Effect of Agricultural Output on Economic Growth in Nigeria: 1990-2022

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DOI: 10.56201/ijssmr.vol.11no2.2025.pg.120.131

Abstract
This paper assessed the effect of agricultural sector output on economic growth in Nigeria. ***Background****: Nigeria is the largest economy in Africa with huge arable land, but is unfortunately facing food importation and high cost of domestic food. Agriculture contributed 63.8% to GDP by 1960 but have dropped so low to average of 24% from 2020 to 2022. Commercial banks loans & advances to this sector stood at 6% in 2021 and 2022 which is considered low.* ***Aims:*** *The specific objectives were to assess the effect of: crop production; livestock; forestry and fishing output on gross domestic product of Nigeria.* ***Methods:*** *This study adopted the ex-post facto research design. Annual time series data were obtained from CBN bulletin, 2022 and analyzed using descriptive statistics and ordinary least square. The hypotheses were tested at 5% level of significance.* ***Results:*** *Crop production had a positive (0.057245) and non-significant effect (0.9417); Livestock output had a positive (27.64295) and significant effect (0.0321); Forestry output had positive (161.2027) and non-significant effect (0.2081); Fishing had a positive (30.14201) and significant effect (0.0001) on GDP for the period reviewed. The probability (f-statistic) was 0.000000 while adjusted R^2 value was 92.9%.* ***Conclusion:*** *The variables used in the study are found to be relevant in explaining agricultural sector effect on economic growth of Nigeria.* ***Recommendation:***

Government and agriculturists should strive for more financing, improved variety inputs and right policies to sustain and improve the significant effect of agriculture on GDP in Nigeria.

Key words: Economic growth, crop production, livestock, forestry, fishing.

Introduction

Nigeria is a country that have been known for her great exploits in agriculture. The country had been producing and even exporting various agricultural products before the discovery and exploitation of crude oil. Agricultural production need to be driven upwards and given its rightful place for any country that wants to achieve food sufficiency and security. The forgoing is critical for developing economies like Nigeria that is having a challenge with producing enough for her citizens. Agriculture does not only provide food for human consumption and for commercial purposes but provides inputs for other productive sectors in the economy. Also, it helps in earning foreign exchange where the nation is able to export its agricultural products. Adesiyan and Ogundele (2022) noted that agriculture contributes to economic growth and development in (i) product (ii) factor markets and (iii) foreign exchange contributions.

Ekine and Onu (2018) noted with concern that preceding the emergence of oil in the early 1960s and 1970s, the production and exportation of agricultural products such as groundnuts, palm oil, cocoa, cotton, coffee, hides and skin, cattle was what the Nigerian economy was largely dependent on. This dependence was not just for feeding of her teeming population, but as well for raw materials inputs to industries and source of foreign revenue.

Beckman and Countryman (2021) stated that agriculture is one of the key economic sectors of any country because it provides food security for the nation, ensures that people grow their own food for consumption, eradicate poverty especially in the rural and among most marginalized communities. Oyetade and Adeyeye (2021) further hinted that the need to use agriculture in improving the economic structure of any nation cannot be over stressed because it is the source of nourishment for animal and man; and gives raw materials for the manufacturing segment. Ogunjimi's study *(*2015, as cited in Ekine and Onu, 2018) hinted that at the commencement of the oil boom in late 1970s, the Nigerian economy became a mono-cultural one with oil being the major source of income which led to the neglect of all other sectors including the agricultural sector.

Obayori's study (2014, as cited in Etea & Obodoechina, 2019) clearly puts it that the ability to compete with other nations is a key element to survival as a nation, hence, there is need for sustained increase in production in the agricultural sector of the economy. The consciousness of this urgent need for an astronomical growth in this sector cannot be over emphasized. The reason is not far-fetched as Nigeria is battling with low agricultural output cum increasing prices of products. Hence, Etea and Obodoechina (2019) corroborating the forgoing instructed that high agricultural sector output, with the right combination of other factors as well as good policy environment will result in higher output and economic growth. According to Adesina's study (2012, as cited in Victoria (2019), Nigeria is still importing what it can produce in abundance and the height of imports dependency is hurting her farmers and displacing local production while creating rising unemployment and much weaker exchange rate.

The agricultural sector being part of the real sector of the Nigerian economy should have so much to contribute towards the growth of the economy. It should be in the fore-front given its diverse and multi-faceted nature. Nevertheless, it is in doubt to what extent this all important sector of the economy can rebound to takes its rightful place and play the leading role expected. The challenges facing the sector are enormous. Ogen's study (2004, as cited in Etea & Obodoechina, 2019) highlighted some of the major challenges as: poor infrastructural facilities, poor feeder roads and road network, storage facilities, rural electrification, poor manpower development, land tenure system, poor government/regulatory policies. He further stated that poor state of agricultural development can lead to a situation of deficit food supply and higher demand for food which consequently leads to higher food importation to supplement domestic food production.

Umaru and Inusa (2022) stated that agricultural output is important in every developing country, especially in Nigeria as food insecurity, high food import, and increasing food prices are pestering issues that have not been addressed, thus, the growing need to increase agricultural sector output. Victoria (2019) noted that agriculture is the major source of food and livelihood in Nigeria which makes the sector to be a critical component of programs that seek to alleviate poverty and attain food security. It is however sad to observe that this all important sector's productivity estimates for Nigeria shows significant fall in agricultural productivity growth since the 1970s. Akpan et al. (2021) furthermore explained that during the early independence era, the importance of the agricultural sector was obvious, as the country was one of the major World producers and exporters of oil palm, rubber, cocoa and groundnuts. The sector was the major earner of foreign exchange and constitute the bulk portion of the country's GDP. In developing countries, the share of agriculture in overall employment is large; therefore growth in agricultural sector incomes is essential to stimulate the overall growth of the economy (Adedayo, 2020).

There have been a problem of decline discovery and exploitation of crude oil in Nigeria. Agriculture had contributed to 63.8% of Nigeria's gross domestic product (GDP) as at 1960, but has dropped drastically to 21.42%, 22.12%, 24.45%, 23.70% and 24.05% in 2018, 2019, 2020, 2021 and 2022 respectively. Etea and Obodoechina (2019) noted that agriculture has on the average contributed 32% of the country's GDP from 1996 to 2000 and 42% between 2001 and 2015. This is due to shift of attention to crude oil in preference to agriculture, hence the declining output. Aside from government reduced emphasis on agriculture is the problem of bank financing. An analysis of the commercial banks loans and advances to various sectors in the last three years showed that agriculture got only 5.15% in 2020, 5.98% in 2021 and 6.16% in 2022 (CBN bulletin, 2022). Furthermore, climate change is affecting agricultural production because we depend highly on the natural rainfall for agricultural activities in Nigeria.

It is against this backdrop that this study is set to examine the effect of agricultural sector output on economic growth in Nigeria for the period 1990 to 2022. Hence the following specific objectives were developed.

1) To ascertain the effect of crop production output on gross domestic product in Nigeria.
2) To assess the effect of livestock output on gross domestic product in Nigeria.
3) To examine the effect of forestry output on gross domestic product in Nigeria.
4) To assess the effect of fishing output on gross domestic product in Nigeria.

Statement of hypotheses:

1) H_0: Crop production output had no positive effect on gross domestic product in Nigeria.

2) H_0: Livestock output had no positive effect on gross domestic product in Nigeria
3) H_0: Forestry output had no positive effect on gross domestic product in Nigeria.
4) $H_{0:}$ Fishing output had no positive effect on gross domestic product in Nigeria

The subsequent sections of this work include: review of related literature, methodology, data presentation, findings, conclusion and recommendations.

Review of Related Literature

Conceptual review

Umaru and Zubairu, (2019) defined agriculture as the systematic way of raising useful plants and livestock under the management and control of man. Nwankpa, (2017) defined agriculture as a deliberate effort to modify a portion of earth's surface through the cultivation of crops and the raising of livestock forsustenance or economic gains. This definition saw agriculture as a means of livelihood as it laid emphasis on the sustenance of man and economic gains. Agriculture also defined as the growing of both plants and animals for human needs (Oni, 2018). The proxies for agriculture output used in this study are crop production, forestry, livestock and fishing. These are the major four areas of agriculture that produces various output for human and industrial uses.

Also, agriculture have been defined as theproduction of food, feed, fibre and other goods by the systematic growing and harvesting of plants and animals (Amaefula, 2019). Being a traditional sector, it is mostly considered a reliable source of raw materials for industrialization through its backward linkages (Akpan and John, 2020). Ahmed's study (1993, as cited in Salisu & Haladu, 2021) defined agriculture as the production of food and livestock and the purposeful tendering of plants and animals. On the other hand, Odubuasi et al. (2020) defined economic growth is an increase in the productive capacity of a state in terms of production of goods and services over a specific period of time.

Theoretical Review:

Endogenous growth theory: This theory maintains that economic growth is primarily the result of internal forces, rather than external ones. It argues that improvements in productivity can be tied directly to faster innovation and more investments in human capital from government and private sector institutions. Endogenous growth theory posits that economic growth is primarily the result of endogenous and not external forces. Endogenous (internal) growth factors include capital investment, policy decisions and an expanding workforce population. This theory was established to refute the neoclassical exogenous growth models, as it made predictions about economic growth without factoring in technological change.

Empirical Review:

Chukwu (2023) examined the impact of agricultural sector on economic growth in Nigeria for the period 1981 to 2020. The variables used were real gross domestic product (dependent variable) while crop production, livestock production, forestry production and fish production (independent variables). The Ordinary Least Square (OLS) technique was used in estimating the relationship between the dependent and independent variables. Findings of the study showed that crop production and livestock production have significant impact while forestry production and

fish production have no significant impact on economic growth in Nigeria. All the independent variables have positive relationship with real gross domestic product.

Adesiyan and Ogundele (2022) investigated the effect of agricultural output on Nigerian economic growth for the period 1990 to 2015. They used time series data obtained from the Central Bank of Nigeria, Africa Development Bank and World Bank data base. The dependent variable was real grossdomestic product (RGDP), while agricultural output (AOP), labour force (LF), capital formation (CF) and Land (LA) were the independent variables. ADF test of stationarity showed that all the variables were stationery at first level of differencing. The regression output showed that agricultural output (AOP) is significant and positively related to the RGDP. Labour force (LF) also showed a significant and positive influence on the RGDP. Also, land (LA) and capital formation (CF) had negative effect on RGDP. Finally, the adjusted R^2 value was 52.81%.

Oyetade and Adeyeye (2021) examined the long-run relationship between agricultural output and economic growth in Nigeria. The study used annual data while the analysis was done using the ARDL bound test. Their findings showed that long-run relationship existed among variables concerned. Also, the pairwise granger causality test showed that there is one-way causality moving from agriculture to economic growth. This showed that agricultural output leads to economic growth, but economic growth does not lead to agricultural output.

Salisu and Haladu (2021) investigated the short-run and long-run relationship among agricultural output,government expenditure and economic growth in Nigeria. They used annual time series data covering 1985 to 2019. The findings of this study using Zivot-Andrew unit root test indicates thatgross domestic product, agricultural output and exchange rate are stationary at first difference, while government expenditure is stationary at level. The Gregory-Hansen test with structural break has confirmed the existence of a co-integration relationship among the variables used in the study. The AutoregressiveDistributive Lag (ARDL) model with break indicates that, in the short-run agricultural output has a negative and statistically insignificant effect on real gross domestic product in Nigeria, government expenditure has a positive and statistically significant effect on real gross domestic product in Nigeria, and the exchange rate has a positive and statistically significant effect on real grossdomestic product in Nigeria.

Yilson, et al. (2021) examined the impact of agricultural output on economic growth in Nigeria. The dependent variable was gross domestic product, while the independent variables were crop production, livestock, forestry and fishery. They obtained data for the analysis from CBN statistical bulletin and National Bureau for Statistics covering the period 1986 to 2020. The researchers carried out unit root test, co-integration and Error Correction Model (ECM). They found out that long-run relationship exists between the variables used in the study. The Error Correction Model showed that the coefficient of livestock and fishery production were both positive with values of 5.0526 and 67.26 respectively and significant at a 5% level of significance with probability of 0.0432 and 0.0292 respectively. Crop production and forestry had a negative and insignificant impact on Nigeria's economic growth with the coefficient of -4.593964 and -2.625762 and probability values of 0.6432 and 0.6432 respectively.

Akpan *et al*. (2021) examined the relationship between agricultural sub-sector's production and the growth of Nigerian economy. They obtained time series data and analysed it using descriptive tests, unit root tests, multivariate regression based on the autoregressive distributed lag

(ARDL) testing. Their findings showed that the agricultural sub-sector's production significantly influence the movement of the per capita GDP of Nigeria in both short and long-run periods.

Adedayo (2020) examined the impact of disaggregated agricultural sector output on economic growth in Nigeria for the period 1981 to 2017. The researcher used data obtained from the Central Bank of Nigeria (CBN) statistical bulletin. The Toda-Yamamoto Granger Causality test and Dynamic Ordinary Least (DOLS) were used to analyze and determine the direction and magnitude of the relationship between the variables. The findings of the study indicated that causality test showed a unidirectional causality from agriculture to economic growth. This indicates that agricultural output help to predict economic growth in Nigeria. The DOLS estimation showed that the crop production output and the forest output led to about 39.8% and 12% respective increases in economic growth in Nigeria.

Amaefula (2019) assessed the impact of agricultural sector on economic growth in Nigeria. Annual time series data was obtained on the variables for the period 1981 to 2017, namely: real gross domestic product (RGDP), crop production (CP), livestock (LS), forestry (FO) and fishing (FI). Multiple linear regression model and trend pattern of percentage ratio measure were used for the analysis of data. The findings of the study showed that all the independent variables except crop production have insignificant and positive impact on real gross domestic product. Furthermore, the trend pattern of percentage ratio measure showed that agricultural sector contributes positively to economic growth in Nigeria.

Methodology

This study adopted the *ex-post facto* research design. The annual time series data of the variables was sourced from the Central Bank of Nigeria statistical bulletin, 2022, hence it is a representation of the formal sector. The data was analyzed using descriptive statistics and ordinary least square technique using E-views10 processing software. The hypotheses were tested at 5% level of significance.

The regression model relationship is:

$Y_t = b_0+b_1X_1+b_2X_2+b_3X_3 \ldots + bnXn + e$

Where:
- Y = dependent variable
- b_0 = intercept term
- b_1, b_2, b_3 = parameters or coefficients of the model
- X_1, X_2, X_3 = independent or explanatory variables.
- e = error term

The functional relationship of agricultural sector output and gross domestic product can be specified in the following model:

GDP = f(CROPPROD, LIVESTOCK, FORESTRY, FISHING)

The model is explicitly defined as follows:

$GDP_t = b_0 + b_1CROPPROD_t + b_2LIVESTOCK_t + b_3FORESTRYt + b_4FISHING_t + et$

Where:

GDP = gross domestic product

CROPPROD = crop production output

LIVESTOCK = livestock output

FORESTRY = forestry output
FISHING = fishing output

The independent variables used to proxy agricultural sector output were: crop production output, livestock output, forestry output and fishing output. The dependent variable was gross domestic product. The *a-priori* expectation is that the independent variables will have positive effect on the dependent variable. The decision rule was to accept the null hypothesis if the sign of the coefficient is negative, otherwise reject null and accept the alternate hypothesis.

Data presentation

Table 1: The raw data on crop production output, livestock output, forestry output, fishing output and gross domestic product.

YEAR	CROPPROD ₦' Billion	LIVESTOCK ₦' Billion	FORESTRY ₦' Billion	FISHING ₦' Billion	GDP ₦' Billion
1990	86.93	14.15	2.35	3.21	489.77
1991	101.65	15.58	2.44	3.58	584.25
1992	153.38	23.03	2.99	4.72	897.12
1993	249.20	36.58	3.97	5.59	1,244.80
1994	377.31	54.30	5.98	7.68	1,751.28
1995	670.18	97.20	8.25	14.51	3,069.43
1996	906.89	130.41	10.37	22.84	4,045.32
1997	1,026.29	145.03	12.55	27.59	4,374.50
1998	1,133.39	158.31	15.88	33.46	4,756.71
1999	1,204.70	164.37	19.31	38.59	5,426.47
2000	1,270.63	172.19	24.49	41.10	6,990.62
2001	1,699.69	228.56	29.98	57.20	8,150.02
2002	3,875.46	271.03	36.23	68.81	11,383.66
2003	4,161.57	299.22	44.13	81.01	13,418.01
2004	4,419.06	360.80	56.39	99.00	17,938.38
2005	5,372.20	463.42	67.45	129.26	22,884.90
2006	6,723.22	560.25	80.20	149.64	30,063.96
2007	7,654.22	642.28	91.50	163.99	34,318.67
2008	9,039.63	758.84	108.10	193.75	39,542.43
2009	10,419.60	863.40	121.25	221.18	43,012.51
2010	11,683.90	979.56	135.72	249.71	54,612.26
2011	12,484.85	1,115.60	153.05	284.33	62,980.40
2012	14,071.24	1,251.93	170.16	322.67	71,713.94
2013	14,862.32	1,399.48	187.95	366.79	80,092.56

2014	15,812.57	1,573.05	207.74	425.25	89,043.62
2015	17,189.97	1,748.03	222.83	476.14	94,144.96
2016	18,883.08	1,875.78	236.25	528.39	101,489.49
2017	21,096.11	1,974.45	257.21	624.79	113,711.63
2018	24,207.80	2,048.60	272.79	842.11	127,736.83
2019	28,296.93	2,108.95	285.88	1,212.39	144,210.49
2020	33,177.54	2,121.37	284.79	1,657.91	152,324.07
2021	36,349.41	2,249.34	296.96	2,230.36	173,527.66
2022	42,677.33	2,620.29	348.84	2,297.60	199,336.04

Source: CBN statistical bulletin, 2022.

Presentation of findings:

Table 2: Descriptive statistics

	GDP	CROPPROD	LIVESTOCK	FORESTRY	FISHING
Mean	52098.99	10646.61	864.4056	115.2717	390.4584
Median	30063.96	6723.216	560.2461	80.19605	149.6392
Maximum	199336.0	42677.33	2620.293	348.8356	2297.601
Minimum	489.7665	86.92620	14.14587	2.346077	3.208541
Std. Dev.	57551.22	11635.86	825.9849	109.5786	607.0359
Skewness	1.017969	1.182175	0.634949	0.599651	2.143806
Kurtosis	2.921858	3.553109	1.948160	1.955941	6.653935
Jarque-Bera	5.707834	8.107116	3.738637	3.476530	43.63542
Probability	0.057618	0.017360	0.154229	0.175825	0.000000
Sum	1719267.	351338.2	28525.39	3803.966	12885.13
Sum Sq. Dev.	1.06E+11	4.33E+09	21832033	384239.1	11791764
Observations	33	33	33	33	33

The above table displayed the descriptive statistical behaviour of all the parameters that were subjected to estimation in this study.

Table 3: Summary statistics for hypotheses testing

Hypothesis	**Variable**	**Coefficient**	**T-statistic**	**Probability**	**Decision**
One	Cropprod	0.057245	0.073804	0.9417	Reject H0
Two	Livestock	27.64295	2.256208	0.0321	Reject H0
Three	Forestry	161.2027	1.288494	0.2081	Reject H0
Four	Fishing	30.14201	4.443132	0.0001	Reject H0

Source: Extract from regression output.

Hypothesis One: Crop production output had no positive effect on gross domestic product in Nigeria.

The coefficient value for crop production is 0.057245 which is positive. The null hypothesis is therefore rejected and it is concluded that crop production output had positive effect on gross domestic product in Nigeria for the period reviewed.

Hypothesis Two: Livestock output had no positive effect on gross domestic product in Nigeria.

The coefficient value for livestock is 27.64295 which is positive. The null hypothesis is therefore rejected and it is concluded that livestock output had positive effect on gross domestic product in Nigeria for the period reviewed.

Hypothesis Three: Forestry output had no positive effect on gross domestic product in Nigeria.

The coefficient value for forestry is 161.2027 which is positive. The null hypothesis is therefore rejected and it is concluded that forestry output had positive effect on gross domestic product in Nigeria for the period reviewed.

Hypothesis Four: Fishing output had no positive effect on gross domestic product in Nigeria.

The coefficient value for fishing is 30.14201 which is positive. The null hypothesis is therefore rejected and it is concluded that fishing output had positive effect on gross domestic product in Nigeria for the period reviewed.

Discussion of findings:

1) Crop production: Crop production had a positive coefficient (0.057245) but insignificant effect (0.9417). There is the need to revisit the crop production sub-sector to enhance its output so as to make its effect on gross domestic product to be significant. This is imperative given the need to achieve food sufficiency and security for Nigerians. Some researchers also found crop production to have a positive effect on gross domestic product (Adedayo, 2020; Amaefula, 2019; Chukwu, 2023), while Yilson et al. (2021) found it to have negative effect. Also, Yilson et al. (2021) in line with the findings of this study found crop production to have insignificant effect on GDP, however, some researchers found crop production to have significant effect on GDP (Adedayo. 2020; Amaefula, 2019; Chukwu, 2023).
2) Livestock output: Livestock output had a positive coefficient (27.64295) and significant effect (0.0321). The outcome is as expected and encouraging given the current level of food shortage and high cost. Some researchers also found livestock output to have a positive effect on gross domestic product (Adedayo, 2020; Yilson et al., 2021; Amaefula, 2019; Chukwu, 2023). Also, some researchers in line with the findings of this study found livestock to have significant effect on GDP (Adedayo, 2020; Yilson et al., 2021; Chukwu, 2023), however, Amaefula (2019) found it to have insignificant effect.
3) Forestry output: Forestry output had a positive coefficient (161.2027) but insignificant effect (0.2081). The forestry sub-sector need to be explored further to tap its potential benefits so as to ensure that its positive effect also becomes significant to GDP. This is possible given the vast land space we have in Nigeria and the need to check indiscriminant

deforestation. Some researchers also found forestry output to have a positive effect on gross domestic product (Adedayo, 2020; Amaefula, 2019; Chukwu, 2023), while Yilson et al. (2021) found it to have negative effect. Also, some researchers found forestry to have insignificant effect in line with the finding of this study (Yilson et al., 2021; Amaefula, 2019; Chukwu, 2023) but Adedayo (2020) found it to have significant effect.

4) Fishing output: Fishing output had a positive coefficient (30.14201) and significant effect (0.0001) which is in line with a-priori expectation. The fishing sub-sector is a ready alternative to livestock and is being embraced by many with the emphasis to reduce consumption of red meat. This positive and significant effect of fishing on gross domestic product need to be maintained and even improved on so as to boost economic growth. Some researchers found fishing output to have a positive effect on gross domestic product (Adedayo, 2020; Amaefula, 2019; Chukwu, 2023; Yilson et al., 2021). Yilson et al. (2021) found it to have significant effect in line with the finding of this study, while some researchers found it to have insignificant effect on GDP (Adedayo. 2020; Amaefula, 2019; Chukwu, 2023).

The adjusted R^2 value of 0.998440 showed that the independent variables explained 99% of the changes in the dependent variable. Also, the Prob(F-statistic) value of 0.000000 indicated that the model is fit to explain the relationships of the variables since it is less than 0.05.

Conclusion:

This study have helped bring to light the nexus between proxies of agricultural sector and economic growth in Nigeria for the period 1990 to 2022. The relationship of the variables in terms of the effect and significance of the effect were identified. The results of the analysis showed that the agricultural sector has been identified to be significant and vital for driving the nation's economic growth.

Recommendations:

1) The Nigerian government and agriculturists should channel their combined efforts towards crop production. They should ensure more financing and improved variety inputs in crop production. This will help achieve significant effect of crop production on gross domestic product in Nigeria.
2) The government and agriculturists should keep on with their policies, strategies cum support for the livestock sub-sector. This will enable it continue to improve on its positive and significant effect on the gross domestic product of Nigeria.
3) The government should support the forestry sub-sector by making more stringent regulations against deforestation and bringing up other policies that will encourage output in this area. This will help ensure that this sub-sector attain significant effect since it already have the highest positive effect on gross domestic product.
4) The government and agriculturists should strive for continued support of this fishing sub-sector. This will ensure its continued positive and significant effect on gross domestic product of Nigeria hence leading to economic growth.

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