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## AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN AGRICULTURAL PRODUCTIVITY AND ECONOMIC GROWTH IN NIGERIA

### ABSTRACT

*This study examined the relationship between agricultural outputs on economic growth in Nigeria from the period of 1992 to 2022. The study ran the Augmented-dickey fuller unit root test to know the level of significant, stationary and the kind of econometric estimation technique to be used, the study employed the ARDL bound test to establish the existences of long-run relationship between variables, this study further conducted the ARDL (long-run analysis) in which the findings from the result showed that there was existence of a long-run relationship between inflation, gross capital formation and labor force Employed on agricultural output, also long-run relationship between agricultural output, gross capital formation and labour force Employed on Real gross domestic product, result also revealed that the variables are significant at 5%, where gross capital formation and labor force Employed on agricultural output were positively significant, while inflation was negatively significant on agricultural output. Also agricultural output, labor were positive on real gross domestic product. While gross capital formation were negative on real gross domestic product. Post estimation test were carried out to ascertain the stability of the variable and to establish whether the variables are normally distributed .this study recommends that both the monetary and the fiscal authority should work hand in hand in order to boost agricultural productivity which server as a main drive to Nigerian economic growth and optimal economic performance could be achieved and economic slumps prevented by influencing aggregate demand through active stabilization and economic intervention policies by the government.*

**Keywords:** *agricultural productivity, inflation, capital formation and labor force*

### INTRODUCTON

Agriculture has its origin in the history of Nigeria and this is the reason for the green in the national flag signifying the nation wealth and it rich natural resources, and also emphasizing the important role the sector played by serving as a major sources of livelihood to over 75 percent of the entire population (ADB) (2020). The agricultural history is interwoven with its political history, hence this can be accessed from the pre-colonial, Colonial and post-colonial periods. Agricultural organization (FAO) (2012).

In most of the developing nations, majority of the poor and food insecure in Africa reside in rural areas, and most of them depend on agriculture for their livelihoods. The issues of agricultural output and economic growth has been a major concern among economic and policy makers around the globe. Nonetheless, Nigeria as a country desired a single digit inflation rate as it play a great role in stabilizing the economy because of the role it play in various sector of which agriculture is part of it. Agriculture plays a crucial role in economic development of developing nations. The role of agriculture in economic development is very important because 70 percent of Nigerians make their living through agriculture (ADB) (2020). Increase in agricultural productivity leads to an increase in the income of rural dwellers and in turn leads to more demand for industrial products, thus development of industrial sector in this way. Agricultural sector help promote economic prosperity by securing as a supplement to industrial sector. Nigeria as a country has in the past depended on the agricultural sector prior to the oil boom. During the 1950's up to the early 1970's before the discovery of crude oil in Nigeria, agriculture was the stabilizing mechanism of the economy, employing about seventy percent of the total population. Because of the oil boom, it has become more distinct thsat the agricultural sector could no longer perform its role of meeting domestic food requirement. Raw materials for industry also started to decline as a source of foreign exchange earner through exports due to economic, social and political problems. Furthermore, the latest data of bureau of statistics indicate the Nigerian economy contracted by 6.1% year on year in the second quarter of 2020, This was as a result of covid-19 pandemics with many Nigerians becoming unemployed combined with the lower volumes of export such as in oil and this was accompany by a steep drop in oil prices amid a drop in global demand left Nigeria extremely short of earning given it dependency on a single commodity as it biggest revenue source. This price instability threatens central bank of Nigeria (CBN) Single Digit Inflation target, purchasing power of naira has been under treat. Following the impact on the local currency devaluation and inflation rate of too much money chasing few commodities, the detail of Nigerian economic contraction made it more urgent for Nigeria to develop and diversify to other sector of the economy by looking into Agriculture as alternative to oil.

### **Concept of Agricultural output**

Agricultural Act (1947), viewed agricultural output as the inclusion of horticulture, seed growing, livestock breeding, fruit growing and dairy farming and using of land for agricultural productivity ranging from grazing, farming, market garden and for wood production. The essence of practicing economic activities is

to produce a desire output. More so, it is also for this same reason that people involve in agricultural activities. CBN (2012) described Agricultural output as simply the products of economic activities and this includes production of food, livestock, forestry and fishing. Agricultural output is therefore seen as the products people reap from various agricultural productive activities that they involve in. In Nigerian, agriculture has produced extremely great output over the years, which have been profitable to both Nigeria itself and on the global international scene. Nigeria has led the world in the production and exportation of some cash crop product such as cocoa, palm produce, groundnuts, rubber and timber respectively, Babalola (2020). He further explains that the percentage of agricultural exports in relation to total exports between the period of 1938 and 1965 varied from 92% to 64% and food imports in year 1963 constituted only about 0.1% of the overall total quantity of food consumption.

### **Concept of economic growth**

Todaro and Smith (2003) viewed growth of an economy as increase in the capacity of a country to produce goods and services when compared from one period to another or a positive changes in the level of production activities of a country over a period of time and also an increase in living standard and societal wellbeing. Okpe (2013) viewed economic growth as increase in output with a technical change and institutional arrangement. Hence, this technical and institutional arrangement refers to the arrangement used to produce the increase output. In this study, economic growth is an increase in the monetary value of goods and services produce by a country for a specified period of time usually one year. It is an increase in the inflation-adjust market value of goods and services produced by an economy over time. This is usually measured as the percentage rate of increase in real gross domestic product, or real GDP, usually in per capital term (Gordon J. 2001)

### **Theoretical Underpinning**

Unbalanced growth theory; formulated by Hirschman (1990) Hirschman pointed out that the developed or industrialized countries of the world did not achieve their development via the growth of the entire economy at one time but their achievement is the expression of the economy and then communicated to other sectors of the economy. The unbalanced growth theory emphasizes that investment should be made in selective sectors rather than simultaneously in all sectors of the economy. The unbalanced growth model is seen as best fit for developing nation. This is obviously because it supports investment in most vital sectors of the economy which when developed will influence and trigger growth in other sector of the economy through

benefits accruing from the developed sector via forward and backward effects. This implies that if the government can focus on agricultural sector especially now that there is fluctuation in the oil price, it will be used to develop other sectors and this lead to overall economic growth.

The unbalanced growth unlike the balance growth model clearly emphasized that the growth of any economy is impossible to be witness simultaneously in all sectors of the entire economy. Rather certain sectors should be developed and these will serve as pilot sectors to the development of others. Since the research work recognizes agricultural development as a condition that grips the nation towards growth and development of the economy, the unbalanced growth model is seen as one of the most vital theory in the context of Nigerian economy. Growth experience in the agricultural sector in Nigeria will be transmitted to other sectors and this overall economic growth will be realistic.

### **Empirical Review**

The impact of growth in Agriculture of a country's economy is reflecting by its contribution to economy growth. Many researchers have used different methods to signify the contribution of agricultural output to economic growth. Some scholars have tried to explain the relationship that exists between agricultural output and economic growth in Nigeria.

Chiekezie, Nkamigbo and Ozor (2020) examined economic assessment of government expenditure on agricultural productivity in Nigeria, in order to establish if it has any direct link with economic growth for the period of 1981 to 2017. The study employed Ordinary least square for analysis, the results revealed a substantial positive correlation between economic growth and recurrent expenditure, and very high positive correlation between economic growth and capital expenditure. Also, very high positive correlation exists between economic growth and commercial banks loans and advances, a negligible positive correlation between economic growth and agricultural guaranteed scheme loans and that government expenditure on agriculture and agricultural sector output have significant impact on economic growth. The study recommended that government should empower the farmers with equipment, capital and technology, formulate and implement policies aimed at improving agricultural sector spending in Nigeria. Base on the recommendation made, government should not be left alone to empower the farmers, private individuals and organization in Nigeria should also empower the farmer.

Cletus and Sunday (2018) examined the relationship between government expenditure on agricultural output and economic growth in Nigeria (1985- 2015). The study employed multiple regression analysis ordinary least square and Johansen co-integration test. The multiple regression results of the study revealed that there

exists a positive and significant relationship between government expenditure on agricultural output and economic growth in Nigeria. The results show that the model's estimates are generally robust; with an R-squared value indicating 99% goodness of fit, on the conclusion there exists a long-run relationship among the variables. The study could have made use of the ARDL model instead of the OLS of which real gross domestic product was not significant at first difference.

Karimou (2018) examined the impact of agriculture on economic growth in West Africa. The study employed ordinary least square method of analysis, it was discovered that, there is a long run relationship between agricultural output, capital, industrial output and GDP. More so the short run disequilibrium is corrected at the speed 21.6%. Apart from feedback and capital shocks, shocks in economic growth are from agricultural sector. This implies that capital formation is primordial for economic growth in West Africa. Industrial output has a little impact on GDP. The positive impact of agricultural output on economic growth confirms that agricultural sector plays a significant role in economic growth of West Africa. It concluded that capital formation, is first needed to boost economic growth in West Africa but the economic activity upon which capital should be primarily invested is agricultural production.

Charles and Uche (2018) Investigated the relationship between agricultural productivity, population growth and economic growth in Nigeria from 1980-2015. The study employed ordinary least square method of analysis, it was discovered that agricultural output is a significant determinant of economic growth in Nigeria, recommendation was made that effort should be made in order to harness the growing population in Nigeria and make them available for agricultural productivity and improve the growing supply of food. This can be done through agricultural research programs. The study neglects the fact that efficient innovation and technology is more productive in boosting agricultural productivity rather than the total number of people in farmland.

Sunday (2017) examined the impact of government expenditure on agricultural output in Nigeria economic growth for the period of 1980 to 2014. The study adopted Vector Autoregression Estimates and Toda-Yamamoto using VAR Test for analysis. The result of the study revealed that the variables have long run relationship because of evidence of two co-integrating equations while the speed of adjustment of the ECM result is 90.9% per annum. The research concluded that government expenditure and agricultural output significantly impacts on Nigeria economic growth. Based on the findings, the study recommended that since agriculture has positive impact on the Nigerian economy, the government should see that a higher percentage of allocations are invested on agricultural sector so that the economy will keep on growing in an increasing rate. The finding recommendation neglect the fact that Nigerian economy have a sector that are

more challenging than the agricultural sector because of the growing insecurity in the country, therefore the Nigerian government are concentrating more on fighting security by financing it more than the agricultural sector.

**Model specification**

The nature of this study necessitated the use of secondary data. Real GDP is taken as the dependent variable and agricultural output, capital accumulation and labor force are taken as explanatory variable. Data from the central bank of Nigeria, and National Bureau of Statistics (NBS) and World Bank development indicators database. Variables used include, agricultural output given by index of aggregate agricultural productivity (Billion of Naira), economic growth given by real gross domestic product (Billion of Naira), capital formation given by (billion naira), labour force given by ( percent sum number of working age group).

The methodology adopted in this paper is the Autoregressive Distribution lag (ARDL) this method was employed to estimate a multiples regression model to investigate the relationship between Agricultural output and economic growth in Nigeria. Real GDP is used to measures the level of economic growth in the economy. The explanatory variable include, agricultural output, capital accumulation and labor force. Its functional relationship is represented as follows

Economic Growth = f (agricultural output, capital accumulation, labor force).

$$RGDP_t = \beta_0 + \beta_1 AGRO_t + \beta_2 CAF_t + \beta_3 LF_t + \epsilon_t \text{-----eqn 1}$$

$$Log RGDP_t = \beta_0 + \beta_1 Log AGRO_t + \beta_2 Log CAF_t + \beta_3 Log LF_t + \epsilon_t \text{-----eqn 2}$$

Where:

RGDP= Real Gross Domestic Product (proxy for economic growth)

AGRO= Agricultural out

CAF= Capital Formation

LF= Labor Force

B0= intercept

Ut= Error Team

B1, B2 & B3= Coefficients of AGRO,CAP and LF respectively

The theoretical explanation is that, B1, B2 and B3 >0. That is, it is expected that both AGRO, CAF and LF will have a positive impact on economic growth. This assumption is drawn from the theoretical framework of this research.

**Results and Discussion**

### 4.3 Correlation matrix

A correlation matrix is a table which displays correlation, the measure is best use in variable that demonstrate a linear relationships between each other. The signs in a correlation tell us what direction the variable move, a positive correlation means the two variables move in the same direction that is, as one variable increases the other also increases, a negative correlation on the other hand, mean the variable move in an opposite directions that is, as the variable goes up, the other variable comes down. The number in a correlation will always be between zero and one.

**Table 4.1: Results of correlation matrix**

	<b>AGRIC</b>	<b>RGDP</b>	<b>INF</b>	<b>GCAP</b>	<b>LBR</b>
AGRIC	1				
RGDP	0.8586	1			
INF	-0.3736	-0.4139	1		
GCAP	0.9631	0.7403	-0.3416	1	
LBR	0.9421	0.8623	-0.5005	0.8909	1

*Source; computed by the researcher using E-views version 10 (2024)*

In each cell of the table shows a correlation between two specific variables. Objective one of this analysis with variables such as agricultural output, gross capital formation and labour force productivity has a strong positive correlation of 0.9631 and 0.9421. While a negative correlation exists between agricultural output and inflation. On the other hand objective two indicate real gross domestic product, agricultural output, gross capital formation and labour force has a strong positive correlation of 0.8586, 0.7403 and 0.8623 respectively.

**Table 4.2 Bounds Test for Cointegration for AGRIC**

<b>F- statistic</b>	<b>lower bound</b>	<b>Upper bound</b>	<b>K(n-1)</b>	<b>Significance</b>	<b>Remarks</b>
	2.72	3.59	3	10%	
3.871704	3.23	3.77		5%	Cointegration
	4.29	5.61		1%	

Source: Researcher’s Computation Using Eviews 10 (2024).

From the table 4.2 above, it can be seen that the value of F-statistic is 3.871704, the value is greater than the lower and upper bounds t-statistic at 5% level of significance. This justifies the rejection of the null hypothesis against the alternative hypothesis that a cointegration relation exists among the variables in the model. This implies that the null hypothesis of “no Cointegration” among the variables of interest was rejected. Hence, we concluded that there exists a long-run or cointegrating relationship among all the



variables in the study. As such, the ARDL cointegration approach was applied to estimate the individual short-run and long-run relationship among the variables.

**Table 4.3 Bounds Test for Cointegration for RGDP**

F- statistic	lower bound	Upper bound	K(n-1)	Significance	Remarks
	2.72	3.77	3	10%	
4.5367773	3.23	4.35		5%	Cointegration
	4.29	5.61		1%	

Source: Researcher’s Computation Using Eviews 10 (2024).

From the table 4.3 above, it can be seen also that the value of F-statistic is 4.5367773, The value is greater than the lower and upper bounds t-statistic at 5% level of significance. This justifies the rejection of the null hypothesis against the alternative hypothesis that a cointegration relation exists among the variables in the model. This implies that the null hypothesis of “no Cointegration” among the variables of interest was rejected. Hence, we concluded that there exists a long-run or integrating relationship among all the variables in the study. As such, the ARDL cointegration approach was applied to estimate the individual short-run and long-run relationship among the variables.

**Table 4.4 Long run coefficient estimation for AGRIC**

Variable	Coefficient	Std. error	t-statistics	Prob
C	-7.250850	5.042345	-1.437992	0.1628
LAGRIC(-1)	0.824761	0.126070	6.542080	0.0000***
INF(-1)	-0.001971	0.000732	-2.692391	0.0125**
LGCAP(-1)	0.047484	0.0194691	0.243895	0.8093
LLBR(-1)	0.956689	0.811826	1.178441	0.2497

Source: Researcher’s Computation Using Eviews 10 (2024).

Table 4.4 presents the long-run relationship among the variables under consideration. -0.001971 implies that given an increase of inflation rate by 1%, agricultural output will on average decrease by -0.001971% keeping all other variables constant. Hence, there is significant negative relationship between inflation and agricultural output. Again, 0.047484 implies that a unit increase in gross capital formation will increase agricultural output by 0.047484% keeping other variables constant. As such, there is a significant positive relationship between gross capital formation and agricultural output. Similarly, 0.956689 implies that one percentage increase in labour will lead to an average increase of agricultural output by 0.956689% holding other variables constant. This implies there is a significant positive relationship between labour and agricultural output. However, the most important is the coefficient of the Error Correction Term (-0.246020)



which represents the speed of adjustment towards the long-run equilibrium. The value is negative and statistically positive. This implies that the model is converging to the long run equilibrium adjustment process. In addition to this, the ECM which is -0.246020, and it is statistically significance at 0.0558 which is at 5% significant level, the R square shows the goodness of fit of the model, while the F statistics shows the overall significant of the result which is less than 5% significant level, The coefficient of inflation is in line with apriori expectation of negative sign while log of gross capital formation, log of labour are in line with apriori expectation of positive sign. The R-Square (R) value of 0.994424 as shown by the result implies that 99% variation in Agricultural output is accounted for by inflation rate, gross capital formation and labour force in Nigeria. The durbin Watson is used for presence of autocorrelation among the error terms. The acceptable Durbin –Watson range is between 0 and 2.4. The model also indicates that there is no autocorrelation among the variables as indicated by Durbin Watson (DW) statistic of 1.693773. This demonstrates that the estimates are unbiased and can be relied upon for economic decisions. In addition, the R square is less than the durbin Watson statistics,  $0.994424 < 1.693773$ , which indicate that the regression is not a spurious regression.

**Table 4.5 Long run coefficient estimation for RGDP**

Variable	Coefficient	Std. error	t-statistics	Prob
C	-7.432363	11.72329	-0.633983	0.1319
LRGDP(-1)	0.063650	0.199718	0.318698	0.0026***
AGRIC(-1)	0.207337	0.293074	0.707454	0.0158**
LGCAP(-1)	-0.301802	0.454848	-0.663522	0.5131
LLBR(-1)	2.296116	1,956844	1.173377	0.0017***

Source: Researcher’s Computation Using Eviews 10 (2024).

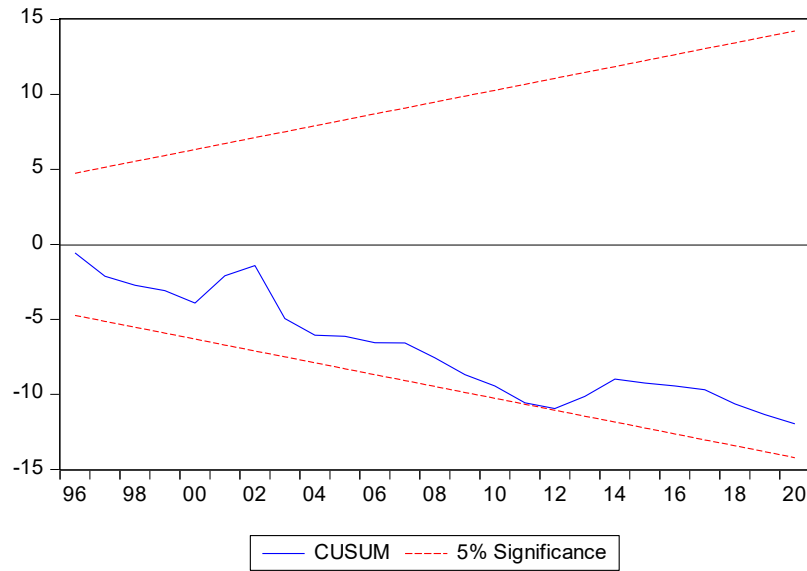
Table 4.5 presents the long-run relationship among the variables under consideration. 0.207337 implies that given an increase of agricultural output by 1%, RGDP, will, on average, increase by 0.21% keeping all other variables constant. Hence, there is insignificant positive relationship between agricultural output and RGDP. Again, -0.301802 implies that a unit increase in gross capital formation will decrease RGDP by -0.30% keeping other variables constant. As such, there is significant negative relationship between gross capital formation and RGDP. Similarly, 2.296116 imply that one percentage increase in labour force participation will increase RGDP by 2.296116% holding other variables constant. This implies there is significant positive relationship between labour force and RGDP. However, the most important is the coefficient of the Error Correction Term (-1.318680) which represents the speed of adjustment towards the long-run equilibrium. The value is negative and statistically positive. This implies that the adjustment process from the short-run deviation is very fast. Thus, the model adjusts itself towards equilibrium by -1.318680%. In

addition to this, the ECM which is, -1.318680 and it is statistically significance at 0.0225 which is at 5% significant level, the R square shows the goodness of fit of the model, while the F statistics shows the overall significant of the result which is less than 5% significant level. The R-Square (R) value of 0.700617 as shown by the result implies that 70% variation in real gross domestic product is accounted for by agricultural output, gross capital formation and labour force in Nigeria. The durbin Watson is used for presence of autocorrelation among the error terms. The acceptable Durbin –Watson range is between 0 and 2.4. The model also indicates that there is no autocorrelation among the variables as indicated by Durbin Watson (DW) statistic of 2.078515. This demonstrates that the estimates are unbiased and can be relied upon for economic decisions. In addition, the R square is less than the durbin Watson statistics,  $0.700617 < 2.078515$ , which indicate that the regression is not a spurious regression.

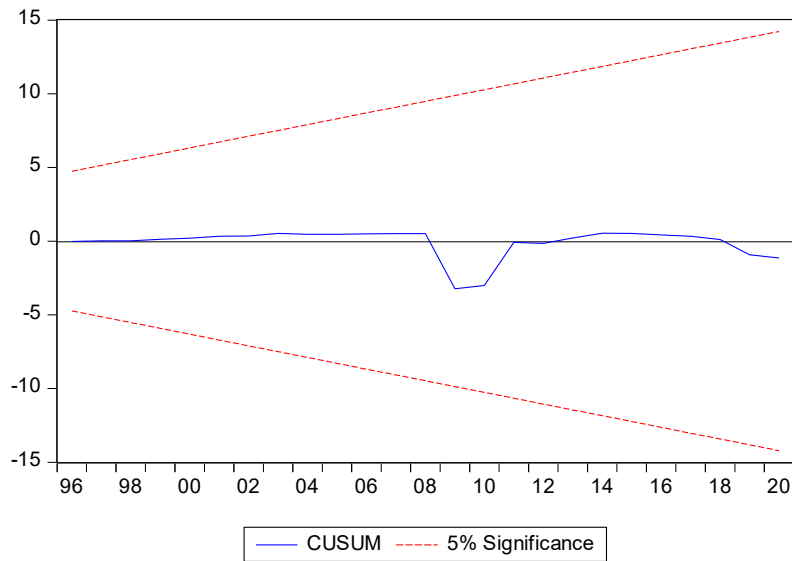
#### 4.5 CUSUM TEST

As for diagnostic tests, the model passes through the tests. It shows there is no evidence of serial correlation and the model is normally distributed. The stability of the model was tested. The technique applied was cumulative sum (CUSUM) test proposed by Brown et al. (1975). If the plot of the CUSUM remains within the critical limits of 5% significance level, the null hypothesis that all the coefficients are stable cannot be rejected. However, if one or another of the parallel line crosses, then the null hypothesis of parameters stability is rejected at 5% significance level. Figure 4.1 shows the result of CUSUM test. It indicates evidence of stability of the model as the critical line remains within the boundary, at 5% significance level.

#### Figure 4.1 CUSUM TEST FOR AGRIC



**Figure 4.2 CUSUM TEST FOR RGDP**



**Conclusion and Recommendations**

The study aimed at analyzing the effect agricultural output and economic growth in Nigeria and also to determine the causal relationships among them from 1992-2022 using Auto Regressive Distributive Lag econometrics method of estimation. The study conducted an empirical analysis test on agricultural output and economic growth in Nigeria. Inflation, gross capital formation and labour are the influencing variables with lead to agricultural output in Nigeria at 5% level of significant in a long run, however the long run

result can be used to predict the effect of agricultural output on economic growth in Nigeria with value of R-square of 70% and adjusted R-squared of 65% shows a good fit of the model. Therefore the evidence from the study backs the conclusion that increased agricultural output will translate to economic growth in Nigeria, which is in line with the A-priori expectation sign, which is true because an increased in agricultural output will in-turn provide employment through increase labour force participation and boost the industrial market given that agricultural out serves as an input material to many industries, this will positively influence economic growth in Nigeria because investor will want to invest more if the returns will be high,

the result of the study shows that agricultural output plays a significant role in Nigeria economic growth, therefore agricultural sector should be effectively monitored and policies aim at boosting productivity should be in place also factors aim at boosting productivity should be in place such, rails, good roads, tractors and farms inputs. Optimal economic performance could be achieved and economic slumps prevented by influencing aggregate demand through active stabilization and economic intervention policies by the government. Also inflation rate should be effectively monitored because of it negative significant impact on productivity. Therefore inflation should be closely watched and brought back to a desired single digit because of it effect on productivity. Finally there should be need for grass root supervision because a huge percentage of those that engage in agricultural productivity are in the grass root, therefore, all the agencies operation to boost agricultural productivity should be extended to grass root, were they can be of easy access to farmers.

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