a strategic tool for promoting economic transformation and national development (Rufus, 2023).

Despite extensive government spending programmes in developing economies, the relationship between public expenditure and economic growth remains controversial. While some scholars argue that government spending stimulates aggregate demand and output growth, others contend that excessive expenditure may crowd out private investment and weaken economic performance. Empirical studies by Akpan and Abang (2013), Okoro (2013), and Inah et al. (2022) found positive effects of government expenditure on Nigeria's economic growth, although spending financed through excessive borrowing may generate fiscal pressures that undermine long-term growth.

Particular attention has been given to infrastructure expenditure because of its ability to enhance productivity and economic efficiency. Investments in transportation, communication, healthcare, education, and energy infrastructure are widely recognized as catalysts for growth and development (Esuabana, 2019). In Nigeria's federal system, expenditure responsibilities are shared among federal, state, and local governments under the framework of fiscal federalism (Buhari, 2011; Usman, 2011).

The expenditure-growth nexus continues to attract scholarly attention due to its policy significance. Keynesian economists argue that public spending stimulates economic activity through increased aggregate demand, whereas Classical and Neoclassical theorists caution that excessive government intervention may distort markets and reduce efficiency. Barro (1989) and Friedman (1997) propose a nonlinear relationship, suggesting that government expenditure promotes growth only up to an optimal threshold.

Sustained economic growth remains a major objective of both developed and developing nations. According to Ijuo and Andohol (2020), governments continuously pursue policies aimed at accelerating development and improving living standards. Public expenditure has therefore become a key mechanism for achieving these goals. However, many developing countries, including Nigeria, face fiscal challenges arising from increasing expenditure obligations, inadequate revenues, and persistent budget deficits (Kolawole, 2016).

Infrastructure remains a critical driver of economic development because it supports production, distribution, and consumption activities. Investments in transportation, education, healthcare, communication, agriculture, and energy improve productivity, business performance, and national income (Kolawole, 2016). Given the capital-intensive nature of infrastructure projects, government spending in this sector constitutes a substantial share of public budgets.

Agriculture occupies a strategic position in the development process of emerging economies. It provides food, raw materials, employment, and income, making it fundamental to both human survival and economic progress (Jerzy, 2013). In Nigeria, agriculture remains a dominant activity in rural areas and contributes significantly to employment and national output. Before the rise of the petroleum sector, agriculture accounted for approximately 75–80 percent of

GDP. Although its relative contribution has declined, the sector remains crucial for food security, employment generation, and economic stability.

Despite its importance, Nigeria's agricultural sector faces challenges including inadequate infrastructure, low productivity, limited technological adoption, poor storage facilities, and weak market linkages. These constraints have hindered its capacity to support industrialization and generate foreign exchange earnings. Given Nigeria's comparative advantage in agriculture, greater investment in the sector is necessary for sustainable growth and structural transformation.

Agriculture contributes to economic development by ensuring food security, creating employment, increasing rural incomes, supplying industrial raw materials, generating export earnings, and improving rural welfare (Michael & Stephen, 2021). As noted by Kuznets (1964), a major challenge of development is mobilizing resources from agriculture to support industrialization without reducing agricultural productivity. Therefore, successful economic transformation depends on both the generation and efficient utilization of agricultural surpluses within the broader economy.

1.2 Review of Literature

A. Theoretical framework

I. Keynesian Theory of Public Expenditure

The Keynesian Theory of Public Expenditure originated from the pioneering works of John Maynard Keynes, particularly his influential publication, *The General Theory of Employment, Interest and Money*, published in 1936 (Keynes, 1936). The theory emerged in response to the unprecedented economic challenges of the Great Depression and represented a significant departure from classical economic thought. Keynes argued that periods of economic stagnation are often caused by insufficient aggregate demand, leading to high unemployment, low investment, and reduced productive activities (Keynes, 1936). Consequently, he emphasized the necessity of active government intervention through fiscal policy to stabilize economic conditions and stimulate growth.

According to Keynes (1936), public expenditure constitutes a powerful macroeconomic policy instrument capable of influencing aggregate demand and promoting economic recovery. He maintained that increases in government spending generate a multiplier effect, whereby an initial injection of public funds produces a larger increase in national income and output. This perspective suggests that strategic public expenditure can stimulate economic activities, encourage investment, create employment opportunities, and foster long-term economic growth. Thus, the Keynesian framework advocates a proactive governmental role in economic management, especially during periods of recession and economic instability (Essien, 2017).

The theoretical foundation of Keynesian economics was shaped by the economic realities of the 1930s. During the Great Depression, many economies experienced persistent unemployment and declining output despite expectations that market forces would naturally restore equilibrium. Classical economists believed that falling wages and prices would eventually stimulate demand and return the economy to full employment. Keynes (1936), however, observed that these self-correcting mechanisms were insufficient to resolve severe economic downturns. Consequently, he proposed government intervention as a means of restoring confidence, stimulating spending, and revitalizing economic activities.

A central proposition of Keynesian economics is the rejection of the assumption that economies automatically return to full-employment equilibrium. Keynes (1936) argued that

pessimistic expectations among households and firms can trigger a cycle of declining spending, reduced investment, lower production, and rising unemployment. Such conditions may persist indefinitely unless deliberate policy measures are implemented. To address this challenge, Keynes advocated counter-cyclical fiscal policies, whereby governments increase expenditure and, where necessary, finance deficits during periods of economic contraction in order to compensate for declining private-sector demand (Barro, 1989).

Within the Keynesian framework, government expenditure extends beyond economic stabilization to include the provision of essential social services. Public investment in sectors such as healthcare and education is regarded as necessary because these services generate significant social benefits that may not be adequately supplied by the private sector. In many developing countries, access to quality healthcare and education is constrained by income limitations and market imperfections, thereby necessitating government intervention (Akpa & Agba, 1989).

The health sector, for instance, contributes significantly to labour productivity and economic performance. A healthy workforce is more productive and capable of contributing effectively to national development, whereas poor health outcomes can reduce efficiency and hinder growth. Similarly, education enhances human capital formation, technological innovation, and workforce competence. Because educational benefits extend beyond individual recipients to society at large, governments frequently intervene through direct provision, subsidies, grants, and other support mechanisms to ensure broader access and affordability (Akpa & Agba, 1989).

In addition to social services, governments incur expenditure on administrative functions and institutional operations. Such expenditures include the procurement of equipment, office facilities, and other resources required for the efficient functioning of public institutions. In some instances, governments also participate directly in economic production through public enterprises and state-owned corporations. According to Nwabueze (2018), these expenditures may involve either the direct production of goods and services or transfer payments made to households, firms, and other institutions for developmental purposes.

Keynes further maintained that expansionary fiscal policy, characterized by increased public expenditure and lower taxation, can stimulate aggregate demand and encourage private-sector investment (Keynes, 1936). The resulting increase in spending generates additional income throughout the economy, thereby initiating a multiplier process in which one person's expenditure becomes another person's income. As this process continues, total output expands beyond the value of the initial government expenditure.

The effectiveness of the multiplier process depends largely on the marginal propensity to consume, which reflects the proportion of additional income that households spend rather than save. Keynes and his followers argued that higher consumption expenditure promotes demand, stimulates production, and encourages employment creation, thereby contributing to economic growth and development (Friedman, 1997).

Although contemporary economists differ regarding the magnitude of fiscal multipliers and the effectiveness of government intervention, the Keynesian framework remains highly influential in economic policy formulation. The theory continues to provide a valuable basis for understanding the role of public expenditure in promoting macroeconomic stability, stimulating growth, and mitigating the adverse effects of economic recessions (Romer, 1986). Its central proposition remains that well-targeted and efficiently managed public spending can serve as an effective instrument for enhancing economic performance and advancing sustainable development.

Agba (1989) have demonstrated that if education is left in the private sector, it will be under-supplied in order to maximize profits. This will be by charging exorbitant fees which most Nigerians will be unable to pay. Accordingly, the government either intervenes and supplies it directly (through government owned institutions) or through grants-in-aid to the private suppliers. These grants can induce them not to charge the maximum fees.

The government in some instances undertakes direct purchases so as to provide for the running of its administrative machinery. This category of government expenditures takes the form of the purchase of office furniture, fixtures and fittings, stationeries etc. All these activities cost money. The experience in most Third World countries is that their governments also dabble into other economic activities such as production of goods and services that are more profitably operated by the private sector. Nwabueze (2018) has noted the rather large size of the government's parastatal companies which were considered excessive. Technically, where the expenditure involves the production of goods and services they are described as exhaustive. On the contrary, they are transfers in nature if money is transferred from the government to the private sector institutions or individuals.

Drawing from his analysis of the Great Depression, Keynes proposed that governments should adopt expansionary fiscal measures, particularly by increasing public expenditure and reducing taxation, as a means of stimulating aggregate demand and revitalizing economic activities (Keynes, 1936). He argued that economic recovery could be accelerated when governments actively intervene in the economy to compensate for deficiencies in private-sector spending. Consequently, Keynesian economics evolved into a framework that emphasizes the use of fiscal policy as a tool for maintaining macroeconomic stability, and minimizing economic losses.

1.3 Objective of the study

The key objective of the study was to examine the impact of federal government's agricultural infrastructures expenditure on economic growth, measured in terms of the gross domestic product (GDP) in Nigeria. Time series data from 1999-2022 was adopted for the study. This was extracted from the Central Bank's (CBN's) statistical report, the Central Bank's Annual Statement of Accounts, and the National Bureau of Statistics' (NBS) reports.

1.4 Research question

From the objective, the research question posed was: What is the impact of federal government expenditure in agricultural infrastructures on Nigeria's GDP?

1.5 Hypothesis

The formulated hypothesis stated in null form is:

Ho: There is no significant relationship between government expenditure in agricultural infrastructure and Nigeria's GDP.

Hi: There is a significant relationship between government expenditure in agricultural infrastructure and Nigeria's GDP.

1.6 Methodology

Research Design

This study adopted an ex-post facto research design because it relied on historical data that had already been generated prior to the commencement of the investigation. The choice of this design was informed by the nature of the variables under examination, which could not be

manipulated or controlled by the researcher. Ex-post facto research involves the analysis of events and conditions that have already occurred, using existing data to establish relationships among variables (Ndiyo, 2005). Consequently, the design was considered appropriate for examining the relationship between government expenditure on agricultural infrastructure and economic growth in Nigeria.

Population and Scope of the Study

The study focused on Nigeria's agricultural infrastructure expenditure and its influence on economic growth. The population of the study comprised all recorded government expenditures directed toward agricultural infrastructure development within the Nigerian economy over the period under review. Specifically, the investigation covered annual observations spanning from 1999 to 2022, thereby providing sufficient data for assessing both short-run and long-run relationships among the variables.

Sources of Data

The study relied exclusively on secondary data obtained from official and credible sources. The data were sourced primarily from various editions of the Central Bank of Nigeria (CBN) Statistical Bulletin, complemented by information obtained from the National Bureau of Statistics (NBS) and relevant CBN Annual Reports. These sources were selected because of their reliability, consistency, and widespread acceptance in economic and financial research.

Data Collection Procedure

Annual time-series data covering the period from 1999 to 2022 were collected for the variables included in the study. Government expenditure on agricultural infrastructure served as the independent variable, while Gross Domestic Product (GDP) was employed as a proxy for economic growth. The selected period provided adequate observations for evaluating the effect of public investment in agricultural infrastructure on Nigeria's economic performance.

Techniques of Data Analysis

A combination of econometric and statistical techniques was employed to analyze the data. Initially, descriptive statistics were utilized to summarize and describe the characteristics, distribution, and trends of the variables under investigation. Measures such as the mean, standard deviation, skewness, kurtosis, and related indicators were examined to provide preliminary insights into the behaviour of the data.

To determine the stationarity properties of the variables, the Augmented Dickey-Fuller (ADF) unit root test was conducted. The ADF procedure examines whether a time-series variable contains a unit root and is therefore non-stationary. The test involves evaluating the null hypothesis of the existence of a unit root against the alternative hypothesis of stationarity. Establishing stationarity is essential for avoiding spurious regression results and ensuring the validity of subsequent econometric analyses.

Following the stationarity test, the Johansen Cointegration Technique was employed to examine the existence of a long-run equilibrium relationship between government expenditure on agricultural infrastructure and economic growth. Cointegration analysis determines whether variables that are individually non-stationary move together over time in a stable long-run relationship. The absence of cointegration implies that no meaningful long-term association exists among the variables.

Furthermore, the Error Correction Model (ECM) was estimated to capture short-run dynamics while simultaneously incorporating long-run equilibrium adjustments. The ECM provides information on how quickly deviations from long-run equilibrium are corrected over time. In addition, it measures the speed at which short-run disequilibria converge toward long-run stability, thereby offering a comprehensive understanding of both immediate and long-term interactions among the variables.

Model specification

In order to test the hypothesis, the analysis is based on government expenditure on agricultural infrastructure and economic growth in Nigeria. The variables shall be built into a functional relationship between variable expressed as:

$$\begin{aligned} EG &= f(GEXPagric) - - - 1 \\ EG &= f(AEDAGRI) - - - 2 \end{aligned}$$

Where;

EG = Economic Growth using Gross Domestic Product as proxies

AEDAGRI = Annual expenditure on agriculture infrastructures

Mathematically, the econometric specification of the ARDL with the influence of structural breaks is given as:

1.7 Data Analysis

Descriptive statistics

The descriptive statistics test is presented in Table 1 and interprets that, Economic Growth (EG) has a mean value of 3961.78 with a standard deviation of 7148.24 having its minimum value as 4.69 and a maximum value of 28631.10. The variable EXPagric has a mean value of 1100937 with a standard deviation of about 1415955 having 4811 and its minimum value and 6725694 as its maximum value.

Table 1: Result of descriptive statistics

	EG	EXPagric
Mean	3961.782	1100937.
Median	706.8296	639200.0
Maximum	28631.10	6725694.
Minimum	4.698331	4811.000
Std. Dev.	7148.243	1415955.
Skewness	2.508379	2.085705
Kurtosis	8.784024	8.536387
Jarque-Bera	80.60635	66.07183
Probability	0.000000	0.000000
Sum	130738.8	36330926
SumSq. Dev.	1.64E+09	6.42E+13
Observations	24	24

Source: E-views 12.0 statistical software

The variables' skewness showed that the exponent (EXPagric) is rightward (positively) skewed. The relative flatness or peakness of the distribution in relation to the normal distribution is

measured by kurtosis. The Jarque-Bera (JB) test takes into account the series' variation in kurtosis and skewness in relation to the normal distribution. The values of the JB, 80.60 (EG) and 66.07 (EXPagric) and its corresponding probability of less than or equals to 0.05 confirms that the series are normal and can be generalized suitably. It further revealed the absence of outliers in the model.

Residual Diagnostic Analysis

To evaluate the adequacy and robustness of the estimated model, several post-estimation diagnostic tests were conducted. These included the Breusch-Godfrey Serial Correlation LM Test, Jarque-Bera Normality Test, Breusch-Pagan-Godfrey Heteroskedasticity Test, and the CUSUM Stability Test. The outcomes of these diagnostic procedures are presented in Table 2.

Table 2: Residual Diagnostic Test Results

Diagnosics tests	Observed values	P-values
Breusch-Godfrey Serial Correlation LM Test	27.89006	0.0000
Jarque-Bera Normality Test	2.284940	0.8723
Breusch-Pagan-Godfrey Heteroskedasticity Test	5.573425	0.1518
Stability diagnostic test	Stable	Stable

Source: E-views 12.0 statistical software

The diagnostic results indicate that the estimated model satisfies the basic econometric assumptions required for reliable inference. The Breusch-Pagan-Godfrey test produced a probability value of 0.1518, which exceeds the conventional 5 percent significance threshold, suggesting the absence of heteroskedasticity in the residuals. Similarly, the Jarque-Bera statistic yielded a probability value of 0.8723, indicating that the residuals are normally distributed. The CUSUM test further confirmed the stability of the estimated parameters throughout the study period. Collectively, these results imply that the model is statistically adequate and suitable for empirical analysis.

Unit Root Analysis

Before estimating long-run relationships, it was necessary to determine the stationarity properties of the variables to avoid spurious regression outcomes. The Augmented Dickey-Fuller (ADF) unit root procedure was employed for this purpose.

Table 3: Augmented Dickey-Fuller Unit Root Results

Table 3: Augmented Dickey-Fuller – Unit Root

Variables	ADF at Level		ADF at First Difference		ot Test
	Test Stat	Prob	Test Stat	Prob	Order of integration
EG	-1.23827	0.6542	-4.598745	0.0031*	I(1)
EXPagric	1.355237	0.9980	-3.143711	0.0385*	I(1)

Source: E-views 11.0 statistical software

The ADF results reveal that both Economic Growth (EG) and Agricultural Infrastructure Expenditure (EXPagric) were non-stationary at their levels because their probability values exceeded the critical significance levels. However, after first differencing, both variables became stationary, as indicated by the statistically significant probability values of 0.0031 and 0.0385 respectively. This confirms that the variables are integrated of order one, denoted as I(1), thereby satisfying the condition for cointegration analysis.

Cointegration Analysis

Having established that the variables possess the same order of integration, the Johansen Cointegration Technique was applied to determine whether a stable long-run equilibrium relationship exists between agricultural infrastructure expenditure and economic growth.

Table 4: Johansen Co-integration Test

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	0.05 Critical Value	t-statistics	Prob**
None*	0.735369	62.81769	99.98719	0.0000
At most 1*	0.559136	47.85613	53.01407	0.0152

Source: E-views 12.0 statistical software

The trace statistics exceed their corresponding critical values at the 5 percent significance level. Furthermore, the probability values are less than 0.05. These outcomes confirm the existence of at least one cointegrating equation, indicating that agricultural infrastructure expenditure and economic growth maintain a long-run equilibrium relationship. Consequently, the null hypothesis of no cointegration is rejected.

Error Correction Model (ECM) Analysis

Following confirmation of a long-run relationship, the Error Correction Model was estimated to capture short-run dynamics and the speed of adjustment toward long-run equilibrium.

Table 5: Error Correction Model Results

ECM Dependent Variable: D(EG)

Method: Least Squares

Date: 08/18/23 Time: 05:58

Sample (adjusted) : 1999 2022

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic
C	8.423941	27.18036	0.309927
D(EXPagric)	-14.67944	45.43350	-0.323097
ECM (-1)	-0.401988	0.132816	-1.517238

regression result

R-squared	0.765195	Akaike info criterion	16.98185
Adjusted R-squared	0.732297	Schwarz criterion	17.25394
F-statistic	0.823290	Hannan-Quinn criter.	17.07340
Prob(F-statistic)	0.000000	Durbin-Watson stat	0.987808

Source: E-views 12.0 statistical software

Model Statistics

Source: Author's Computation using E-Views 12.0

The estimated ECM equation can be expressed as:

$$EG = 8.423941 - 14.67944 (EXP_{agric})$$

The coefficient of agricultural infrastructure expenditure is negative, suggesting an inverse relationship between government spending on agricultural infrastructure and economic growth during the study period. However, the associated probability value of 0.7491 indicates that this effect is statistically insignificant. The coefficient of the error correction term is negative and significant at the 5 percent level ($p = 0.0408$), confirming the existence of a short-run adjustment mechanism toward long-run equilibrium.

The coefficient of determination ($R^2 = 0.765195$) indicates that approximately 76.5 percent of the variations in economic growth are explained by changes in agricultural infrastructure expenditure. The significant F-statistic probability further suggests that the model possesses overall explanatory power. Additionally, the Durbin-Watson statistic indicates no serious autocorrelation problem within the model.

Hypothesis Testing

The hypothesis tested in this study was stated as follows:

H₀: Government expenditure on agricultural infrastructure has no significant relationship with Gross Domestic Product in Nigeria.

H₁: Government expenditure on agricultural infrastructure has a significant relationship with Gross Domestic Product in Nigeria.

The empirical results reveal that the coefficient of agricultural infrastructure expenditure is negative (-14.67944) and statistically insignificant ($p = 0.7491 > 0.05$). Based on this evidence, the null hypothesis is accepted while the alternative hypothesis is rejected. Therefore, government expenditure on agricultural infrastructure did not exert a statistically significant influence on economic growth in Nigeria during the period under investigation.

1.8 Conclusion

This study examined the relationship between government expenditure on agricultural infrastructure and economic growth in Nigeria using annual time-series data spanning 1999 to 2022. The results of the unit root and cointegration analyses confirmed the existence of a stable long-run relationship between the variables. However, findings from the Error Correction Model

revealed that expenditure on agricultural infrastructure exerted a negative and statistically insignificant effect on economic growth. These results suggest that although agricultural infrastructure expenditure forms part of the broader growth process, its contribution to economic expansion during the study period was limited and insufficient to generate significant growth outcomes.

1.9 Recommendations

Government should increase investment in agricultural infrastructure while ensuring that such expenditures are efficiently managed and effectively implemented. Greater emphasis should be placed on monitoring and evaluating agricultural projects to improve transparency, accountability, and project outcomes. Public investments should be directed toward critical agricultural infrastructure such as irrigation facilities, rural road networks, storage systems, and energy supply.

Policy consistency should be strengthened to ensure continuity in agricultural development programmes across successive administrations. Government should implement employment-oriented agricultural initiatives capable of stimulating productivity, reducing unemployment, and enhancing the sector's contribution to economic growth.

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