Analysis of Agricultural-Subsector Contribution through Economic Development of Nigeria 1981-2020

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Abstract

Stagnation in agriculture is the principal explanation for poor economic performance in many developing economies of the world, and rising agricultural productivity is the core reason for successful industrialization. The study analyzed the contribution of agricultural subsector to the economic development of Nigeria. Secondary data were sourced from various issues of Central Bank of Nigeria (CBN) annual reports and statement of account, Statistical Bulletin between 1981 – 2020. The study employed a unit root test for stationarity, cointegration test of long-run relationship to avoid spurious regression, Ordinary Least Square to investigate the impact of all the independent variables (Agricultural subsectors) on the dependent variable (GDP). The Granger causality test was used to test the causal relationship between the time series data. The null hypothesis for the unit root and cointegration were rejected. The result of the regression analysis showed a good fit with high R^2, and some of the variables were significant. Some of the variables have unidirectional causality between each other, but there is no causal relationship between some of them. The study recommends that forest resources should be better harnessed to contribute more to the nation's gross domestic product. Also, the use of improved livestock breeds should be encouraged to improve their output further.

Keywords: Gross Domestic Product, Agricultural subsectors, Unit root, Cointegration, Granger causality, Nigeria

Introduction

Nigeria is a third-world country situated in Sub-Saharan Africa with huge agricultural potential, with a land area of about 98 million hectares, 72.4 percent of which is arable, while

only 27.6 percent is non-arable (Nwankpa, 2017). In the past, agriculture was the main occupation of most Nigerians, but that is no longer the case because of the dependence on revenue from oil and gas resources (Adebayo & Olagunju, 2015).

The majority of the Nigerian labour force (70-80 percent) are peasants practicing subsistence farming (Odetola & Etumnu, 2013; Adebayo & Olagunju, 2015). After independence, agriculture was Nigeria's major income earner, bringing in about 63.49 percent of the gross national product, which was used to fund the country's National Development Plan between 1962 and 1968 (CBN, 1980).

Agriculture could provide employment to a greater percent of Nigeria's fast-growing population if the sector was well developed. Furthermore, Nwaknpa (2017) argued that the importance of agriculture to the Nigerian economy is evident in the nation's natural endowments in production factors – extensive arable land, water, human resources, and capital (Alhassan & Haruna, 2024). Apart from employment generation, agriculture can provide raw materials for the industrial sector, which by implication means that Nigeria can fast-track economic growth by focusing more attention on this sector. (ASHORO, Collins Ovwigho et al., 2024)

The agriculture sector has been the mainstay of the economy since independence, and despite several bottlenecks (Adeyanju et al., 2024), it remains a resilient sustainer of the populace (Amuda & Alabdulrahman, 2024). In the 1960s, Nigeria was the world's largest exporter of groundnut, the second largest exporter of cocoa and palm produce, and an important exporter of rubber cotton (Sekunmade, 2009). More recently, agriculture employs about two-thirds of Nigeria's labour force, contributes significantly to the GDP, and provides a large proportion of non-oil earnings (CIA, 2013, Sekunmade, 2009). Furthermore, the nation was self-sufficient in food production, and exports of major crops accounted for over 70% of total exports in 1960 (Epsar Philip Kopteer et al., 2024). However, due to a fall in local production, among other things, the importation of food began to increase, and food items like bread made from imported wheat flour began to replace cheap staple foods (Olagunju et al., 2024). In 2012 alone, the importation of wheat was valued at $ 1 billion (Nzeka, 2013). Largely due to a significant fall in the output of export products like cocoa, palm oil rubber, and groundnuts, the share of agricultural products in total exports decreased to less than 2% in the 1990s (Olajide, Akinlabi & Tijani, 2012).

The subsectors of the agriculture sector in Nigeria have the potential to give the sector an opportunity for growth. According to CBN (2012), between 1960 and 2011, an average of 83.5% of agriculture GDP was contributed by the crop production subsector, making it the key source of agricultural sector growth (ENWA Sarah et al., 2024). The food production role of the agriculture sector depends largely on this subsector as all the staples consumed in the nation come from crop production, 90% of which is accounted for by small-scale, subsistent farmers (Ituma et al., 2024). The major crops cultivated include yam, cassava, sorghum, millet, rice, maize, beans, dried cowpea, groundnut, cocoyam, and sweet potato. The second largest is the livestock subsector, which contributed an average of 9.2% between 1960 and 2011. This sector is the largest source of animal protein, including dairy and poultry

products (Ogundiwin, 2024). The economic importance of the subsector is therefore evident through food supply (Ikuemonisan et al., 2024), job and income creation, and the provision of hide as raw material. Despite this, the sub-sector has been declining in its contribution to economic growth, according to Ojiako and Olayode (2008). Between 1983 and 1984, the share of livestock in agricultural GDP was about 19%, but this dropped as low as 6% between 2004 and 2005. In the fishery subsector, local production is inadequate for domestic demand and consumption (Ahmed & Olaitan, 2024). Nigeria imports 700,000MT of fish annually, which is 60,000 MT more than the total domestic production (Ibru, 2005 in Essien & Effiong, 2010). However, the subsector has recorded the highest average growth rate of 10.3% (1961-2011) compared to the 6% recorded in crop production in the same period (CBN, 2012). With an average contribution of 4.3% to total agriculture GDP between 1960 and 2011 and provision of at least 50% animal protein, fisheries contribute to economic growth by enhancing food security and improving livelihood of fish farmers and their households (Gabriel et al., 2007; Essien & Effiong, 2010). Forestry is the smallest sub-sector in Nigerian agriculture, contributing only 3.0% (between 1960 & 2011); however, the subsector plays a major role in providing industrial raw materials (timber), providing incomes as well as preserving biodiversity. (Emezirinwune et al., 2024)

Results from cross-country regressions among developing countries show that $1 increase in GDP results in significantly more poverty reduction when the growth is in agriculture rather than other sectors (Lipton, 2012). This sectoral growth increases the incomes and, therefore, the purchasing power of farmers, resulting in a vibrant domestic market for other sectors and, hence, growth in the economy (Taiwo et al., 2024). Sertoglu et al. (2017) examined the contribution of agricultural sector to economic growth in Nigeria. This study sought to empirically examine the impact of agricultural sector on the economic growth of Nigeria, using time series data for the period 1981 to 2013. The study findings revealed that real gross domestic product, agricultural output, and oil rents have a long-run equilibrium relationship (Sosanya et al., 2024). The vector error correction model result showed that the speed of adjustment of the variables towards their long-run equilibrium path was low, although agricultural output had a positive impact on economic growth (Isaac AGBOLA, KELIKUME, et al., 2024). Based on the findings, it was then recommended that the government and policymakers embark on diversification and enhance allocation in terms of budgeting for the agricultural sector (ASHORO Collins Ovwigho et al., 2024). Oyakhilomen & Zibah (2014) studied agricultural production and economic growth in Nigeria. This study was carried out to provide empirical information on the relationship between agricultural production and the growth of Nigerian economy with a focus on poverty reduction (Isaac AGBOLA, YUSUF, et al., 2024). Time series data were employed in this research, and the analyses of the data were carried out using unit root tests and the bounds (ARDL) testing approach to cointegration (Olumide et al., 2013). The data analysis showed that agricultural production significantly influences the favorable trend of economic growth in Nigeria. It was then recommended that better policies on agriculture should be designed to alleviate rural poverty through increased investments in agricultural development by the public and private sectors (Edeme et al., 2018). Ahungwa et al. (2014) did a study on trend analysis of the contribution of agriculture to the gross domestic product of Nigeria (1960-

2012). The study examined the contribution of agriculture to the gross domestic product (GDP) of Nigeria within a time frame of 53 years (1960-2012). Time-series data were used for trend and regression analysis. The regression results revealed that agriculture has a positive relationship with GDP and contributes significantly.

The study recommended that government should create an enabling environment by increasing the budgetary allocation-friendly policies framework for a strong and efficient agricultural sector that can accelerate the attainment of Nigeria's economic growth (Sadan & Amuda, 2024). Yunana & Ahmed (2018) examined the impact of the agricultural and mining sector on economic growth in Nigeria. This study aimed to analyze the impact of agricultural and mining sectors on economic growth in Nigeria between 1999 and 2017 using the ordinary least-squared (OLS) regression model. The variables used for the study were first subjected to a unit root test using an augmented dickey-fuller test. The result revealed that both agriculture and mining outputs have a significant and positive impact on Nigeria's economic growth. The contribution of the various activity sectors to GDP can never be over-emphasized. The value of Nigerian GDP has been on a steady increase, so it becomes pertinent to study how Agriculture, Industry, and Services sectors contribute to GDP based on the huge amount of budgetary allocation by the government to these key sectors of the economy in line with the transformation agenda of the present Federal government. Also, the vision of making Nigeria one of the top twenty economies of the world by the year 2020 can only be possible if the Nigerian economy is diversified.

The study objectives are to investigate the effect of the agricultural subsectors on Nigeria's economic growth and identify the sectors that contributed significantly to Nigeria Gross Domestic Product (GDP) growth.

Literature Review

A different literature has established a relationship between agriculture sector and economic growth (Gallup et al., 1997; Thirtle, Lin &Piesse, 2003; Awokuse, 2008; Irz et al., 2001). Tolulope and Chinonso (2013) contributed to the literature using Solow's growth accounting framework and estimated their model with time series data on the Nigerian economy from 1960 to 2011. In their model, aggregate output growth is conceptualized as the sum of growth contributions from each sector of the economy. (Olagunju et al., 2024)

They further modify the model to provide evidence of the importance of the agriculture subsectors in the growth of the sector. Similar, Collins and Bosworth (1996) and Iyoha & Oriakhi (2002) reported that growth in the agriculture sector is taken to be the weighted sum of the growth in the sub-sectors of the agriculture sector – namely, crop production, livestock production, fisheries, and forestry. It is expected that disaggregating the agriculture sector will provide clearer evidence of how agriculture contributes to economic growth by highlighting the sources of growth in the agriculture sector.(Kotur et al., 2024)

Research Method

Data Collection and Analysis

A secondary source of data was used for the study. The time series data covering the period of (1981 – 2020) was sourced mainly from various issues of Central Bank of Nigeria (CBN) annual reports and statement of account, Statistical Bulletin, and National Office of Statistics report. Real Gross Domestic Product was used as the dependent variable, while the independent variables were the annual output of Crops, Livestock, Forestry, and Fishery.

Unit root and cointegration tests were used to test the data stationarity and the long-run relationship of the variables. Ordinary Least Square was used to investigate the effect of all the independent variables (Agricultural subsectors) on the dependent variable (GDP). The Granger causality test examined the causal relationship between the time series data.

Result and Discussion

Mean and Standard Deviation (1981 – 2020)

Table 1 shows the mean and standard deviation of the variables. The mean of Real Gross Domestic Product (RGDP) Crop, Livestock, Forestry, and Fishery, according to Table 1 were 36843.40, 7235.83, 696.79, 108.73, and 173.91, respectively, with 19785.11, 5090.56, 294.52, 38.51 and 110.49 as their standard deviation respectively. The mean shows the average values of the variables during the specified study period, while the standard deviation takes into account the deviation of the minimum and maximum variable values of the mean.

Table 1: Mean and Standard Deviation of the variables

Variables	Observation	Mean	Std Deviation
RGDP	40	36843.40	19785.11
CROP	40	7235.83	5090.56
LIVESTOCK	40	696.79	294.52
FOREST	40	108.73	38.51
FISH	40	173.91	110.49

Augmented Dickey-Fuller Test for Unit Root

Table 2 shows the stationarity of the variables that were tested using Augmented Dickey-Fuller (ADF) unit root test to ascertain whether or not the variables were stationary or nonstationary at levels and 1st difference. The combined Augmented Dickey-Fuller test for the variables is nonstationary at levels. However, the variables are stationary at 1st difference at 5% level of significance. The null hypothesis is therefore rejected, which implies that the variables do not have a unit root.

Table 2: Augmented Dickey-Fuller Test for Unit Root

	Test Statistic	1% Critical Value	1% Critical Value	1% Critical Value
Z (t)	-3.201	-3.689	-2.975	-2.619
	MacKinnon approximate p-value for Z(t) = **0.0199**			

Cointegration Test

The Johansen Cointegration test is used to determine the long-run relationship between the variables. The analysis aims to prove and predict the existence of cointegration between the variables. Table 3 shows the results of the Johansen cointegration test. The null hypothesis is rejected because cointegration is at a 0.01 level. This implies that there is a long-run equilibrium relationship between the selected variables in the study; this means that there is the existence of a long-run relationship between RGDP, CROP, LIVESTOCK, FORESTRY, and FISHERY in Nigeria from 1981 to 2020.

Table 3: Johansen cointegration Test

Beta	Coefficient	Std error	Z	P>|Z|
_ce1				
RGDP	1			
CROP	3.268	1.152	2.84	0.005
LIVESTOCK	-103.051	23.473	-4.39	0.000
FORESTRY	-8.938	100.366	-0.09	0.929
FISHERY	-36.767	25.850	-1.42	0.155
Cons	10178.65			

Ordinary Least Square Regression

The regression results show the relationship between RGDP and the independent variables used in the study. According to the result derived presented in table 4, the value of the R-squared is 0.9932, which implies that 99.32% of the explained variable, RGDP is explained by the independent variables in the model. The R-square of 99.32% indicates a good fit of the model. All the variables have positive relationship with RGDP. The result revealed that a unit increase in crop production will increase the GDP by 1.503and it is significant at 1%. This revealed that the more farmers produce more crops, the increase in the GDP will be significant. Livestock production also has a significant impact on the GDP. A unit increase in livestock production will lead to 24.089 unit increase in the GDP of Nigeria. This is further confirming the importance of agriculture and most especially livestock production in the affairs of Nigeria as a nation. Forestry though not significant at any level, but has a positive coefficient which shows a positive contribution to the GDP. This might be due to the fact that forest resources are not being maximized to the optimum. In another perspective, forest resources help in maintaining a good climatic condition which in turn will be beneficial to other sectors of agriculture, thereby improving their output and the GDP of the country. Fishery contribute significantly to the GDP of Nigeria. It is significant at 1% and a unit increase in fishery production results in 29.892 increase in the GDP. The constant value shows how important the explanatory variables are to the GDP. That is, if left constant it will have a negative impact on the GDP. The overall result shows that all the explanatory variables affect the RGDP in one way or the other.

Table 4: Regression Analysis

RGDP	Coefficient	Standard Error	t-value	Prob
Constant	-1142.374	2266.595	-0.50	0.617
CROP	1.503	0.463	3.25	0.003***
LIVESTOCK	24.089	9.919	2.43	0.020**
FORESTRY	47.136	38.389	1.23	0.228
FISHERY	29.892	10.535	2.84	0.008***
F (4, 35)	1271.23***			
R-SQUARE	0.9932			
ADJ. R-SQUARE	0.9924			

***= Significant at 1%, **= Significant at 5%

Granger Causality

There is a unidirectional relationship between RGDP and Crop, RGDP and Forestry, RGDP and Fishery, Livestock, and Crop, and Crop and Fishery, as shown in Table 5. That means RGDP does not granger cause crop, but crop granger causes RGDP. RGDP granger causes forestry while forestry does not granger cause RGDP. In the same vein, RGDP does not cause fishery, but fishery granger causes RGDP. Speaking further, crop does not granger cause livestock, while livestock granger cause crop. Crop granger causes fishery while fishery does not granger cause crop. According to the result of the analysis, there was no causality between the following RGDP and Livestock, Crop and Forestry, Forestry and Livestock, Fishery and Livestock, and last but not least, Forestry and Fishery.

Table 5: Granger Causality

Null Hypotheses	Chi2	Df	Prob > chi2
RGDP does not granger cause CROP	3.2038	2	0.202
CROP does not granger cause RGDP	4.9339	2	0.085
RGDP does not granger cause LIVESTOCK	2.5091	2	0.285
LIVESTOCK does not granger cause RGDP	2.3583	2	0.308
RGDP does not granger cause FORESTRY	5.1998	2	0.074
FORESTRY does not granger cause RGDP	1.2790	2	0.528
RGDP does not granger cause FISHERY	0.8791	2	0.644
FISHERY does not granger cause RGDP	6.5595	2	0.038
CROP does not granger cause LIVESTOCK	4.2562	2	0.119
LIVESTOCK does not granger cause CROP	9.2669	2	0.010
CROP does not granger cause FORESTRY	0.9608	2	0.619
FORESTRY does not granger cause CROP	0.9577	2	0.620
CROP does not granger cause FISHERY	5.4872	2	0.064
FISHERY does not granger cause CROP	0.3082	2	0.859
FORESTRY does not granger cause LIVESTOCK	0.3206	2	0.852
LIVESTOCK does not granger cause FORESTRY	0.3155	2	0.854
FISHERY does not granger cause LIVESTOCK	0.2082	2	0.901
LIVESTOCK does not granger cause FISHERY	2.0514	2	0.359
FORESTRY does not granger cause FISHERY	1.2539	2	0.534
FISHERY does not granger cause FORESTRY	2.9164	2	0.233

Source: Results from Stata Analysis 2024

Conclusion

The data of the variables under review were from 1981 to 2020. The mean of Real Gross Domestic Product (RGDP) Crop, Livestock, Forestry, and Fishery, according to Table 1 were 36843.40, 7235.83, 696.79, 108.73, and 173.91, respectively, with 19785.11, 5090.56, 294.52, 38.51 and 110.49 as their standard deviation respectively. The combined Augmented Dickey-Fuller test for the variables is nonstationary at levels. However, the variables are stationary at 1st difference at 5% level of significance. The null hypothesis is therefore rejected, which implies that the variables do not have a unit root. The results of the Johansen cointegration test led to the null hypothesis being rejected because cointegration is at 0.01. From the result of the ordinary least square regression, the value of the R-squared is 0.9932, which implies that 99.32% of the explained variable, RGDP, is explained by the independent variables in the model. The result revealed that a unit increase in crop production will increase the GDP by 1.503, which is significant at 1%. Also, Livestock production also has a significant impact on the GDP. A unit increase in livestock production will lead to 24.089 unit increase in the GDP of Nigeria. Fishery contributes significantly to Nigeria's GDP. It is significant at 1%, and a unit increase in fishery production results in 29.892 increase in the GDP. The result of the granger causality showed that there is a unidirectional relationship between RGDP and Crop, RGDP and Forestry, RGDP and Fishery, Livestock, and Crop, and Crop and Fishery. In addition, there is no causality between RGDP and Livestock, Crop and Forestry, Forestry and Livestock, Fishery and Livestock, and last but not least, Forestry and Fishery.

Based on the findings, the study recommends that forest resources should be better harnessed to contribute more to the nation's gross domestic product. Also, the use of improved livestock breeds should be encouraged to further improve their output.

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