

Agricultural Inputs And Agricultural Productivity In Nigeria

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ABSTRACT:

The study investigated effect of agricultural inputs on agricultural productivity in Nigeria for the period 1981 – 2021. It seeks to ascertain the effect of agricultural inputs on agricultural productivity in Nigeria and whether there is a sustainable long run relationship between agricultural inputs and agricultural productivity in Nigeria. The Ordinary Least Square (OLS) estimation technique was used for estimation, time series data were obtained from Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS). Results showed that agricultural inputs had a significant effect on agricultural productivity at 5% level of significance while the Johansen co-integration test indicated a long run relationship between Agricultural Productivity (AGOUT), Agricultural Credit Guarantee Scheme Fund (ACGSF), Commercial Banks' Loans and Advances to Agricultural Sector (CBLAAS) and Total Rainfall (RNFL). Based on the above findings, the study recommended among others that there is need to increase agricultural credit guarantee scheme fund as it has effect on agricultural productivity and to sustain commercial banks loans and advances to agricultural sector as it has a significant effect on agricultural productivity in Nigeria.

KEYWORDS: *Agricultural Inputs; Agricultural Productivity; Agricultural Sector; Agricultural Credit Guarantee Scheme*

MANUSCRIPT TYPE:

Research Paper

PUBLICATION DETAILS:

Received: May 2022

Revised: May 2022

Accepted: Sept 2022

Publication College of Management Sciences, Michael Okpara University of Agriculture, Umudike Nigeria



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INTRODUCTION

Agricultural production in Nigeria is progressively on the decline in terms of its contribution to the Gross Domestic Product (GDP) as well as satisfying the country's food requirement, despite the fact that about 70 per cent of the population engage in agriculture. This inability of Nigeria agricultural sector in fulfilling its most basic role of being the source of food for the nation has led to a continuous rise in food importation (Odigbo, 2000). There is a growing recognition by the Nigerian farmers of the effect of improved inputs and new technologies on agricultural field. The use of these inputs and the adoption of high yielding techniques have given rise to an increased need for agricultural credits. In order to improve agricultural production, modern farm inputs such as fertilizers, improved seed, feeds and plants protection, chemicals and machineries are needed. Agriculture contributes to the Nigerian economy in ways like, provision of food, supply of adequate raw materials to a growing industrial sector, a major source of employment, generation of foreign exchange earnings, and provision of a market for the products of the industrial sector (Okumadewa, 1997); World Bank, 1998; Winters et al, 1998; FAO, 2006).

The agricultural exports include cocoa, beans and products, rubber, cotton, processed skin etc (Okoro & Ujah, 2009). These agricultural products account for about 3.97 per cent of the total non oil exports in 2007 (CBN, 2007). The import export gap has been widening since 1999 and this puts the agricultural policy of

the nation to question. This situation provides a unique opportunity for closing up this agricultural deficit through functional policies and budgets (Okoro & Ujah, 2009).

Although Nigeria depends heavily on the oil industry for her revenues, Nigeria is predominantly an agrarian society which the sector contributed about 42 per cent of real GDP in 2008 (CBN, 2008). The working population data indicates that growth rate of agriculture working population seems to be the driver of the growth rate in total working population. For instance, the growth rate of agriculture working population dropped from 3.73 percent in 2003 to 1.94 per cent in 2007, while that of the total working population dropped from 4.46 per cent in 2003 to 3.25 per cent in 2007 (Ujah & Okoro, 2007). The high correlation between growth rates of total working population and agriculture working population suggests that agriculture holds the potential for tackling unemployment in the country at least in short run.

Despite all government's efforts in improving agricultural production through agricultural credit etc, agricultural production has not yet improved. Governmental programmes that were set up in improving agricultural credit and production in Nigeria include: Agricultural Credit Guarantee Scheme (ACGS), which was formed in 1977 with the objective of encouraging financial institutions to lend funds to farmers, Agricultural Development Programmes (ADP) which was designed to enhance the production of Agricultural outputs, Agricultural Project Monitoring and Evaluation Unit (APMEU) which was designed for monitoring and evaluation ADPs units and Federal Agricultural Coordinating Unit (FACU), which provides technical assistance to the ADPs in agriculture and infrastructure; undertake studies, and prepare new projects.

In 1981 credit was 35,642 and output was 2,364.37 billion and in 1990 credit was 98,494.50 while output was 3,464.72 billion. From 1981 to 1990, there were increases in loans guaranteed and outputs. In 1991 credit was 79,107.40 and output was 3,509.84 billion and in 2000 credit was 361,449.00 while output was 4,840.97 billion. In 2001 credit was 728,545.40 and output was 5,024.54 billion and in 2010 credit was 7,840,496.63 while output was 13,048.89 billion. From 2001 to 2010, there were substantial increases in the value of loans guaranteed and agricultural output.

In 2011 credit was 10,028,988.81 and output was 13,429.38 billion and in 2015 credit was 10,857,380.83 and output was 15,952.22 billion. From 2011 to 2015, there was no much difference in the credits guaranteed due to fluctuations in the value of loans guaranteed under Agricultural Credit Guarantee Scheme, but in the agricultural outputs there were little increases between 2011 and 2015, (CBN Statistical Bulletin, 2015 and National Bureau of Statistics).

In spite of the efforts of government through these programmes in improving the credits given to farmers, agricultural output has not improved. There is over dependence on importation of agricultural products. Nigeria has consistently spent less than 5 per cent of its annual budget on agriculture. Some African countries such as Ghana, Uganda and Malawi have stabilized their budget expenditure on agriculture around 10 per cent. Malaysia on the other hand, has achieved accelerated agricultural development through sustained annual expenditure between 20-25 per cent of its budget on agriculture in the last three decades (Youngstars Foundation, 2010). This poor annual budgetary allocation to the agricultural sector also contributes to the sector's low productivity.

LITERATURE REVIEW

Conceptual Literature

The primary interest of the study is to examine the impact of agricultural credits on agricultural productivity in Nigeria. The goal of agricultural development of any country is to boost food production in order to attain food security. The attainment of this goal is impossible if the farmers have no resources to produce with. Therefore, the provision of agricultural credits to the farmers is a must if the goal is to be achieved. The empowerment of farmers is to provide agricultural credits. Warren (2001), explained that agricultural credits is the economic study of the acquisition and use of capital in agriculture. It deals with the supply of and demand for funds in the agricultural sector of the economy. From this definition, one could say that agricultural credit is the amount of investment funds made available for agricultural production. These resources could be in the form of cash or kind. The resources in cash could be loans from government, commercial banks, saving and cooperative societies. While the resources in kind could be, by supply of inputs to farmers by the government and non-governmental agencies who are interested in agriculture or food production. However, the availability of food at the right quantity and quality cannot be compromised. Therefore, agricultural credit facilities need to be improved. The agricultural sector needs finance to survive.

The government established the Nigerian Agricultural Cooperative and Rural Development Banks (NACRDB) in 1973 in order to enhance credit flow to the sector. However, with the establishment of NACRDB, the challenge of poor credit supply still remained. This is an indication that the budgetary allocation to NACRDB was insufficient for the credit needs of the sector (Akinyele, Akanni and Oladoja, 2003). According to Zakaree (2014), in an attempt to address this issue, the government established the Agricultural Credit Guarantee Scheme (ACGS) in 1977 to encourage commercial banks to increase credits' supply to the agricultural sector by providing guarantees against inherent risk in agricultural lending. Akinyele *et al.* (2013), asserted that despite several years of the establishment of the Agricultural Credit Guarantee Scheme (ACGS), the level of commercial banks' involvement is yet uncertain. Nigeria with natural endowment is yet relying on massive importation of basic food and industrial raw materials.

Role of Credit in Agricultural Development

Agricultural development means providing assistance to the farmers with the help of various agricultural resources to boost production. Efficient and effective credit is used for the adoption of new technology by farmers which in turn boost agricultural activities. Murshid and Rahman (1991), indicated that agricultural growth occurs through capital accumulation and technical changes. Most of the high yielding technology has been a vehicle of growth in agriculture. Galbraith (1952), recognized the vital role of credit which he described as a catalyst in stepping up agricultural production. Credit has been said to propel the transition from traditional agriculture towards modernization and commercialization. This transformation from traditional to modern agriculture will inspire farmers towards better nutrition, health, better housing and education for the farm family (Nweke; 1986).

Theoretical Literature

Linear stages of growth

Prof. Rostow described five stages of economic growth through which all developing countries pass through. The Traditional Society: It is the basic stage of economic development which is characterized by subsistence agriculture. The labour force depends upon agriculture and there is less mobility of factors of production.

Pre-Conditions to "Take-Off"

In the second stage of economic growth, an economy undergoes a process of change for building up conditions for growth and take-off. According to Rostow, these changes in society and the economy had to be of fundamental nature in the socio-political structure and production techniques. There are three important dimensions to this transition: Firstly, is the shift from an agrarian to an industrial or manufacturing society? Secondly, trade and other commercial activities of the nation broaden the markets. Lastly, the surplus attained should not be wasted by the land owners or the state, but should be spent on the development of industries, infrastructure and thereby prepare for self-sustained growth of the economy. This strategic factor is that investment level should be above 5 per cent of the national income. Accordingly, to Rostow, capital formation depends on the productivity of agriculture and creation of capital. Agriculture plays an important role in this transition process as the surplus quantity of the produce is to be utilized to support an increasing urban population of workers. Increases in agricultural productivity also led to expansion of the domestic markets for manufactured goods and foreign income, investment, production and purchasing power begin to increase.

The Take Off

According to Rostow, take off period is normally 20 to 30 years. In this stage, all the obstacles of development are controlled, the rate of economic development increases, new markets are found, new industries are stabilized and the latest technology is used in the various sectors of the economy. The ability of a country to make it through this state depends on these factors.

A sustained effective demand for the product of key sectors, introduction of new production technologies and technique of the sectors, the society's increasing capacity to generate or earn enough capital to complete the take-off transition and activities of the key sector should induce a chain of growth to other sectors of the economy that also develop rapidly.

Drive to Maturity

After takeoff, there follows a long interval of sustained growth known as the stage of drive to maturity. Rostow defines it "as the period when a society has effectively applied the range of modern technology to the bulk of its resources. Some 10 – 20 percent of the national income is steadily invested, permitting output to regularly exceed the increase in population, new industries accelerate, the economy finds its place in the

international economy; goods formerly imported are produced at home and labour force composition in agriculture shifts from 75 percent of the working population to 20 percent.

The Age of High Mass Consumption

In this stage of economic growth, prosperity is being found in the country. The per capita income is high and people can save easily after meeting the basic necessities. Rural population moves to urban areas, durable goods like cars and machines are produced in the country, colleges and universities are available in large number.

Structural Change Theory

This theory was postulated by Arthur W. Lewis in the mid-1950s. The theory focuses on the mechanism by which underdeveloped economies can transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern and advanced agricultural practice through heavy financial support in order to attain industrial breakthrough. The extended version added that the full benefits of agricultural development cannot be realized unless government support systems are created to provide the necessary incentives, economic opportunities and most importantly, access to needed credits and inputs to enable small scale farmers expand their outputs and raise their productivity. Wiggins explains that agricultural financial incentives can play a dual role in the process of economic development. Firstly, it will produce more food and also produce many great jobs needed.

The Classical Theory of Growth

Adam Smith who is the foremost classical economist identified major sources of growth. The sources include:

- **Technological Changes:** Technological changes brought about innovations that introduces new products, new ways of producing existing products and new forms of business organizations. These can be achieved if farmers are provided with capital in order to purchase improved inputs and new technologies.
- **Investment in Human Capital:** A country with high percentage of educated labour force will experience faster economic growth than a country with a low percentage. Since about 70 per cent of the Nigerian population engage in agriculture, if these people are educated, there will be faster economic growth and the productivity of the sector will increase.

Empirical Literature

Udih (2021), investigated banks' credits and agricultural development. The paper used primary and secondary sources of information that were extracted from five (5) banks and ten (10) agricultural enterprises in Delta State. A simple random sampling technique through the lottery method was adopted to test the hypotheses. The research finding include: that banks' credits and advances to agricultural entrepreneurs promotes agricultural development and productivity and that regulated banks' credits to the agricultural entrepreneurs have no or little impact on the entrepreneurship performance. Thus, he suggested that adequate banks' credits should be granted to small scale farmers in order to increase productivity, and their farmlands should be used as collateral. Uger (2020) used a time series data from 1991 to 2018, employing the OLS model to examine the effect of government expenditure on agricultural sector. The findings revealed that there is a positive but insignificant relationship that existed between government expenditure and agricultural output in Nigeria. Nafisat (2017) used an ordinary least square (OLS) estimation technique for the period of 1977 to 2016 to examine the impact of government expenditure on agricultural output in Nigeria. The results revealed that agricultural output does not respond significantly to government expenditure on agriculture. It confirms that the government contribution to agriculture is not enough for its development. The study therefore suggested that government expenditure on agriculture should be increased. Oboh (2016) used error correction model to investigate farmers' allocative behavior in credit utilization in Benue State. The study revealed that the usefulness of any agricultural credit programmes do not depend only on its availability, accessibility and affordability, but also on its proper and efficient allocation and utilization for intended uses by beneficiaries. In spite of the importance of credit in agricultural production, its acquisition, management and repayment are replete with a number of problems.

Enga, and Alimba (2015) used OLS multiple regression model to examine the effect of commercial bank funding on the Nigerian agricultural sector from 1986 to 2013. The study revealed that agricultural sector repayment ability, cash reserve ratio and interest rate have a theoretical signs indicating that an increase in interest rate and repayment ability of the sector causes an increase in the amount of credit by commercial bank funding to the agricultural sector.

Rahman *et al.* (2014) used a logistic regression model to examine the effect of agricultural credit on agricultural productivity in Pakistan. The study revealed that there is a positive and significant relationship between agricultural credit and agricultural productivity. They concluded that timely provision of appropriate amount of loan to farmers is helpful for the enhancement of agricultural productivity as it enables farmers to purchase high yielding variety seeds, fertilizers and pesticides. Idoko (2012), used data from 1975 to 2010 to study the effect of government expenditure on agricultural output in Nigeria. They used an ordinary least square for the estimation. The variables for the study included foreign direct investment on agricultural sector, annual rainfall, government expenditure on agricultural sector, agricultural credit guarantee scheme fund, and commercial bank loans and advances to the sector. The result of the estimated OLS model revealed that, the relationship that existed between government expenditure on agriculture and Nigerian agricultural sector output was found to be significant and positive during the evaluation period. Ayaz and Hussain (2011) employed a stochastic Frontier Production Analysis (SFA) to examine the effect of credit availability to farmers in Pakistan. The study revealed that agricultural credit has a positive effect on agricultural output. They concluded that credit to agricultural sector has more constructive and significant impact on farmers' technical efficiency than other factors like farming experience, education and number of cultivation practices.

Rahji and Adeoti (2010) used Logit Model to identify the determinants influencing commercial banks' decision to ration agricultural credit in South-West, Nigeria. Data were sourced from the agricultural credit transactions of the banks. Evidence from the estimated logit model indicated that farm size of the farmers, previous incomes, enterprises type and household net worth are significant but are negative factors influencing the banks' decision to ration credit. Hence higher values of these variables increase the likelihood of being credit rationed. Dong et al. (2010) used an endogenous switching regression model to examine the effect of agricultural credit on agricultural productivity in North East, China. The study revealed that the productivity and income of credit unconstrained farmers are higher than the credit constrained farmers.

METHODOLOGY

Model Specification

In order to estimate the effect of agricultural inputs on agricultural output, this study will use the Cobb-Douglas production function to analyze the data.

$$Q = f(L, K)$$

Where,

Q	=	Total production of the inputs
L	=	Labour input
K	=	Capital input

This study will adopt the model by Uger (2017) in the empirical literature. The study used an OLS with a time series that covers between 1991 and 2016.

$$Y = f(x) \quad 1$$

$$Y = \beta_0 + \beta_1 x + u_i \quad 2$$

Where,

Y	=	Agricultural output in Nigeria
X	=	Agricultural expenditure
ui	=	Error term.

With modification both in variable and time factor, this study intends to show the effect of agricultural inputs on agricultural output in Nigeria. The study will use an ordinary least squares (OLS) with a time series data that covers from 1981 to 2021. The model for this study is implicitly stated as:

$$AGOUT = F(ACGSF, CBLAAS, RNFL)$$

Explicitly, the model is stated as:

$$AGOUT = \beta_0 + \beta_1 ACGSF + \beta_2 CBLAAS + \beta_3 RNFL + u_i$$

Where

AGOUT = Agricultural output

ACGSF = Agricultural credit guarantee scheme fund

CBLAAS = Commercial Banks' Loans and Advances to Agricultural Sector

RNF = Total Rainfall

Ui = Stochastic error term. This will take care of other variables that have influence on agricultural output but are not specified in this model.

β_1 and β_2 are the coefficients of agricultural credit guarantee scheme fund and commercial banks' credit and advances to agricultural sector.

RESULTS

The analysis was carried out using four variables, one dependent variable and three independent variables. Agricultural output (AGOUT) was used as dependent variable while ACGSF, CBLAAS and RNFL were used as independent variables. Data were collected from CBN statistical bulletin, National Bureau of statistics and Nigeria Meteorological Agency.

Unit Root Test

This test tries to examine the property of the variables. It is used to check for the presence of a unit root i.e. no stationarity of the variables. This test is carried out using the Augmented Dickey Fuller (ADF) test. This is the first test carried out in the Cointegration analysis and is known as the pre Co-integration test. The ADF is carried out using E-views software package and the results from the test are tabulated below:

Table 1: Test for Stationarity

Variables	AT LEVELS			At 1 st DIFFERENCE			
	ADF Test statistic	Critical Value at 5%	Remarks	ADF Test Statistic	Critical Value at 5%	Remarks	Order of Integration
AGOUT	1.972910	-2.957110	NS	-4.544087	-2.960411	S	I(1)
ACGSF	-1.950507	-2.960411	NS	-3.890507	-2.960411	S	I(1)
CBLAAS	-1.642663	-2.957110	NS	-4.851131	-2.963972	S	I(1)
RNFL	-5304134	-2960411					I(0)

Source: Author's Compilation from E-views 10

The a priori expectation when using the ADF test is that a variable is stationary when the value of the ADF test statistic is greater than the critical value at 5%. None of the variables used met this a priori expectation at all levels as they were non-stationary (NS) and as such were differenced once to become stationary (S). Thus AGOUT, ACGSF and CBLAAS integrated of order one while RNFL is integrated of order zero.

Johansen Co-integration test

The co-integration test is used to check for long run relationship between the dependent and independent variables. The co-integration test was carried out using the Johansen technique also using E-views software package and it produced the following results:

Table 2: Test for Johansen Co-integration Using Trace Statistic

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Value	Critical Value	Prob.**
None *	0.808381	86.82273	63.87610		0.0002
At most 1	0.457610	32.60317	42.91525		0.2211
At most 2	0.306475	16.11962	25.87211		0.4830
At most 3	0.152745	4.554616	12.51798		0.6290

Source: Author's Compilation from Eviews10

From the above table the trace indicates one co-integrating equation at 5 percent level.

Table 3: Test for Johansen Co-integration Using Max-Eigen Value

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	0.05 Value	Critical Value	Prob.**
None*	0.808381	51.21956	32.11832		0.001
At most 1	0.457610	19.48355	25.82321		0.2740
At most 2	0.306475	11.34501	19.38704		0.4784
At most 3	0.152745	4.554616	12.51798		0.6290

Source: Author's Compilation from Eviews10

From the above table the Max-Eigen value indicates one co-integrating equation at 5 percent level. Based on the above tables we reject the null hypothesis of no cointegrating equations.

Table 4: Long run Normalized Co-integration Estimates

LRAGOUT	ACGSF	CBLAAS	RNFL
1.000000	0.060263 (0.05932) [1.00689]	0.723011 (0.08449) [8.55736]	-0.006284 (0.00146) [4.25411]

Source: Author's Compilation from Eviews10

The above table shows the normalized co-integration co-efficients with the standard error and t-statistic in parentheses () and [].

There is an inelastic relationship between LRAGOUT and ACGSF. A unit change in agricultural credit guarantee scheme fund (ACGSF) will bring about a less than proportionate change in long run agricultural output (LRAGOUT). The t-statistic shows the significance of the independent variable with respect to the dependent variable in the long run. The rule of thumb for t-statistics states that $t \geq 2$ is significant. Therefore ACGSF is statistically insignificant at 1.00689.

There is an inelastic relationship between LRAGOUT and CBLAAS. A unit change in commercial bank loan and advances to agricultural sector (CBLAAS) will bring about a less than proportionate change in LRAGOUT. The rule of thumb states that $t \geq 2$ is significant. Therefore CBLASS is statistically significant at 8.55736.

There is positive relationship between LRAGOUT and RNFL. A unit increase in rainfall (RNFL) will bring about a 0.006284 increase in LRAGOUT. This meets a priori expectation of a positive relationship between rainfall and agricultural output. The rule of thumb states that $t \geq 2$. Therefore RNFL is statistically significant at 4.250411.

Test of Hypothesis

H0: Agricultural inputs do not have a significant effect on agricultural output in Nigeria

Result of Regression Analysis with EViews 10

Dependent Variable: AGOUT

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	145.8045	10.95743	13.30646	0.0000
ACGSF	1.668705	0.000193	-0.085732	0.0325
CBLAAS	1.946705	8.347606	2.325182	0.0307
RNFL	1.117805	0.000565	-0.108270	0.0149
R-squared	0.762647	Mean dependent var		2069160
Adjusted R-squared	0.715176	S.D. dependent var		67.22186
Durbin-Watson stat	0.466977	Prob(F-statistic)		0.000005

Source: Researcher's Compilation from Eviews 10

The result of the above analysis is as follows. The partial slope coefficient of 1.66 measures the agricultural output with respect to agricultural credit guarantee scheme fund. This number (1.66) states that, if agricultural credit guarantee scheme fund increases by 1 percent, agricultural output rate goes up by about 1.66 percent. Similarly, if commercial banks' loan and advances increases by 1 percent, agricultural output goes up to about 1.94. The analysis also shows that the increase in rainfall will also lead to an increase in agricultural output. 1 percent increase in rainfall will lead to 1.11 increase in agricultural output.

The R^2 of 0.7626 shows that about 76% of the variation in agricultural output is explained by agricultural credit guarantee scheme fund (ACGSF), commercial banks' loan and advances to agricultural sector (CBLASS) and rainfall (RNFL). The remaining 24% is as a result of other variables not captured in the model.

The estimated F-value is significant (because p-value is less than 0.05) we can strongly reject null hypothesis and accept alternative hypothesis and therefore conclude that agricultural inputs have significant effect on agricultural output.

CONCLUSION AND RECOMMENDATIONS

The objective of the study is to examine the impact of agricultural inputs on agricultural outputs. The agricultural development of any country is to boost food production in order to attain food security. The attainment of this goal is impossible if the farmers have no resources to produce with. Therefore the provision of agricultural credits to farmers is a must if the goal is to be achieved. Such credits includes agricultural credit guarantee scheme fund and commercial banks' loan for agricultural sector. The result of the analysis shows that these determinants of agricultural output (agricultural credits guarantee scheme fund, commercial banks' loan to agricultural sector and rainfall) have significant relationship with agricultural output. However, the study concludes that agricultural inputs have significant impact on agricultural productivity.

Based on our results we recommend the following policy guidelines:

- (i) There is need to increase agricultural credit guarantee scheme fund as it has effect on agricultural output and sustain commercial banks loan and advances to agricultural sector as it has a significant effect on agricultural output in Nigeria.
- (ii) Government should introduce new policies that will increase agricultural output in Nigeria.
- (iii) There is need for government to put in place policies to stimulate agricultural commercialization through cooperative system, agricultural subsidies and zero-tariff for importation of agricultural inputs.
- (iv) Farmers should farm with season considering the time of heavy rainfall since rainfall has impact on agricultural output.
- (v) Farmers should be able and also encouraged to apply judiciously their own funds for agricultural development without even the Guarantee Scheme Fund Loan, and once this is achieved, will in turn enhances agricultural productivity in Nigeria.

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