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Agriculture Sector Productivity and Human Development in Nigeria

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ABSTRACT

The study examined the impact of the agriculture sector productivity on human development in Nigeria between 1981 and 2023. Human development was measured by the human development index (HDI), while the value of crop output (CPN), value of livestock output (LIP), and value of forestry output (FOP) were used to measure the agriculture sector. The annual time series were obtained from various reliable sources, comprising the CBN Statistical Bulletin (various issues), National Bureau of Statistics (NBS), World Development Indicators (WDI) of the World Bank, and the United Nations Development Programme (UNDP) Human Development Report. The datasets were analysed using the autoregressive distributed lag (ARDL) method, the Augmented Dickey-Fuller (ADF) test of unit root and the bounds cointegration test, among others. The findings showed that livestock production in the short run had a significant negative impact on HDI. This result negates the a priori expectations and is against theoretical thought. The results also showed that crop output does not significantly affect HDI. On the other hand, the results showed that forestry output had a significant positive impact on HDI in the short run, which conforms to the a priori expectations. The error correction term has a coefficient value of -0.368173 and is appropriately signed, indicating that annually, the deviation from long-run equilibrium will be corrected at a speed of approximately 36.82%. Given the findings, this study concludes that agricultural output has not offered the intended opportunity for human development in Nigeria. Therefore, it is recommended for the government to synergise with the private sector to boost the level of forestry output and create opportunities for human development in Nigeria.

1. INTRODUCTION

Development economists have emphasised how boosting agricultural productivity can drive economic growth and modernisation. From this viewpoint, the advancement of an economy relies heavily on the agricultural sector's growth (Idisi, Ebukiba, and Sunday, 2019; Awoyemi, Afolabi, and Akomolafe, 2017). The agricultural sector in Nigeria includes forestry, livestock, fishing, and the production of both food and cash crops such as yams, cassava, maize, cocoa, groundnuts, and oil palm, among others. The country is richly endowed with the natural resources essential for agricultural development, including vast land, as well as human and forestry resources. Nigeria boasts a total land area of approximately 98.3 million hectares, of which 71.2 million hectares (about 72.4%) are cultivated, yet only 34.2 million hectares (roughly 34.8%), are actively utilized (Oluwatoyese and Applanaidu, 2021, cited by Yilson, Adikaba, Ngukwarai, Dom, and Lopwus, 2021).

Agriculture is the bedrock of economic growth and development among nations of the world. Thus, most nations all over the world make it a priority by developing and exploiting this sector for the feeding and earning of revenue for development purposes. The development of agriculture is the key tool for poverty alleviation in rural areas. Agriculture sector provides employment opportunities in farming and non-farming sector. So, another important contribution of agriculture sector is the capital accumulation that can be made with the agriculture surplus. When agriculture surplus increases, the welfare of rural people will increase (Yilson*et al,* 2021).

Nigeria's agriculture sector needs to witness an increase in productive investment to build successful value chains. Nigeria's agricultural sector contributed 26.21% to GDP in 2020 (NBS, 2021). Agricultural value chains can contribute more significantly to economic growth. Agents, merchants, processors, and marketers are combined with agricultural growers. An analysis of a cocoa barometer provides a typical illustration, showing that only 6.6% of the value contributed to producing a bar of chocolate is added in the manufacturing process, with the remaining value-added being distributed throughout chain players such as processing, marketing, and retail (PwC, 2017). Agriculture is a source of food and raw materials to the industrial/manufacturing sector. It provides raw materials for industrial use for speeding up industrialization. It involves crop production, livestock production, forestry production, and fishery production, for man's consumption and use; processing and marketing of the agricultural products. These contributions, in effect, have been the source of gainful employment opportunities, poverty reduction, and improvement of income redistribution. Furthermore, foreign earnings from the exportation of agricultural local materials help to reduce the pressure on balance of payment in most African nations. Based on these contributions, agriculture is regarded as fundamental to the socioeconomic development of a nation. In low and middle-income countries, the agricultural sector is the largest contributor, providing inputs, food, employment opportunities, raw materials for other industries, provision of foreign earnings from the exportation of the surpluses, and, more importantly, the enormous advantage of the value added in the various production processes. Hence, this study examines how agricultural outputs contribute to human development, with a focus on the human development index (HDI).

2. LITERATURE REVIEW

2.1 Theoretical Literature

Hirschman (1958) and Rostow (1956) developed the theory of unbalanced growth as a strategy for underdevelopment of developing countries. The strategy is concentrated on investing in the key sectors of the economy, rather than spreading resources across all the sectors at once. Through the theory, other sectors will grow automatically due to what is called the "linkages effect" (Saliminezhad and Lisaniler, 2017, as quoted in Ibbih and Nwogu, 2024). The theory here is that adding imbalances to the system can ultimately prove to be the most successful growth strategy, especially with the limited resources one has available in the less developed countries—each little bit that does exist must be leveraged successfully.

In Nigeria alone, the agricultural sector can really use to see more productive investment if it is to grow viable value chains. Agriculture represented 26.21% of GDP (NBS, 2021) in 2020 and is capable of enhancing economic growth through enhancing agricultural value chains. The sector involves an organization of agents, traders, processors, and marketers working with agriculture producers. This is illustrated by a cocoa barometer study, which reveals that 6.6% of the value of producing a chocolate bar is invested in manufacturing alone, whereas most of the value comes from contributors throughout the chain, including processing, marketing, and retail (PwC, 2017).

Agriculture not only provides us with food but also with materials to be utilized for the manufacturing and industrial industries, which contribute to industrialisation at a faster rate. It comprises crop cultivation, animal rearing, forestry, and fishery, all working towards fulfilling human consumption and requirements, along with the processing and marketing of these agricultural products. These have provided useful employment opportunities, reduced poverty, and increased income distribution. In addition, overseas revenues generated from the export of domestic agricultural resources contribute significantly to relieving payment balance pressures in most African countries.

2.2 Empirical Literature

Kamil, Sevin, and Bekun (2017) took a close look at how the agricultural sector influences economic growth in Nigeria by analysing time series data from 1981 to 2013. Their findings showed that there's a long-term equilibrium relationship between real gross domestic product, agricultural output, and oil rents. The results from the vector error correction model indicated that the adjustment speed of these variables toward their long-term equilibrium was quite slow, although agricultural output did positively affect economic growth. They recommended that the government and policymakers focus on diversifying the economy and allocate more budget resources to the agricultural sector.

In another study, Subrata et al. (2025) explored how human capital and remittances impact agricultural labour productivity at the regional level in Bangladesh from 2000 to 2016. They used data from four waves of the nationally representative Household Income and Expenditure Survey and applied Ordinary Least Squares, Fixed Effects, and Panel Corrected Error Models. Their findings revealed a positive link between agricultural labour productivity and both human capital and remittance inflows, with additional benefits from better access to technology and electricity. However, they found that larger farm sizes were negatively correlated with productivity. The study suggests that investing more in education and healthcare, improving accessibility, and creating policies that facilitate remittance inflows could boost agricultural labour productivity. Therefore, the government must allocate resources to enhance access to education and healthcare, improve workforce skills, and reduce absenteeism due to illness.

Mohamed and Mzeea (2017) explored how foreign aid influences human development, using the human development index (HDI) as a measure across 124 developing countries from 1980 to 2013. They employed Quantile regression to analyze data collected from these nations. The findings generally indicate that aid has a positive correlation with the human development index. Interestingly, it was noted that countries with lower levels of human development experience a more significant impact from international aid on their HDI. Given the notable positive effect of aid on human development, the study concluded that aid plays a crucial role in enhancing human welfare.

In a separate study, Tuaneh, Agbenyi & Obe-nwaka (2025) examined the relationship between the Human Development Index (HDI) and agricultural output in Nigeria from 1999 to 2022. They utilized annual secondary data sourced from the Central Bank of Nigeria Statistical Bulletin and the Index Mundi Database. To analyze both short and long-term effects of HDI indicators on agricultural output, they applied the Autoregressive Distributed Lag Error Correction Model. Their results showed that, in the long run, the birth rate positively and significantly influenced agricultural output ($PV < 0.05$), while government spending on education had a negative and significant effect ($PV > 0.05$). In the short term, the birth rate continued to show a positive and significant impact at the 5% level, whereas both the death rate and life expectancy had negative and significant effects. The study suggested that the government should capitalise on the population growth driven by the rising birth rate to boost agricultural participation and, in turn, enhance productivity.

Korhan, Martins, and Nigar (2018) examined how foreign direct investment (FDI) affects the human development index (HDI) in Nigeria from 1972 to 2013. They used the Johansen Cointegration test and the Toda-Yamamoto test for their analysis. The findings from the Johansen Cointegration test indicated a long-term relationship between FDI and the human development indices. Meanwhile, the Toda-Yamamoto test showed a long-run bidirectional causality between FDI and life expectancy at birth, along with a unidirectional causality from FDI to gross national income. These results suggest that FDI plays a significant role in influencing the HDI in Nigeria during the studied period. The study advised that policymakers should carefully consider both the advantages and disadvantages of FDI inflows to maximize their impact on various aspects of human development.

3. METHODOLOGY

3.1 Research Design

This study adopted a quasi-experimental research design. The appeal for this research design was necessitated given that the study relied on secondary data.

3.2 Data Type and Sources

The datasets required for the estimation of the model are annual time series data which cover the period of 1981 to 2023. The data on independent variables, such as crop output, livestock output and forestry output, were obtained from the CBN Statistical Bulletin. The data for the dependent variable, which is the human development index, was obtained from United Nations Development Programme (UNDP)

3.3 Model Specification

The functional specifications of the model is provided as follows:

$$HDI = f\ (CPN, LIP, , FOP) \quad (3.1)$$

The linear econometric form of the model is specified below as:

$$HDI = a_\circ + a_1CPN + a_2LIP + a_3FOP + \mu \quad (3.2)$$

Where:

HDI = Human development index, CPN = Crop output, LIP = Livestock output, FOP = Forestry output

a_o= Constant parameter

$a_1 - a_3 = Slope$ parameters

μ = Error term

3.4 Method of Data Analysis

This study adopted the autoregressive distributed lag (ARDL) estimation by Pesaran, Shin and Smith (2001). The choice of this method was necessitated by the evidence of mixed-integration in the series in terms of I(0) and I(1) stationary processes. We also employed the unit root methodology developed by Phillips and Perron (1988) to test the null hypothesis of non-stationarity against the alternative hypothesis of stationarity at the conventional 5% level. Additionally, a cointegration test was conducted in order to test for the presence of a long-run relationship. It is very important to consider the possible presence of co-integration when one is choosing a technique to test the relationships between economic time series variables that have a unit root. In particular, we applied the bounds cointegration test method given that the variables are mixed-integrated. The estimated model was evaluated with the application of post-estimation tests comprising the serial correlation, heteroskedasticity and normality tests, among others.

4. RESULTS AND DISCUSSION

Table 1: Unit root test results

Variable	ADF Test Stat.	5% Critical Value	P-value	Order of Integration	Test Option	Remark
GPP	-3.357145	-2.935001	0.0185	I(0)	Intercept	Integrated of order 0
HDI	-6.69834	-3.523623	0.0000	I(1)	Trend & Intercept	Integrated of order 1
POV	-3.291017	-2.933158	0.0217	I(0)	Intercept	Integrated of order 0
UNP	-4.811423	-3.544284	0.0024	I(1)	Trend & Intercept	Integrated of order 1
CPN	-6.76487	-3.523623	0.0000	I(1)	Trend & Intercept	Integrated of order 1
LIP	-3.674579	-3.526609	0.0359	I(0)	Trend & Intercept	Integrated of order 0
FOP	-4.911998	-3.523623	0.0015	I(1)	Trend & Intercept	Integrated of order 1

Source: Author's computation from Eviews software, 2025

The ADF unit root test results in Table 1 show that the POV and LIP series were stationary at level, suggesting that they do not possess a unit root. This implies that the mean and variance of the series do not vary systematically over time. This is evident on the basis that their respective ADF test statistic values of -3.357145, -3.291017, and -3.674579 are more negative than their respective critical values at 5% level. All other variables, HDI and FOP, became stationary after first differencing and as such are integrated of order one [I(1)]. The result of the unit root test suggests that the variables have mixed order of integration.

Table 2: Bounds Cointegration Test Results

Test Statistic	Value	Signif.	I(0)	I(1)	Decision
HDI CPN LIP FOP					
F-statistic	12.72375	10%	2.37	3.20	
K	3	5%	2.79	3.67	Cointegrated
		2.5%	3.15	4.08	
		1%	3.65	4.66	

Note: K denotes number of explanatory variables

Source: Author's computation from Eviews software, 2025

The bounds cointegration test result presented in Table 2 was performed at 5% level of significance using the F-statistic. The results show that the computed F-statistic of the HDI model is 12.72, which is greater than the corresponding upper bound critical value of 3.67 at 5% level. This suggests the existence of a long-run relationship between HDI and the independent variables.

Table 3: ARDL Long and Short Run of the HDI Model

Dependent Variable: HDI				
	Short run results			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(HDI(-1))	0.021569	0.070482	0.306015	0.7622
D(HDI(-2))	0.012847	0.070163	0.183109	0.8563
D(HDI(-3))	0.833291	0.135451	6.151953	0.0000
D(LIP)	-0.280016	0.089728	-3.120717	0.0047
D(LIP(-1))	-0.060153	0.091092	-0.660350	0.5153
D(LIP(-2))	-0.230848	0.071199	-3.242280	0.0035
D(FOP)	3.556065	0.420505	8.456653	0.0000
D(FOP(-1))	0.156237	0.267193	0.584736	0.5642
D(FOP(-2))	0.361473	0.270332	1.337148	0.1937
D(FOP(-3))	0.604636	0.228969	2.640691	0.0143
CointEq(-1)*	-0.368173	0.042735	-8.615210	0.0000
	Long run results			
CPN	0.019363	0.012235	1.582685	0.1266
LIP	0.388970	0.276205	1.408269	0.1719
FOP	-0.365945	1.144486	-0.319746	0.7519

R-squared	0.896862			
Adjusted R-squared	0.860028			
Durbin-Watson stat	2.161034			

Source: Author's computation from Eviews software, 2025

In the short run, the result in Table 3 shows that LIV had a significant negative impact on HDI in the current period and in the 0.0047 second lag period at 5% level. This is borne on the fact that the corresponding probability values of LIV of 0.0047 and 0.0035 in the current period and the second lag period are less than 0.05. However, in the long run, though, no significant impact was established. The result also shows that FOP had a significant positive impact on HDI in the current and third lag period at 5 per cent level. Just like the LIV result, FOP in the long run, had no significant influence on HDI at the 5 per cent level. Similarly, CPN in the long run had no influence on HDI, showing that the performance of HDI in Nigeria is not influenced by CPN outcomes. The error correction term has a coefficient value of -0.368173 and is appropriately signed. Further, it is associated with a probability value of 0.0000, which suggests that annually, the deviation from long-run equilibrium will be corrected at a speed of approximately 36.82%. The R-squared result of 0.896862 is high and implies that 89.69 per cent of the variations in HDI are influenced by the independent variables. This shows that the model is a good fit. Further, the model has no evidence of autocorrelation as the Durbin-Watson value of 2.161034 is within the region of 2.

Table 4: Result of Post-estimation tests

Breusch-Godfrey serial correlation LM test	F-statistic	1.866099	Prob. F(2,22)	0.1784
	Obs*R-squared	5.656559	Prob. Chi-Square(2)	0.0591
Breusch-Pagan-Godfrey Heteroskedasticity test	F-statistic	1.311968	Prob. F(14,24)	0.2705
	Obs*R-squared	16.90762	Prob. Chi-Square(14)	0.2611
Ramsey RESET	t-statistic	11.35699	Prob. Value	0.0000
	F-statistic	128.9813	Prob. Value	0.0000

Source: Author's computation from Eviews software, 2025

Table 4 shows the result from the residual diagnostics tests (Breusch-Godfrey serial correlation LM test and Breusch-Pagan-Godfrey heteroskedasticity test) and Ramsey RESET Test. The test results on the model show, there was no evidence of serial correlation in the model at 5% significance level. This is because the corresponding probability values 0.059 of the Lagrange multiplier (LM) statistic (Obs*R-squared) is greater than 0.05. Similarly, the Breusch-Pagan-Godfrey heteroskedasticity test shows that there was no evidence of heteroscedasticity in the models at 5% significance level because the probability value of 00.26 of the Obs*R-squared for both models is greater than 0.05.

5. CONCLUSION

The study investigated the effect of agricultural productivity on HDI in Nigeria from 1981 to 2023. The datasets on the variables were analysed using the ARDL method. The findings showed that shows that livestock production in the short run had a significant negative impact on HDI. This result negates the a priori expectations and is against theoretical thought. On the other hand, the results showed that forestry output had a significant positive impact on HDI in the short run, which conforms to the a priori expectations. Given the findings, this study concludes that agricultural output has not offered the intended opportunity for human development in Nigeria. Therefore, it is recommended for the government to synergise with the private sector to boost the level of forestry output and create opportunities for human development in Nigeria.

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