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An empirical investigation of agricultural productivity and its effect on economic growth: Evidence from Kebbi state, Nigeria

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Abstract
This paper investigated the effect of agricultural productivity on economic growth. The current study used a survey approach to collect data from respondents. The population of the study consists of the entire farmers in Kebbi State. Population parameters in most statistical research studies are usually unknown and have to be estimated from the sample (Heizer, Render, 2004). Therefore, a sample size of 384 was generated using infinite population table. Where 384 copies of questionnaires were administered to only farmers that read and write. Out of 384 copies of questionnaires only 376 copies were validly returned by the respondents. The study employed convenience sampling technique. However, purposive sampling technique was used in selecting farmers for the study. Both descriptive and inferential statistics were used to analyse data for the study. The demographic data in this study was analysed using descriptive statistical techniques such as tables and the frequency graphs. On the other hand, multiple regression model was employed to establish the relationship between agricultural productivity components and economic growth. The results from the analysis discovered that agricultural productivity influences economic growth positively and significantly. Therefore, the study recommended the for the Government and stakeholders should focus more on agricultural productivity such as provision of modern farm equipment, provision of credit and marketing facilities, provision of good roads and supply of better manure seeds as they predict economic growth of the state.

Keywords: Agriculture productivity, economic growth, credit facilities, modern farm equipment, supply of quality inputs, improve in crop breeding

1. Introduction

The agricultural sector is known to be the backbone of the Nigerian economy for decades. In the early 1960's, the sector was said to be the mainstay of the economy (Kamil, Sevin & Festus, 2017) [9]. It has also regarded as the engine and panacea to economic prosperity. In fact, to further demonstrating how important it is to the Nigerian economy, the agricultural sector is part of the Millennium Development Goals program of poverty reduction in Nigeria. Agriculture is the bedrock of economic growth, development and poverty eradication. Agriculture has also been viewed as the engine and panacea for economic growth in most developing countries around the world (Awoyemi, Afolabi & Akomolafe, 2017) [3]. The agricultural sector is still the largest contributor in most developing countries (low and middle-income countries), providing inputs, food, employment opportunities, raw materials for other industries, foreign earnings from surplus exportation, and most importantly the enormous advantage of the value added in the various production process (Izuchukwu, 2011) [8]. Therefore, it is clear that the agricultural sector plays a significant role in the Nigerian economy's growth and development. Agriculture is concerned with the cultivation of land for crop production and rearing of animals for human consumption as well as animal feed (livestock).

Forestry, fishery, processing and marketing of the agricultural products are all sub-sectors of agriculture (Kamil, Sevin & Festus, 2017) [9]. It provides job opportunities and raw materials for many agro-allied industries.

Moreover, several scholars (Gardner, 2005; Chebbi, 2010) [5, 4] have raised a lot of questions regarding the impact of agricultural sector on economic growth. Gardner (2005) [5] asked, "Is agriculture an engine of growth?" Lavorel *et al.* (2013) [11] investigated the causation relationship between agricultural value added per worker and gross domestic product (GDP) per capita for 85 countries.

Agricultural productivity refers to the rise in per capita output of agricultural produce within an economy over time. The period of time can be monthly, quarterly or annually. Though, economists and statisticians prefer to use the annual period of time since it provides more reliable and consistent information. The output produced by a given level of inputs in the agricultural sector of a particular economy is referred to as agricultural productivity (Amire, 2016) [2]. In more technical terms, it can be defined as the ratio of the value of total farms outputs to the value of total inputs farm inputs (Iwala 2013) [7]. Agricultural productivity is measured as the ratio of final output in appropriate units to some measure of inputs. Olajide, Akinlabi and Tijani, (2012) [12] suggested that yield per unit should be considered while determining agricultural productivity. Many scholars opposed this notion while pointing out that it simply considered land as the factor of production. Some researchers believe that agricultural productivity should include all the factor of production such as: labour, farming experience, fertilizers, water availability and management and other biological factors. In addition, total factor productivity (TFP) can be used to assess agricultural productivity. This method of calculating agricultural productivity compares an index of agricultural inputs to an index of outputs. Generally, total factor productivity is attributed to technological progress. Agricultural productivity is important, because it boosts food production and increases farmer's opportunities for growth and competitiveness in the agricultural market. Farmers who are more productive benefit from adoption of new techniques and differences, while those who are not productive enough will exit the market to seek success elsewhere (Yair, 2007) [18]. As the world's population continues to rise, agricultural productivity is becoming increasingly important. Increases in agricultural productivity help more than just the people work in agriculture. Those in employed other sectors benefit also enjoy lower food prices and a more consistent food supply. It is not only the people employed in agriculture who benefit from increases in agricultural productivity. Those employed in other sectors also enjoy lower food prices and a more stable food supply.

Therefore, this study intends to investigate the effect of agricultural productivity on economic growth with particular reference to Kebbi state.

1.1 Research Objectives

The main purpose of this study is to investigate the Effect of Agricultural Productivity on Economic Growth in Kebbi State, Nigeria.

The specific objectives are as follows

i. To determine whether provision of credit facilities significantly influence economic growth.
ii. To assess whether or not provision of modern farm equipment have influence on economic growth.
iii. To determine whether supply of quality inputs significantly influence on economic growth.
iv. To determine whether or not improve in crop breeding significantly influence on economic growth.

2. Literature Review

An empirical review of authorities who conducted studies in the area of discussion is required to support the claims of any study. However, similar studies were reviewed as follows:

Runganga and Mhaka (2021) [13] conducted a study on the Impact of Agricultural Production on Economic Growth in Zimbabwe. The purpose of this study is to ascertain the impact of agriculture on economic growth in Zimbabwe using the Autoregressive Distributed Lag (ARDL) estimation technique, employing data from 1970 to 2018 in both the short run and long run. The study revealed that inflation, government expenditure, and gross fixed capital formation have a positive impact on economic growth. The study also discovered that agricultural production has a positive impact on economic growth in the short run, and no impact on economic growth was found in the long run. It is obvious from the results of this study that agriculture is an engine for growth in the short run and should eventually be supported by other macroeconomic policies to promote economic growth in the long run. The study recommended that there is need to boost agricultural output through various measures such as plugging the loopholes in the existing land legislation so that surplus land may be distributed among the small and marginal farmers and providing adequate credit facilities at reasonable cheap rates to farmers.

Awoyemi, Afolabi and Akomolafe (2017) [3] examined the impact of agricultural productivity on economic growth in Nigeria between the periods of 1981 to 2015. The agricultural productivity was measured by Agricultural value added (AGVADD) Agricultural labour productivity (AGLP), Agricultural capital productivity (AGKP), while Real Gross Domestic Product (RGDP) proxy economic growth. Inflation rate (INFR) was included as a control variable. Secondary data were sourced from the Central Bank of Nigeria and the World Bank Database (WDI, 2016). The major method of analysis employed in this study is the regression analysis. The results found out that the agricultural labour productivity and agricultural value added were the positive determinants of economic growth. The study concluded that improvement in the performance of the agricultural sector has a significant effect on economic growth in Nigeria. The study recommended that the government should encourage labour force participation in the agricultural sector by increasing investment in the agricultural sector.

Kamil, Sevin, Festus (2017) [9] conducted a research on the impact of Agricultural Productivity on Economic Growth in Nigeria. The objective of this study is to empirically investigate the impact of Nigeria's agriculture industry on the country's economic growth. The study used time series data from 1981 to 2013 to analyse data for the study. The findings demonstrated a long-run equilibrium link between real gross domestic product, agricultural output, and oil rents. The results of the vector error correction model demonstrate that, despite agricultural output having a beneficial impact on economic growth, the speed of adjustment of the variables towards their long term equilibrium path was slow. The study also found out that from the Johansen multivariate test that, there is a long run relationship between all variables.

Therefore, the study recommended the government and policy makers should embark on diversification and enhance more allocation in terms of budgeting to the agricultural sector.

Victor (2015) [17] examined the impact of agricultural sector on the economic growth of Nigeria. The study was conducted using annual time series data running from 1981 to 2013. The study employed Johansen multivariate cointegration test and Vector Error Correction model (VECM) as the estimation techniques. The results discovered that Real Gross Domestic Product (RGDP), agricultural output and oil rents have a long-run equilibrium relationship according to the Johansen Multivariate cointegration test. Whereas, the VECM result indicates that the speed of adjustment of the variables towards their long-run equilibrium path was low, estimated as 10.3042%. The study recommended the need for the government and financial institutions to make provision of credit facilities to farmers with little payback. Moreover, government should promote the diversification of the Nigerian economy to other non –oil sector and more allocation in terms of budgeting to the agricultural sector.

3. Methodology

To obtain data from respondents, the current study used a survey approach. The current study used convenience sampling technique in selecting Kebbi State for the study. However, purposive sampling technique was employed in selecting farmers for study. Because, the study is interested in farmers that can read and write. This is a quantitative study that employed the use of questionnaires as the main tools for data collection where 384 copies of questionnaires were administered to the respondents out of which 376 were retrieved. Moreover, descriptive and inferential statistics were used to analyse the data in the study. The demographic data in this study was analysed using descriptive statistical techniques such as tables and the frequency graphs. On the other hand, multiple regression model was employed to establish the relationship between agricultural productivity components and economic growth. Provision of credit and facilities, Provision of modern farm equipment, supply of quality inputs and improve in crop breeding are the four dimensions of agricultural productivity and were used as independent variables. The population of the study consists of the entire farmers of Kebbi state. In most statistical research studies, population parameters are usually unknown and have to be estimated from the sample (Heizer, Render, 2004) [6]. The formula for calculating sample size using Kriejcie and Morgan (1970) [10] is as follows:

$$SS = \frac{Z^2 P(1-P)}{C^2}$$

Where

Z = Z value (e.g. 1.96 for 95% confidence level)

P = population proportion (expressed as decimal) assumed to be 0.5 (50%), it is the margin of error

C = confidence level = 0.05

Hence, given P = 0.5, Z = 1.96 and C = 0.05

The above formula returns a sample size of:

$$SS = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}$$
$$= \frac{3.8416 \times 0.5(0.5)}{0.0025}$$
$$= \frac{3.8416 \times 0.25}{0.0025}$$
$$= 384.$$

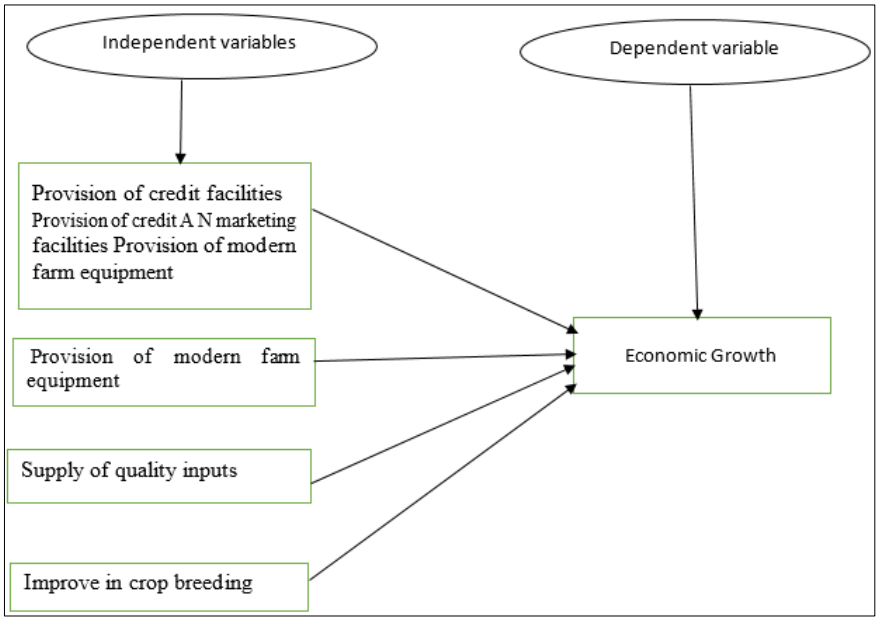

Fig 1

4. Results and Discussion

4.1 Reliability

Questionnaires were first administered to ninety (90) respondents randomly selected for reliability testing of the instrument. Internal consistency was measured using the Cronbach's alpha, and the results were within the acceptable range of 0.70 to 0.95 (Ahmed, Burodo & Suleiman, 2022; Suleiman & Usman, 2016; Suleiman and Yasir, 2022A;

Suleiman and Yasir, 2022B) [1, 14, 15, 16] as presented in Table 1.

Table 1: Summary of Cronbach's alpha results

Section	No. of items	Cronbach's alpha
Provision of credit facilities	3	0.762
Provision of modern equipments	3	0.832
Supply of quality inputs	3	0.767
Improve in crop breeding	3	0.771

4.2 Socio-Demographic Profile of Customers

Table 2 presents the socio-demographic characteristics of 976 respondents' recovered questionnaires out of 1000 administered. It shows that 506(51.8%) and 470(48.2%) of the respondents are male and female respectively. The age distribution of the respondents shows that 82(8.4%), 329(33.7%), 422(43.2%) and 143(14.7%) aged less than 20 years, 21 to 40 years, 41 to 60 years and above 60 years respectively. Educational qualification profile of the customers shows that 88(11.6%), 187(24.7%), 209(27.5%) and 275(36.2%) possessed Quranic/Islamiyya, Primary school certificate, Secondary School certificate and tertiary certificate respectively. Employment status profile of the customers reveals that 127 (16.7%), 77(10.2%), 239(31.5%), 249(32.8%) and 67(8.8%) of the respondents are civil servants, retired workers, self-employed, students and other specified employments respectively. Finally, marital status of the customers shows that 252(33.2%), 289(38.1%), 134(17.6%) and 84(11.1%) of the respondents are single, married, divorced and widowed respectively.

Table 2: **Socio-Demographic Characteristics of Patients**

Gender	Frequency	Percentage (%)
Male	506	51.8
Female	470	48.2
Total	976	100.0
Age	Frequency	Percentage (%)
≤ 20	82	8.4
21-40	329	33.7
41-60	422	43.2
Above 60	143	14.7
Total	976	100.0
Highest educational qualification	Frequency	Percentage (%)
Quranic/Islamiyya School	88	11.6
Primary School	187	24.7
Secondary school	209	27.5
Tertiary school	275	36.2
Total	759	100.0
Employment status	Frequency	Percentage (%)
Civil servant	127	16.7
Retired	77	10.2
Self employed	239	31.5
Student	249	32.8
Other specify	67	8.8
Total	759	100.0
Marital Status	Frequency	Percentage (%)
Single	252	33.2
Married	289	38.1
Divorced	134	17.6
Widowed	84	11.1
Total	759	100.0

***Source*:** Field Data, 2022

4.3 Test of Hypothesis

Hypothesis 1: Provision of credit facilities has no significant effect on Economic growth in Kebbi State.
Hypothesis 2: Provision of modern farm equipment has no significant effect on Economic growth in Kebbi State.
Hypothesis 3: Supply of quality inputs has no significant effect on Economic growth in Kebbi State.
Hypothesis 4: Improve in crop breeding has no significant effect on Economic growth in Kebbi State.
In order to test the hypotheses, data gathered were subjected to multiple regression analysis to examine whether the provision of credit facilities, provision of modern farm equipment, supply of quality inputs and improve in crop breeding predict Economic growth in Kebbi State. Tables 3, 4 and 5 present the multiple regression analysis for the hypotheses formulated.

Table 3: Model Summary of the constructs

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732[a]	.536	.519	.85413
a. Predictors: (Constant), provision of credit facilities, provision of modern farm equipment, and supply of quality inputs and improve in crop breeding.				

Table 3 shows the overall predictability of the model. The result indicated that 53.6% (R^2=0.536) of the observed variance in economic growth were jointly explained by the independent variables (provision of credit facilities, provision of modern farm equipment, and supply of quality inputs and improve in crop breeding.). The remaining 46.4% unexplained variance could be attributed to other factors outside the regression model other than the identified independent variables which are outside included in the stochastic error term.

Table 4: Anova of the constructs

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	91.050	4	22.763	31.201	.000[b]
	Residual	78.790	108	.730		
	Total	169.841	112			
a. Dependent Variable: Economic Growth						
b. Predictors: (Constant), provision of credit facilities, provision of modern farm equipment, and supply of quality inputs and improve in crop breeding.						

Table 4 presents the overall significance of the regression model in terms of goodness of fit. The F-value was significant as p was less than 0.05. Hence, the model was statistically significant at 0.05 level. This implies that combination of the four independent variables significantly predicts the dependent variable-economic growth (F=31.201; p<0.05). It indicates that the model and the data did well describing economic growth. Therefore, to increase overall economic growth in Kebbi State, it is rational to concentrate on the improvement of provision of modern farm equipment, provision of credit and marketing facilities, provision of good roads and supply of better manure seeds.

Table 5: Regression Coefficients of Economic Growth

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.201	.068		2.492	.024
	Provision of modern farm equipment.	.307	.078	.338	4.472	.000
	Provision of credit and marketing facilities	.303	.072	.327	4.215	.000
	Provision of good roads	.199	.079	.199	2.505	.014
	Supply of better manure seeds	.390	.070	.400	5.539	.000
a. Dependent Variable: Economic Growth						

The unstandardized Beta Coefficients that represent the contributions of each variable to the model is presented in Table 5. The t and p-values showed the impact of the independent variables on the dependent variable. The result showed that all the agricultural productivity constructs had a positive and significant impact on economic growth as follows: Provision of credit facilities ($\hat{\beta}$=0.307,$p = 0.000$), Provision of modern farm equipment ($\hat{\beta}$=0.303,$p = 0.000$), Supply of quality inputs ($\hat{\beta}$=0.199,$p = 0.014$) and improve in crop breeding ($\hat{\beta}$=0.390,$p = 0.000$). The fact that the constant variable is also significant further explains that there are other factors outside the model that can predict economic growth in the region under study.

5. Conclusion and Recommendation

5.1 Conclusion

This research assessed the effect of agricultural productivity on economic Growth: Evidence from Kebbi State. provision of credit facilities, provision of modern farm equipment, and supply of quality inputs and improve in crop breeding were identified as component of agricultural productivity that predict the economic growth in Kebbi State four hypotheses were defined from the research objective and tested, and the results show that all four null hypotheses that stated that agricultural productivity do not have significant effect on economic growth were rejected in favor of their alternative hypotheses as all p-values are less than 5% level of significance. Based on the above, this study concludes that agricultural productivity in the direction of provision of credit facilities, provision of modern farm equipment, and supply of quality inputs and improve in crop breeding are antecedents to economic growth in the region and the more the improvement in these constructs, the higher the economic growth will be achieved in the region.

Based on the above conclusion, the following recommendation was made:

Government and stakeholders should focus more on agricultural productivity such as provision of modern farm equipment, and supply of quality inputs and improve in crop breeding as they predict economic growth of the region.

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