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Research paper

Exploring The Gross Domestic Product Contribution of Agriculture and Natural Resource-Based The Activities Sector in Nigeria

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Abstract

This study explored the contribution of the agricultural sector, which included agriculture and natural resource-based activities, to Nigeria's GDP. The data used in the study were secondary data obtained from the 2023 Central Bank of Nigeria (CBN) statistical bulletin, for the period of 1981 to 2023. Multiple linear regression analysis and Z-test for two population equality means were employed in this study. From the graphical representation, it was evident that different sectors contributed varying proportions to Nigeria's GDP. It was revealed that the services sector, as one of the key sectors of Nigeria's economy, contributed the highest share of 49.50% to GDP, the industrial sector contributed 27.47%, while the agricultural sector contributed 23.07% over the study period. In establishing the relationship between Nigeria's economy and agriculture and natural resource-based activities, the results demonstrated that farming-related activities had a positive relationship with Nigerian GDP, whereas natural resource-based activities had a negative relationship with Nigerian GDP over the study period. Also, the results indicated that all the independent variables used in the study were statistically significant with Nigeria's GDP ($p<0.05$). The model used was a good fit for the dataset, with an R-squared value of 0.9930, indicating that 99.30% of the variability in agriculture and natural resource-based activities was explained by the model. The remaining 0.70% was attributed to factors not included in the study. In addition, the graphical display for the agricultural sector's contribution to Nigeria's GDP showed that farming-related activities accounted for a substantial 95.67% of the sector's contribution, while natural resource-based activities contributed only 4.33%. Based on the findings, the regression results ($R^2 = 0.9930$ and parameter significance at $p < 0.05$), along with the Z-test result ($p < 0.05$), indicate that the agricultural sector is a relevant driver of Nigeria's GDP. If the government pays more attention and allocates more resources to the sector, it could significantly boost the country's economic growth. The study recommended that since the agricultural sector contributed only 23.07% to Nigeria's GDP compared to other sectors and is underperforming, the Federal Government should revamp agricultural policies to support mechanization and improve access to modern technologies, which will enhance the productivity of agricultural activities in the country.

Keywords: *Nigerian GDP; Agriculture and Natural Resource-Based Activities; Agricultural Sector and Contributions.*

1. Introduction

Gross Domestic Product (GDP) is the total monetary value of all goods and services produced within the borders of a country over a specific period, typically measured quarterly or annually. It serves as a broad indicator of a nation's economic performance and health. GDP includes the output of all residents and institutions within the country, regardless of whether the income generated is retained domestically or repatriated abroad (World Bank, 2021). Also, Dickinson (2011) stated that GDP is the ultimate measure of a country's overall welfare, a window into an economy's soul. Its use spread rapidly, becoming the defining indicator of the last century.

Many sectors are contributing to the GDP of a country which including Agriculture and Resources-Based sector, remaining a pivotal component of Nigeria's economy, significantly influencing the GDP and overall development trajectory. Historically, agriculture served as the backbone of Nigeria's pre-oil economy, contributing over 60% to GDP in the 1960s and employing the majority of the labor force (Ekpo and Umoh, 2015). Although the discovery of crude oil in the 1970s shifted the economic focus towards hydrocarbon exploitation, agriculture and other natural resource-based industries continue to play essential roles in economic diversification and poverty alleviation (Olayemi, 2019).

The agriculture sector's contribution to GDP includes crop production, livestock, forestry, and fishing. These activities fall under two main categories within the primary sector of the economy: agriculture and natural resource-based activities. Agriculture, also known as farming-related activities, involves the cultivation of plants and the rearing of animals for food, fiber, and other products. In contrast, natural resource-based activities, or non-farming biological resource activities, involve the harvesting of natural biological resources that are not typically cultivated. However, the agricultural sector is not the only contributor to GDP. As noted by Akinlo (2012), GDP is composed of

several components: personal consumption expenditure, business investment, government spending, and net exports (exports minus imports). There are also multiple ways to measure a country's GDP. Understanding the various types and their applications is essential. These include, but are not limited to, Nominal GDP, Real GDP, GDP Growth Rate, and GDP per Capita—the latter often considered the most effective for comparing GDP across countries (Akinlo, 2012).

Moreover, according to Callen (2008), Gross National Product (GNP) is an alternative concept including all the output produced by the residents of a country. Therefore, if a German-owned company has a factory in the United States, the output of that factory would be included in the USA's GDP but in Germany's GNP.

The idea of GDP came out of the Great Depression and World War II (Dickinson, 2011). Dickinson (2011) further narrated that an economist at the National Bureau of Economic Research, by name Simon Kuznets, in 1937, presented the original formulation of gross domestic product in his report to the U.S. Congress, "National Income, 1929-35". Kuznet's idea was to capture all economic production by individuals, companies, and the government in a single measure, which should rise in good times and fall in bad. This brought about the birth of the GDP.

In recent years, the Nigerian government has implemented several reforms aimed at revitalizing the agricultural sector and promoting resource-based industrialization as part of its broader economic recovery and growth strategies (National Bureau of Statistics [NBS], 2023). These reforms aim to reduce the economy's overdependence on oil revenues by enhancing productivity in non-oil sectors. As a result, understanding the contribution of the agriculture and resources-based sector to GDP has become increasingly important for policymakers, investors, and development partners.

Furthermore, Ekpo and Umoh (2015) noted that Nigeria's GDP has had a truncated history. They further stated that, for the period 1960-70, the GDP recorded an annual growth of 3.1 percent. During the oil boom era (1970-78), GDP grew positively by 6.2 percent annually. Egbulonu et al. (2017) in their work stated that, in the 1980s, GDP had a negative growth rate due to a slump in the oil price in the early 80s. He further explained that, in the period 1988-1997, which constitutes the period of structural adjustment and economic liberalization, the GDP responded to economic adjustment policies and grew at a positive rate of 4.0 percent. The growth of agriculture for periods 1960-1970 and 1970-1978 was unsatisfactory. After the structural adjustment programme, GDP declined from 8.3% in 1990 to 1.3% and 2.2% in 1994 and 1995, respectively (Egbulonu et al., 2017). They further explained that since 1999, GDP in the country has been on averaged 6.3% and has not translated into visible growth and development.

It is often assumed that countries endowed with abundant natural resources should experience significant economic prosperity. However, over the years, it has been observed that developing nations such as Nigeria—despite being rich in oil, gas, and mineral resources—have struggled to achieve sustained economic development. The agriculture sector—comprising crop production, livestock, forestry, and fishing—and the resource-based sector—such as crude oil, natural gas, and other extractive industries—have historically played important roles in the nation's economy. However, despite these apparent advantages, Nigeria continues to face challenges related to underdevelopment, poverty, poor infrastructure, and economic instability.

Over the past decades, there has been a noticeable shift in Nigeria's economic focus, with an over-reliance on crude oil and gas, while the agriculture sector has experienced relative neglect. Yet, the agricultural sector remains a major source of employment and food security for the population. Simultaneously, the resource-based sector, particularly crude petroleum, contributes a significant share of government revenue but has been associated with environmental degradation, mismanagement, and inconsistent contributions to GDP growth. This imbalance raises critical questions about the actual and potential contributions of both sectors to Nigeria's GDP. Despite substantial earnings from resource exports, the nation's socio-economic development remains sluggish. Basic infrastructure is deteriorating, unemployment is high, and many Nigerians remain in poverty. The empirical test of the contribution of agriculture and the natural resource-based sector on Nigerian GDP, which is the subject matter of this study, shall provide precise answers to the relationship between agriculture and the resource-based sector and the Nigerian economic problems, and proffer possible policy recommendations.

This research aims to measure the contributions of agriculture and the natural resource-based sector to Nigeria's GDP, while the specific objectives are as follows: To examine the performance of agriculture and the natural resource-based sector over the years under study and to determine the contributions of crude agriculture and natural resource-based sectors to Nigeria's GDP for the period under study. Also, to estimate the relationship that exists between agriculture and the natural resource-based sector and Nigeria's GDP over the period under study, and finally, to find out if there is a significant difference between the contribution to Gross Domestic Product and agriculture and the natural resource-based sector.

2. Review of literature

2.1. Conceptual literature review

Gross Domestic Product (GDP) serves as a primary indicator of a nation's economic performance, reflecting the total value of goods and services produced within an economy. In Nigeria, the agriculture and resource-based sectors (notably oil and solid minerals) have historically contributed significantly to GDP and employment. This literature review explores the conceptual frameworks that inform the understanding of how these sectors contribute to Nigeria's GDP, drawing from economic development theories, sectoral models, and institutional perspectives.

GDP represents the aggregate economic output of a country and is influenced by multiple sectors, including agriculture and extractive industries. According to Todaro and Smith (2015), the sectoral composition of GDP provides insights into the structure and developmental stage of an economy.

The agriculture and resource-based sector sub-sectors of the agricultural sector play a pivotal role in Nigeria's economy. However, Auty (2001) opined that resource-rich nations often experience economic underperformance due to over-reliance on extractive industries, price volatility, and weak governance. Nigeria exemplifies this paradox—while oil generates over 80% of government revenue, it contributes less to GDP diversification and employment (Sala-i-Martin and Subramanian, 2003). The theoretical perspective or polices are relevant in assessing how the agricultural sector has affected the broader Nigerian economy.

2.2. Agricultural policies and programmes in Nigeria

Agricultural policymaking in Nigeria has evolved considerably over the decades. A succession of initiatives—launched with the goals of ensuring food security, reducing poverty, and diversifying the economy has produced uneven results, hampered by frequent shifts in direc-

tion, weak implementation, and limited stakeholder involvement. For instance, the Federal Government's Structural Adjustment Programme (SAP), introduced in July 1986 to dismantle administrative bottlenecks and promote a market-oriented economy, built on earlier efforts such as the Farm Settlement Scheme, the National Accelerated Food Production Programme (NAFPP), Agricultural Development Projects (ADPs), River Basin Development Authorities (RBDAs), the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB), and Operation Feed the Nation (OFN). While some of these schemes have since been abandoned or restructured, others continue to operate today.

The National Agricultural Policy of 1988 sought to achieve both food self-sufficiency and a steady supply of industrial raw materials; however, its effectiveness was curtailed by SAP-related austerity measures and chronic underfunding (Ogen, 2007). In 2004, the federal government launched economic reform known as the National Economic Empowerment and Development Strategy (NEEDS), which was positioned as a catalyst for poverty alleviation, emphasizing mechanization, reliable input distribution, and rural infrastructure development. Critics, however, contend that frequent policy changes and inadequate extension services undermined its impact (Ajetomobi and Yabaji, 2017).

A further shift came in 2011 with the Agricultural Transformation Agenda (ATA), which reframed farming as an agribusiness opportunity. Key elements included value-chain development, fertilizer-distribution reforms, and youth-targeted programmes like the Youth Employment in Agriculture Programme (YEAP) (Adesina, 2012). Building on the ATA, the current Agriculture Promotion Policy (2016–2020)—the "Green Alternative"—prioritizes import substitution, productivity gains, and job creation. Nevertheless, poor coordination among federal, state, and local authorities (Nwafor et al., 2021), unresolved land-tenure issues, and inadequate rural infrastructure continue to stifle progress.

Furthermore, experts advocate for more inclusive, decentralized policies backed by rigorous monitoring and evaluation frameworks. They also stress the need to integrate climate-smart practices, support youth-led agribusiness incubation, and harness digital technologies to bolster resilience and global competitiveness (Adegbite et al., 2022). In sum, while Nigeria's agricultural policies have demonstrated a clear intent to transform the sector, their limited achievements reflect persistent institutional weaknesses, funding shortfalls, and insufficient engagement of the farming community. Strengthening governance structures, empowering farmers, and investing in rural infrastructure will be essential to realizing sustainable agricultural growth and ensuring national food security.

2.3. Sectoral linkage of agriculture and its multiple effects on Nigerian economic development

Analyzing how each sector contributes to GDP hinges on understanding its interconnections. The input–output framework and multiplier theory revealed that expansion in one industry often sparks activity elsewhere: for instance, a thriving agricultural sector can feed agro-processing and distribution chains, while oil revenues—if judiciously deployed—can underwrite infrastructure and broader industrial growth (Hirschman, 1958). Yet in Nigeria, the weak integration of resource-based industries with other parts of the economy blunts these multiplier effects. As Eboh et al. (2012) observed that persistent structural bottlenecks and inadequate infrastructure prevent primary commodities from being transformed into higher-value products, thereby constraining overall GDP growth.

Some literature reviews have underscored the symbiotic backward and forward linkages between agriculture and manufacturing as Okuneye (2002) noted that agro-industries depend on farm outputs for raw materials, while farmers rely on industrial goods such as fertilizers, machinery, and agrochemicals. This interdependence not only boosts productivity but also accelerates structural change. Beyond manufacturing, agriculture propels the service sector through transportation, storage, and market distribution, knitting rural producers into urban demand centers (Ogen, 2007). The NBS (2023) reports suggested that agriculture's multiplier effects extend to poverty alleviation and job creation, employing roughly 70% of Nigeria's rural labor force. According to Adelaja (2021), improving farm productivity raises household incomes, ignites demand for non-farm goods and services, and lays the groundwork for rural industrialization—thus setting in motion an inclusive growth cycle.

However, the realization of these linkages is hampered by poor road networks, unreliable power supply, and inefficient storage systems, which Onyeuka and Eguavoen (2018) identify as critical impediments to a seamless agro-industrial value chain. To address these gaps, Adegbite et al. (2022) advocate for strategic investments in rural infrastructure, value-chain development, and the cultivation of agro-industrial clusters, integrated within a coherent industrial policy. Such measures, they argue, would strengthen inter-sectoral synergies, bolster economic resilience, and expand employment opportunities. Ultimately, unlocking the full GDP potential of agriculture and other resource-based sectors in Nigeria requires not only sound theoretical grounding in structural transformation and sectoral interlinkages but also effective governance, robust institutions, and targeted policy implementation.

2.4. Empirical literature review

Momodu et al. (2025) carried out empirical research on the effects of agricultural sector performance on economic growth in Nigeria. Yearly time series data were used for the period, 1981-2023, and were obtained from the annual Statistical Bulletin of the Central Bank of Nigeria (CBN). The data were analyzed using the Augmented Dickey Fuller (ADF) unit root test for the stationarity of the data and the Autoregressive Distributed Lag (ARDL) approach to estimate the long-run relationship between the Nigerian economic growth and explanatory variables (such as crop production, livestock production, forestry production, and fishery production). The result showed that Forestry Production (FOR) was stationary at levels, while other variables used in the study were stationary at first order of differentiation. The ARDL results showed that for the short-run relationship, Crop Production (CRP), Livestock Production (LVS), and Fishery Production (FIS) had a statistically significant relationship with Nigeria's economic development at 5% level of significance (p-value = 0.0292, 0.0214, and 0.0286, respectively) except Forestry Production (FOR). Also, The ARDL results showed that for the long-run relationship, that Crop Production (CRP), Livestock Production (LVS), and Fishery Production (FIS) had a statistical significant relationship with Nigeria economic development at 5% level of significance (p-value = 0.0184, 0.0006, and 0.0023, respectively) except Forestry Production (FOR). It was concluded that the findings of the study indicated that crop production, livestock production, and fishing production as indicators of agricultural sector performance have a significant effect on Gross Domestic Product, unemployment rate, inflation rate, and balance of payment in Nigeria.

Agwu (2015) conducted a study examining the factors influencing economic growth in Nigeria. The study aimed to assess the role of key macroeconomic variables in promoting economic growth, analyze the nature of their impact, and propose policy recommendations for leveraging these variables to foster growth. To achieve these objectives, the study employed the Vector Error Correction Mechanism (VECM) to identify both short-run and long-run determinants of economic growth. The findings revealed that, in the long run, government expenditure and oil revenue positively contributed to economic growth, while interest rates and inflation had significant negative effects.

Based on these results, the study recommended the implementation of policies aimed at promoting sustainable growth, with a particular focus on addressing corruption.

Izuchukwu (2011) studied an empirical research on the contribution of the agricultural sector to the Nigerian economic development using time series data. The data was obtained from the statistical bulletin of CBN from 1986 to 2007. Multiple regression analysis was used to explain the impact of domestic savings, government expenditure, and foreign direct investment on the Nigerian economy. The results showed that all the explanatory variables had a positive relationship with the Nigerian economy. Also, only domestic savings had a statistically significant relationship with the Nigerian economy at 5% level of significance (p-value = 0.0000) while other explanatory variables were not statistically significant. An R^2 value of 0.902 was obtained, which indicated that about 90.20% of the total variation in exchange rate variability was accounted for by variations in the explanatory variables used in the study. Also, about 9.20% of this variability may come from other variables outside the model. It was concluded that Nigeria's agricultural sector is still characterized by low yields, attributable to the use of crude implements, a low level of inputs, and limited areas under cultivation, among others. explained by Domestic Savings, Government Expenditure, and Foreign Direct Investment. To improve the agricultural sector, it was recommended that the government provide more funding for agricultural universities in Nigeria to carry out research on all areas of agricultural production. This will lead to more exports and an improvement in the competitiveness of Nigeria's agricultural production in international markets.

2.5. Literature review gap

In exploring the Gross Domestic Product (GDP) contribution of agriculture and natural resource-based activities in Nigeria, it is essential to evaluate the existing literature and identify gaps that the current study can address. The past studies reviewed provide valuable insights into the relationship between agricultural performance and economic growth, but they also highlight certain limitations and areas for further exploration.

Momodu et al. (2025) and Agwu (2015) provided a foundation for understanding the relationship between agriculture and economic growth. Several gaps can be identified from their studies, predominantly utilizing ARDL and VECM approaches, respectively, which are suitable for capturing dynamic relationships and long-run equilibrium. However, there is limited exploration of Multiple Linear Regression (MLR) analysis in this context, which can provide a simpler and more interpretable framework for understanding the contributions of various agricultural sectors to GDP. Although Izuchukwu (2011) did not specifically disaggregate the agricultural sector into its subsectors (for example, crop production, livestock, forestry, and fishery). This study intends to fill this gap by using MLR to explore sub-sectors of agricultural contributions to GDP, which offers clearer policy insights into which sub-sector drives economic growth the most.

Existing studies (especially Momodu et al., 2025 and Agwu, 2015) often treat agriculture within the broader macroeconomic framework or focus on dynamic behavior, but comparative sectoral contribution to GDP, especially from natural resource-based activities alongside agriculture, remains underexplored. Both ARDL and VECM approaches used in Momodu et al. (2025) and Agwu (2015), respectively, are structured for dynamic and temporal analysis (short-run and long-run causality). This study focuses on estimating contemporaneous sectoral contributions—an aspect not explicitly addressed in previous studies using dynamic models.

Past studies have not explicitly included or evaluated natural resource-based sectors (such as forestry and fisheries) in direct relation to GDP using MLR. The study aims to bridge this by quantitatively estimating natural resources-based activities contributions to Nigeria's GDP.

While ARDL and VECM have been shown in the literature, for example, Greene (2018) offers strengths in handling time series properties, cointegration, and lagged effects. Momodu et al. (2025) and Agwu (2015) works also come with complex estimation procedures, require extensive pre-testing, and are more suitable for causal inferences rather than contribution analysis.

In contrast, MLR Analysis is a robust and interpretable tool for estimating the magnitude and significance of direct contributions of independent variables (such as sub-sectors of agriculture and natural resources) to a dependent variable (GDP), especially when:

- The primary focus is on quantifying sectoral effects, not temporal dynamics;
- The variables are expected to be stationary, or the data are cross-sectional or short panel/time series;
- The goal is to provide clear policy-relevant estimates of sectoral impacts on GDP.

Thus, the use of MLR in this study provides a complementary perspective to existing research. It emphasizes direct, interpretable relationships between sectoral outputs and GDP, providing a clearer understanding of which sub-sectors are most impactful, which dynamic models may obscure.

This study aims to fill the identified gaps by employing MLR analysis. This approach focuses on sectoral contributions of agriculture and natural resource-based activities; The use of MLR to estimate their direct effect on GDP; and an empirical contrast to dynamic models (ARDL, VECM) that focus more on relationships over time rather than the magnitude of contribution. Therefore, the MLR approach enhances understanding of where policy investments and structural support may be most impactful in the agriculture and natural resource sectors in Nigeria.

3. Methodology

The data utilized in this work covers a period of 43years (1981-2023), and was obtained from the 2023 Edition of the Statistical Bulletin of the Central Bank of Nigeria (CBN). The data featured GDP at current basic prices- annual (₦' Billion), which includes activity sectors such as agriculture, industry, construction, trade, and services. The data are as shown in Table 1.

Table 3.1: Yearly Data of Nigerian GDP at Current Price and the Activity Sector

Year	GDP	Activity Sectors Agriculture					Industry	Services
		TOTAL	Crop Production	Livestock	Forestry	Fishing		
1981	137.93	17.05	12.82	2.53	1.16	0.55	54.67	66.20
1982	147.57	20.13	14.32	3.96	1.17	0.67	51.88	75.56
1983	157.18	23.80	16.35	5.19	1.27	0.99	54.16	79.22
1984	164.21	30.37	21.50	6.62	1.38	0.87	50.33	83.51
1985	185.98	34.24	25.07	7.16	1.47	0.54	62.86	88.88
1986	196.17	35.70	25.97	7.39	1.57	0.77	65.05	95.42
1987	242.26	50.29	39.66	8.37	1.59	0.66	80.47	111.51
1988	312.50	73.76	61.85	8.89	1.86	1.17	102.94	135.80

1989	410.77	88.26	71.88	11.79	2.17	2.41	146.83	175.68
1990	489.77	106.63	86.93	14.15	2.35	3.21	175.15	207.98
1991	584.25	123.24	101.65	15.58	2.44	3.58	218.12	242.90
1992	897.12	184.12	153.38	23.03	2.99	4.72	341.66	371.34
1993	1,244.80	295.32	249.20	36.58	3.97	5.59	417.06	532.41
1994	1,751.28	445.27	377.31	54.30	5.98	7.68	553.96	752.05
1995	3,069.43	790.14	670.18	97.20	8.25	14.51	1,132.84	1,146.45
1996	4,045.32	1,070.51	906.89	130.41	10.37	22.84	1,530.05	1,444.76
1997	4,374.50	1,211.46	1,026.29	145.03	12.55	27.59	1,557.54	1,605.49
1998	4,756.71	1,341.04	1,133.39	158.31	15.88	33.46	1,379.20	2,036.47
1999	5,426.47	1,426.97	1,204.70	164.37	19.31	38.59	1,609.82	2,389.68
2000	6,990.62	1,508.41	1,270.63	172.19	24.49	41.10	2,388.83	3,093.38
2001	8,150.02	2,015.42	1,699.69	228.56	29.98	57.20	2,328.41	3,806.19
2002	11,383.66	4,251.52	3,875.46	271.03	36.23	68.81	2,650.03	4,482.11
2003	13,418.01	4,585.93	4,161.57	299.22	44.13	81.01	3,525.14	5,306.95
2004	17,938.38	4,935.26	4,419.06	360.80	56.39	99.00	5,145.43	7,857.69
2005	22,884.90	6,032.33	5,372.20	463.42	67.45	129.26	6,520.74	10,331.83
2006	30,063.96	7,513.30	6,723.22	560.25	80.20	149.64	7,822.11	14,728.56
2007	34,318.67	8,551.98	7,654.22	642.28	91.50	163.99	8,441.76	17,324.92
2008	39,542.43	10,100.33	9,039.63	758.84	108.10	193.75	9,874.38	19,567.72
2009	43,012.51	11,625.44	10,419.60	863.40	121.25	221.18	9,229.81	22,157.26
2010	54,612.26	13,048.89	11,683.90	979.56	135.72	249.71	13,826.43	27,736.94
2011	62,980.40	14,037.83	12,484.85	1,115.60	153.05	284.33	17,853.11	31,089.46
2012	71,713.94	15,816.00	14,071.24	1,251.93	170.16	322.67	19,587.72	36,310.22
2013	80,092.56	16,816.55	14,862.32	1,399.48	187.95	366.79	20,853.85	42,422.17
2014	89,043.62	18,018.61	15,812.57	1,573.05	207.74	425.25	22,213.01	48,812.00
2015	94,144.96	19,636.97	17,189.97	1,748.03	222.83	476.14	19,188.58	55,319.41
2016	101,489.49	21,523.51	18,883.08	1,875.78	236.25	528.39	18,641.17	61,324.81
2017	113,711.63	23,952.55	21,096.11	1,974.45	257.21	624.79	25,639.90	64,119.18
2018	127,736.83	27,371.30	24,207.80	2,048.60	272.79	842.11	33,218.33	67,147.20
2019	144,210.49	31,904.14	28,296.93	2,108.95	285.88	1,212.39	39,879.69	72,426.66
2020	152,324.07	37,241.61	33,177.54	2,121.37	284.79	1,657.91	43,530.78	71,551.68
2021	173,527.66	41,126.06	36,349.41	2,249.34	296.96	2,230.36	55,300.97	77,100.63
2022	199,336.04	47,944.06	42,677.33	2,620.29	348.84	2,297.60	62,278.99	89,112.99
2023	229,912.94	53,273.14	47,779.28	2,063.42	432.62	2,335.49	76,386.30	100,253.49

This study utilizes multiple linear regression and a test of equality of two population means to analyze the relationship between the agriculture and natural resource-based sub-sectors of the agricultural sector and Nigeria's GDP over the study period. Furthermore, it assesses whether there is a statistically significant difference in their respective contributions to the Gross Domestic Product. The relationship between the dependent and independent variables is represented by the following multiple linear regression equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \tag{3.1}$$

Where,
Y is the Gross Domestic Product
X's are independent variables (Agriculture and Natural Resource-Based Activities)
Also,
ε is the error term, β_0, β_1 and β_2 are the regression model parameters, which are estimated as

$$\beta_1 = \frac{(\sum X_1 Y)(\sum {X_2}^2) - (\sum X_2 Y)(\sum X_1 X_2)}{\sum {X_1}^2 \sum {X_2}^2 - (\sum X_1 X_2)^2} \tag{3.2}$$

$$\beta_0 = \bar{Y} - \beta_1 \bar{X} - \beta_2 \bar{X} \tag{3.3}$$

$$\beta_2 = \frac{(\sum X_2 Y)(\sum {X_1}^2) - (\sum X_1 Y)(\sum X_1 X_2)}{\sum {X_1}^2 \sum {X_2}^2 - (\sum X_1 X_2)^2} \tag{3.4}$$

Normally, testing the assumptions of linear regression is essential to validate the reliability of the estimates. However, in studies where the primary goal is merely to establish a relationship between the dependent and independent variables—without evaluating the individual parameters—these assumptions may not require formal testing. Instead, it is sufficient that the number of observations exceeds the number of parameters to be estimated, the regression model is linear, and the independent variables are assumed to be non-stochastic. In addition, in this study, the primary objective is to estimate the contribution of agriculture and natural resource-based sectors to Gross Domestic Product (GDP) using MLR analysis. While classical linear regression assumes normality, homoscedasticity, and absence of multicollinearity, these assumptions are mainly important for ensuring the validity of statistical inference (for example, confidence intervals and some hypothesis tests) as Gujarati (2004) noted that the estimability of the model parameters requires the fulfillment of the assumptions of linear regression analysis, which might not necessarily for establishing the relationships of the dependent and independent variables. The normality assumption is crucial only when relying on small sample sizes or when making formal statistical inferences (for example, t-tests or F-tests). In large samples, the Central Limit Theorem implies that the sampling distribution of the estimators approximates normality, even if the residuals themselves are not perfectly normal. Therefore, testing for normality is not strictly necessary if the study focuses on coefficient estimates rather than formal hypothesis testing.
Furthermore, heteroscedasticity can affect the efficiency of the estimators and distort standard errors, it does not bias the estimated coefficients. If the emphasis is on understanding the direction and magnitude of sectoral contributions to GDP rather than on making precise interval estimates or predictions, strict enforcement of this assumption becomes less critical. Although high multicollinearity inflates standard errors and may make individual coefficients unstable or insignificant, it does not affect the overall fit or predictive power of the model.

In this study, where sectors may naturally correlate (for example, agriculture and forestry), excluding variables solely to reduce multicollinearity may remove important explanatory power. Hence, multicollinearity diagnostics may be omitted if interpretation focuses on collective sectoral impact rather than on isolating the effects of individual predictors.
The decision not to test these assumptions is based on the study's objective-driven focus—estimating the relative contribution of sectors to GDP rather than performing strict inferential statistics. As such, the analysis prioritizes interpretability and model fit over rigorous assumption checking, particularly where assumptions do not critically undermine the main research goals. Also, in this study, the aim is to establish the relationship between the dependent and independent variables, evaluate the model, and assess its significance to quantify the contribution of the agricultural sector to Nigeria's gross domestic product.
The essence of hypothesis testing of the equality of two population means lies in statistically determining whether the difference between the means of two groups is significant or if it could have occurred by random chance, and to assess whether two population means are equal or different, based on sample data. Also, it transforms observed data into evidence-based conclusions by accounting for randomness and uncertainty. According to Iwuagwu (2004), for example, the null hypothesis of unknown population deviation is to be rejected if and only if the Z-score is greater than or equal to the critical value, $Z_{1-\frac{1}{\alpha}}$ (that is, H_0 is to be rejected if and only if $Z \geq Z_{1-\frac{1}{\alpha}}$). The Z-score test statistic (see, for example, Iwuagwu, 2004) is given by,

$$Z_{-score} = \frac{(\bar{X}_1 - \bar{X}_1) - (\mu_1 - \mu_2)}{\sqrt{\frac{S_1^2}{n_1} - \frac{S_2^2}{n_1}}} \tag{3.5}$$

The critical value for the Z-score test is given by $Z_{1-\frac{1}{\alpha}}$ and can be read off from a statistical table, such as Neave (1978).

4. Discussion of results

The descriptive statistics for the dataset, which include the sum, mean, standard deviation, standard error of mean, range, count, minimum, and maximum values, are presented in Table 4.1.

Table 4.1: Descriptive Statistics

	GDP	Agriculture	Crop Production	Livestock	Farming Related Activities	Forestry	Fishing	Natural Resources Activities	Industry	Services
Count	43	43	43	43	43	43	43	43	43	43
Sum	1951134.27	450199.44	399406.95	30650.70	430057.63	4250.24	15229.27	19479.47	535910.06	965024.76
Mean	45375.22	10469.75	9288.53	712.81	10001.34	98.84	354.17	453.01	12463.02	22442.44
Std. Error of Mean	9409.12	2156.20	1918.34	126.50	2038.58	18.07	96.69	113.02	2814.14	4524.48
Std. Deviation	61699.72	14139.16	12579.38	829.51	13367.86	118.50	634.03	741.15	18453.56	29668.99
Range	229775.01	53256.09	47766.46	2617.76	49827.36	431.46	2334.95	2766.40	76335.97	100187.29
Minimum	137.93	17.05	12.82	2.53	15.34	1.16	0.54	1.71	50.33	66.20
Maximum	229912.94	53273.14	47779.28	2620.29	49842.70	432.62	2335.49	2768.11	76386.30	100253.49

The graphical representation of the activity sector contributing to Nigeria GDP from 1981 to 2023 is shown in Fig. 4.1. From Fig 4.1, The results revealed services sector which comprises different sub-sectors contribute highest percentage of 49.50% to Nigerian GDP, industry sector contributes percentage of 27.47% and Agricultural sector contributes percentage of 23.07% to Nigerian GDP over the years under study.

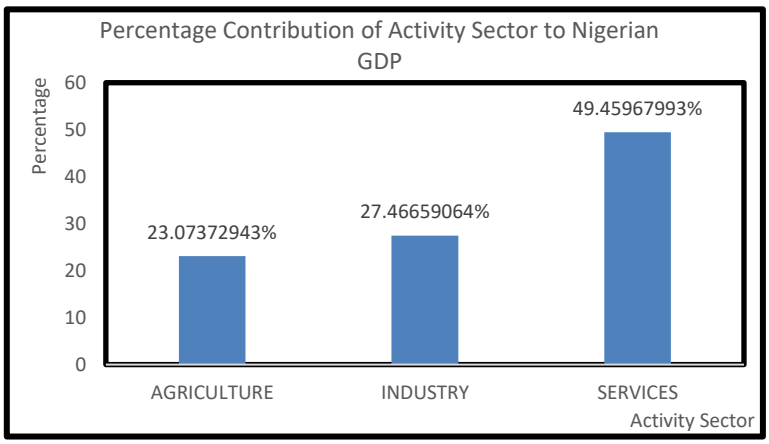

Fig. 4.1: Percentage Contribution of Activity Sector to Nigerian GDP.

Figure 4.2 below presents the graphical representation of agricultural sub-activities contributing to the Nigerian economy from 1981 to 2023. Over this period, the crop production sub-sector consistently emerged as the highest contributor to the economy among all agricultural sub-sectors, showcasing an upward movement of trend, while forestry showed the lowest contribution with a dwindling movement of trend.

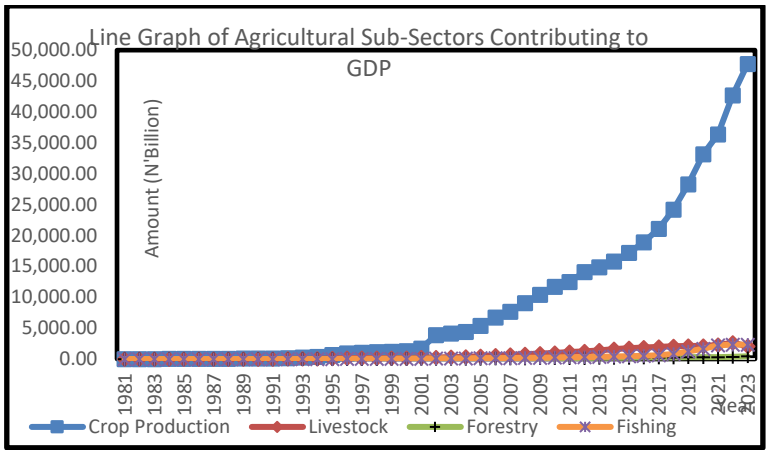

Fig 4.2: Line Graph of Agricultural Sub-Sectors Contributing to GDP.

The results of the multiple linear regression analysis on the dataset, after subtracting the agricultural sector from the Nigerian economy and regressing it against agriculture (farming-related activities) and natural resources-based activities, are presented in Table 4.2.

Table 4.2: Regression Analysis Result The Contribution of Gross Domestic Product, Contribution of Agriculture and Natural Resource-Based Activities

Summary Output						
Multiple R	0.996539					
R Square	0.993089					
Adjusted R Square	0.992744					
Standard Error	4056.012					
Observations	43					
ANOVA						
	Df	SS	MS	F	Significance F	
Regression	2	9.46E+10	4.73E+10	2873.966	6.18E-44	
Residual	40	6.58E+08	16451232			
Total	42	9.52E+10				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-1634.1	845.4847	-1.93274	0.06037	-3342.89	74.68831
Farming Related Activities	4.205859	0.212214	19.81896	2.72E-22	3.776959	4.634759
Natural Resources-based Activities	-12.1954	3.827642	-3.18615	0.002795	-19.9314	-4.45949

From Table 4.2, the results indicate that all the independent variables are statistically significant, as their p-values are all below the selected level of significance. α =0.05. The regression line shows that the contribution of agriculture and natural resource-based activities has a negative intercept of – 1634.1 when regressed with the GDP during the studied period. The estimated parameters, β_1 and β_2, which stands at 4.206 and -12.195, revealed that agriculture and natural resource-based activities, respectively. Farming-related activities had a positive relationship with Nigeria's economy, implying that a one-unit increase in farming-related activities would lead to a corresponding increase in Nigeria's GDP. In contrast, natural resource-related activities had a negative relationship with the Nigerian economy, suggesting that a one-unit increase in such activities could lead to a decrease in GDP. This negative relationship may be attributed to the country's heavy reliance on natural resource sectors such as oil, gas, solid minerals, and extractive industries, which often leads to the neglect of more productive sectors, including agriculture, as has been shown in the literature, for example, Auty (2001). Additionally, the unregulated exploitation of these resources (for example, oil spills, deforestation, and mining pollution) can result in the loss of livelihoods—particularly in rural communities—and a reduction in long-term productivity. In many cases, the external costs (such as environmental degradation, community displacement, and social conflict) outweigh the short-term gains to GDP. For instance, in the South-South geo-political zone of Nigeria—also known as the Niger Delta oil region—natural resource exploitation has caused significant environmental damage. This has displaced local communities and undermined agricultural activities, ultimately exerting a negative effect on national economic outcomes.

Moreover, from Table 4.2, the results output of the test for significance of MLR model parameters, showcase that the P-values for farming and natural resource-based activities of sub-sectors of agriculture are 0.000 and 0.0028, respectively. The P-values for farming and natural resource-based activities are less than the level of significance. $\alpha = 0.05$. Thus, the conclusion is that farming and natural resource-based activities had statistically significant relationships with the Nigerian economy, at 5% level of significance. The significance of natural resource-based activities to the Nigerian economy demonstrates the effectiveness of statistical significance, which contributed dwindling of the Nigerian economy in the perspective of the agricultural sector. The computed F-statistic of 2873.966 (a p-value equivalent of about 0.000) in Table 4.2 led to the conclusion that the model is of fit to the dataset.

The R-squared value (0.9930) indicates that 99.30% of the variability in agriculture and natural resource-based activities in the Nigerian economy is explained by the model, while the remaining 0.70% may be due to other factors not included in the study.

The testing of hypothesis was conducted on the dataset to confirm whether there are different means. The contribution of GDP Contribution of agriculture and natural resource-based activities is presented in Table 4.3 and Fig. 4.4.

Table 4.3: Z-Test for Two Paired Samples / Two-Tailed Test:

Difference	9548.329
z (Observed value)	4.951
|z| (Critical value)	1.960
p-value (Two-tailed)	< 0.0001
alpha	0.05

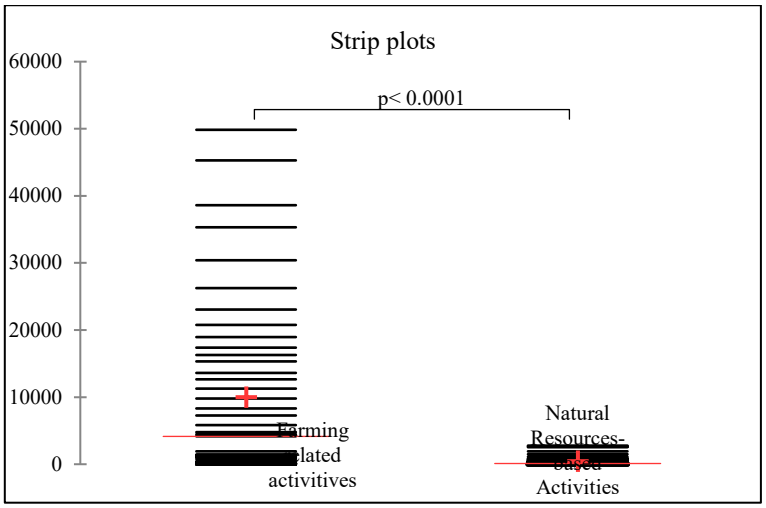

Fig. 4.4: Percentage Contribution of Agriculture Sub-Sector to Nigerian GDP.

From Table 4.3, comparing the result from means the contribution of GDP Contribution of agriculture and natural resource-based activities, it was revealed that the computed p-value (0.0001) is lower than the significance level alpha=0.05; therefore, the null hypothesis, H_0 is rejected, which led to the conclusion that the difference between the means of agriculture and natural resource-based activities is different from zero. In addition, the difference of the means is statistically significant, showcasing the evidence that the average of agriculture and natural resource-based activities sub-sectors of the agricultural sector is not equal. This result indicates that the average contribution of farming-related activities to GDP is significantly different (and likely higher) than that of natural resource-based activities. This highlights a performance gap between the two sub-sectors of the broader economic structure. Natural resource activities (forestry and fishing) may not be contributing as effectively to GDP, possibly due to volatility, environmental degradation, and social unrest.

Consequently, the farming-related sub-sector—which includes crop production and livestock—indicates that Nigerians are predominantly engaged in farming activities rather than in natural resource-based agricultural activities. Farming-related activities accounted for a substantial 95.67% of the sector's contribution to the Nigerian economy, whereas natural resource-based activities contributed only 4.33%.

5. Conclusion

This study explores the contribution of the agricultural sector, which includes agriculture and natural resource-based activities, to Nigeria's GDP from 1981 to 2023. It emphasizes that agriculture and natural resource-based activities have not significantly improved the well-being of Nigerian citizens, as evidenced by food shortages and rising food prices due to the underperformance of the agricultural sector.

The study also estimates the relationship between agriculture, natural resource-based activities, and Nigeria's GDP. The results reveal that the services sector—one of the key sectors of Nigeria's economy—contributed the highest share of 49.50% to GDP. The industrial sector contributed 27.47%, while the agricultural sector contributed 23.07% over the study period. This suggests that a large portion of the population is engaged in the services sector, while the agricultural sector has been relatively neglected, potentially leading to inefficiencies and widespread hunger.

In establishing the relationship between Nigeria's economy, agriculture, and natural resource-based activities, the results showed that farming-related activities had a positive relationship with Nigeria's GDP, whereas natural resource-based activities had a negative relationship with Nigeria's GDP over the study period. The model used is a good fit for the dataset, with an R-squared value of 0.9930, indicating that 99.30% of the variability in agriculture and natural resource-based activities is explained by the model. The remaining 0.70% may be attributed to factors not included in the study. The findings also show that agriculture and natural resource-based activities are statistically significant to the Nigerian economy (p-values<0.05), suggesting that with proper policy harmonization, the agricultural sector could contribute more effectively to economic growth.

Furthermore, the comparison of the means of agriculture and natural resource-based activities reveals that their contributions to the Nigerian economy are statistically different. It implies that the statistical difference or means supports the case for re-evaluating government priorities in resource allocation, especially between extractive and productive sectors. Also, farming-related activities accounted for a substantial 95.67% of the sector's contribution, while natural resource-based activities contributed only 4.33%. This result reinforces the need for diversification away from extractive industries toward more stable and inclusive growth sectors like agriculture.

Based on the findings, the regression results ($R^2 = 0.9930$ and parameter significance at $p < 0.05$), along with the Z-test result ($p < 0.05$), indicate that the agricultural sector is a relevant driver of Nigeria's GDP. If the government pays more attention and allocates more resources to the sector, it could significantly boost the country's economic growth.

6. Recommendation

This study reinforces the urgent need for strategic repositioning of the agricultural sector. From the findings, it was revealed that the service sector currently dominates the Nigerian economy, and agriculture remains a critical and statistically significant sector. If properly supported, it can substantially boost GDP, ensure food security, reduce poverty, and correct the imbalance caused by over-dependence on oil and gas. Based on the results of the study examining the contribution of agriculture and natural resource-based activities to Nigeria's GDP from 1981 to 2023, the following meaningful recommendations are drawn for the Nigerian government, stakeholders, and the general populace:

a) Nigerian government should prioritize agricultural development in economic planning, since the study showed that the agricultural sector contributed only 23.07% to GDP and is underperforming. So, the Federal Government should revamp agricultural policies to support mechanization and improve access to modern technologies, which will enhance the productivity of agricultural activities in the country.

b) Nigerian government should invest heavily in agricultural infrastructure, such as building and maintaining irrigation systems, rural roads, storage facilities, processing plants, and expanding rural electrification to power agricultural operations.
c) Nigerian government should promote agricultural financing and incentives such as providing low-interest loans, grants, and subsidies for seeds, fertilizers, and equipment to its citizens.
d) Private sector, NGOs, and Development Partners should invest more in agribusiness and value chain development, which includes investing in processing, storage, packaging, marketing, and developing value addition enterprises to reduce post-harvest losses and increase export value.
e) Nigerian populace should shift its perception of agriculture and re-engage with it as a viable and profitable business, and also they should form cooperatives or clusters to access resources and markets.

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