

**THE EFFECTS OF AGRICULTURAL INFRASTRUCTURE ON OUTPUT GROWTH:  
EVIDENCE FROM NIGERIA**

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## **ABSTRACT**

Agricultural infrastructure primarily refers to a wide range of public services that facilitates production procurement, processing, preservation and trade. Agricultural infrastructures can be in the form of farm equipments, machineries, water facilities, transport, storage, research institutes, communication technology, electricity/power etc., it involves huge capital investments and increasing crop yields, thereby promoting agricultural growth and development. The study focused on the effects of agricultural infrastructure on output growth in Nigeria and how these agricultural infrastructures have impacted on output growth. In order to carry out these objectives a review of different authors on the topic was carried out for this research of the relevance the results were discussed in methodological terms as it relates to this study. Secondary data was used for this study and they were analyzed using tables and statistical software (Eviews). Results shows that agriculture infrastructure have an effect on output growth in Nigeria positive signs with the explanatory variables which were; road transport, electricity, and water on the dependent variable which was agriculture outputs. Recommendations based on where that the Nigerian government should make a dedicated and conscious effort in providing more agricultural infrastructure and make them accessible to the end users/farmers so as to provide an enabling environment to stimulate agricultural development through output growth.

## **1.0 INTRODUCTION**

In spite of the growing importance of oil, Nigeria has remained essentially agrarian economy with agriculture accounting for significant shares in the GDP and the total exports as well as employing the bulk of the labor force. This was made possible with the improvement in transportation, telecommunication, storage facilities, Irrigation systems, administration, good portable water and drainage system which unfortunately have been receiving less attention and innovation which in turn contributed to the decline and further neglect of agricultural productivity and outputs. (Alithea Capital 2010).

In the last few decades, most developed economies (e.g. the United Kingdom) have proposed various forms of public private partnerships (PPPs) for the delivery of infrastructure public utilities and large services projects, achieving significant successes from utilizing the competences and expertise arising from the agric sector. Emerging markets such as India and South Africa are also recording successes using tried and tested PPP templates to create, expand and modernize infrastructure It is apparent that these dynamic partnerships between the public and private sector have become certain across the globe. (Alithea capital 2010).

Agricultural infrastructure primarily refers to a wide range of public services that facilitate production procurement, processing, preservation and trade. Agricultural infrastructure can be grouped under the following; **Input based infrastructure**; which includes seeds and fertilizers, pesticides, farm equipment and machineries. **Resource based infrastructure**; water/irrigation, farm power/energy. **Physical infrastructure** which includes, transport, storage, processing,

preservation, **Institutional infrastructure**; financial services, marketing, research institutes, information and communication technology. Agriculture infrastructure although involves huge initial capital investments, long gestation periods, high incremental capital output ratio, high risks and low rates of returns on investments and increasing crop yields, thereby promoting agricultural growth. (Amrit Patel)

Despite the huge resources that have so far being channeled to the revamping of the agricultural sector to influence economic growth in this era of globalization calls for the need to create more awareness about the importance and impacts of agric infrastructure have in the boosting agriculture yield yet, the sector have remained in a comatose state.

As mentioned earlier the availability of agric infrastructure helps to boost the agric sector output in the economy and bring about rapid development in the country, but there are constraints that limits improved productivity of agriculture for economic development such as political instability, inconsistent and poorly conceived government policies and lack of basic infrastructure as this was further aggravated by the boom in oil.

Gains from agriculture forestry and off-farm income generating activities cannot be achieved or sustained in the absence of appropriate and basic infrastructures which ranges from roads, communication, electricity and energy to education, health. While the importance of establishing adequate road networks is widely recognized.

As a result of the important role of infrastructure in the development of agriculture, government have geared its efforts towards opening up agricultural lands and linking rural communities with the urban centers and public utilities are gradually being put in place in the rural areas. Electricity water and roads have been of national priorities for almost two decades, with the aim

of improving the infrastructural base in the rural areas in Nigeria. But the extent to which these infrastructures have assisted or impacted in increasing agricultural productivity is of major interest for this research, which hence will be the main focus.

Therefore, the study seeks to find out why investments in agriculture infrastructure have yielded low output in the agricultural sector as well as to investigate the impacts of agric infrastructure on output growth in the economy.

## **2.1 LITERATURE REVIEW**

### **2.1.1 The Production Theory**

Wikipedia (2012) refers to production theory as the economic process of converting inputs into outputs. Production makes use of a resource to create a good or service that is suitable for use or exchange in an economy. Production as a process occurs through time and space because it is a flow concept where it is measured as 'a rate of output' in a period of time. It involves three processes which are; (i) The quantity of the good or service produced (ii) The form of the good or service created and (iii) the temporal and spatial distribution of the good or service produced.

Michael P. T (2004). In relation also postulate that in most developing countries such as Nigeria, new agricultural technology and innovations in farm practices are preconditions' for sustained improvements in the level of outputs and productivity. However two major sources helped in increasing farm yields. The first being the introduction of mechanized agriculture which had a dramatic effect on the volume of output per worker especially when land is extensively cultivated and labor is scarce. Also the second being the biological (hybrid seeds), water control (irrigation), chemical (fertilizer, pesticides, insecticides etc.), innovations which helps in land argumentation i. e, improving the quality of the existing land by raising yields per hectare and indirectly increasing output per worker. Theoretically they can be applied on a large

scale, where they do not necessarily require large capital inputs as they are well suited for the tropical and subtropical regions in third world nations like Nigeria.

### **2.2.2 Growth Theory**

Echer Witt (1976) asserts that W. W Rostow discovered that the process of growth among developing nations at their various points in their economic history proposed a theory of economic growth where he assumes that all nations are to pass through the five stages of development (i. e the traditional stage, the pre-conditions to take off, the take off stage, the drive to maturity and the age of mass consumption) as they move along the paths of economic progress. Ricardo Contrarera (2011), also stated that Walt W. Rostow believed that most advanced nations have passed the stage of take-off and had attained self-sustaining growth, while the developing economies were either in the pre-conditions or traditional stage. Also Echer Witt (1976) noted William Nicholas where he believed that the role of agriculture rest heavily on the stages of growth in economic history where a particular nation finds itself and especially at a time where self-sustenance and progress was the norm.

What these countries needed in order to take-off (so as to realize self-sustaining growth) was to follow certain rules of development. He (Rostow) defined take-off as a period where the intensity and productivity of economic activity attains a critical level and brings about changes which ensures a massive and progressive structural transformation of the economy and nation as a whole. Ricardo Contreras (2011) also noted that the take off stage will be attained when the following criteria could be satisfied. Firstly the nation must increase its investments level amounting to nothing less than ten percent of the national income, which is to be done by means of the country's own savings or in the form of aids or foreign investments. Secondly there has to

be the development of one or more substantial manufacturing sectors coupled with massive growth. And thirdly both the political, social and institutional framework has to be created or be in existence so as to promote the expansion of the new modern or industrialized sector.

From the theories outlined above it is obvious that investments play a very vital role in the development and expansion of the sectors of the economy most especially in the agric sector where the government is to invest substantially in infrastructure along with the private sector so as to induce productivity and output growth.

Furthermore, several literature attempts's to examine the benefits and roles of infrastructure on agricultural productivity and output growth, will be reviewed in empirical terms mostly using empirical reviews from India or on the Indian economy.

USAID (1978) at an ex-post study of the effects of road infrastructure improvements in Philippines economic social and human services indicators is as a result of improvement on rural roads. It asserts that the gross household income increased by 28 per cent mainly due to cheaper and more affordable means of transport , cheap farm inputs, higher farm gate price and larger share of major crops sold directly in the markets, thereby leading to nonfarm employment better access to education, healthcare and farm management services, information flows and improved recreation facilities.

Hans, Binswanger et. al (1998) used micro data from 8-5 randomly selected districts of India in their study to examine the impacts of road infrastructure among other factors in agricultural investments and out puts. The study discovered that road investments contributed directly to growth of agricultural output and other factors and benefits.

The study of IFPRI on a survey of 129 villages in various parts of Bangladesh categorized the villages into two groups based on an aggregate index developed to reflex the ease of access in the village to various services such as markets, schools, banks and local administration offices. Villages with better access were found to be significantly better off in a number of areas including agricultural production, household income e .t .c.

Gulati (1997) observed a positive “impact of social development” and irrigation intensity factors in the composite index of economic development at the district level within the “social development” factors. The surface roads lengths and electricity turned out to be the crucial indicators. In a state level analysis for two time periods, viz 1970-71 and 1980-81, inadequacy of infrastructural facilities has been seen as a major obstacle in the path of progress of developing states. Singh (1983) observed that a positive correlation between infrastructure and agriculture development. Among the various infrastructural facilities agricultural development was strongly correlated with agriculture infrastructure index, followed by the index of transportation and communication. Majumdar (2002) on the basis of regression analysis of the state cross section data for each of the years from 1971 to 1995 indicated that among the various physical infrastructures it was the transport infrastructure that significantly affected the agricultural output level and the agricultural development index. However besides physical infrastructure, social infrastructure also had significant positive impacts on the dependent variables. At the district level, from the regression analysis at three time periods viz, 1971, 1981 and 1991 that agricultural and transport infrastructure are important determinants of agricultural outputs and agricultural development index.

Thorat and Sirohi (2002) attempted to analyze the impacts of infrastructure on agricultural development using a larger data set both in terms of time periods (I .e pooling data for the four

time periods viz 1961, 1971, 1981, and 1991) and coverage of infrastructural variables to include ten explanatory variables, viz transport, power, water, tractorisation, research extension, access to primary agricultural credit societies, regulated and wholesale marketing infrastructure, access to fertilizer sales points and commercial banks, covering physical, financial and research infrastructure. The results indicated that transport, power, irrigation and research infrastructure are four critical components, which affects agricultural productivity in a significant manner. However between transport and power, the former emerged as a more dominant variable. Though there was complementarity between transport and power in the sense that the accessibility to roads is normally followed by accessibility to power. With improvements in access to power the irrigation infrastructure also improved particularly through energization of pump sets. In turn improved irrigation facilities coupled with research inputs enhanced agricultural productivity. The other infrastructural facilities like access to fertilizer sales points, credits, markets, extension services e .t .c. also developed with the development of road infrastructure.

Fan et al (2002) using provincial data examines the effects of different types of government expenditures on growth and rural poverty in People's Republic of China (PRC). They discovered that road infrastructure significantly reduces poverty incidence through agricultural productivity and non-farm employment. The estimated elasticity with respect to road densities are 0.08 for agriculture GDP per worker, 0.10 for non-agricultural employment and 0.15 for wages of non-agricultural workers in rural areas. Among government infrastructure project, rural roads are found to have to have the largest impacts on poverty incidence for every 10,000 Yuan invested on rural roads 3-2 persons are estimated to be lifted out of poverty.

Bhatia (1999) in his study which examined the relationships between infrastructure and agricultural outputs showed that Punjab which has the highest index of infrastructure also has the highest yield of food grains and value of agricultural production per hectare. Tamil, Nadu and Haryana which placed second and third on the infrastructure index have the third and second highest yield per hectare of food grains. Rajasthan and Madhya Pradesh, which have a very low index of infrastructure also, have low yield of food grains and total value of agricultural production per hectare. Fan et al (1999, 2000) studied the impacts of government expenditure on agricultural research and development, irrigation, roads education, power, soil and water conservation, on agricultural growth and rural poverty. The study concluded that these expenditures which help to improve infrastructure and disseminate technology had contributed to agricultural growth. Government expenditures on roads by far have the largest impact on poverty reduction and increased growth in agricultural productivity.

Antle (1983) used the cross country as well as global empirical studies to establish the linkages between infrastructure development and sustained output growth. Antle in 1983, using cross-sectional data for 47 less developed countries including India, established a strong positive relationship between infrastructure development and aggregate agricultural productivity. These views have been substantiated by several studies from Asian countries and more importantly Antle (1984) documented evidences of positive linkages between various types of infrastructure and agricultural output growth specifically from studies under Indian settings using annual data for 58 countries, positive and significant correlation between road development and aggregate output was established. (Bonney 1964) in his classic study, reveals that there is a direct relationship in increase in acreage of exports crops cultivation and the standards of roads and distance from the sales centres, where entrepreneurship is being enhanced with a sharp decline in

freight, passenger charges and coupled with improved services, as a result of increased investments in roads infrastructure.

(Binswanger 1987) made use of annual data for 58 countries where he observed that there is a significant and positive correlation between transport development and aggregate crop outputs. Both rail and road transports helps in the diffusion of technology by improving access to commercial markets, improving the efficient allocation of resources, reducing cost and thereby helping the farmers to realize inputs and output prices which in turn enhances aggregate outputs in agriculture.

Gulati (1997) generally made use of time series data in his analysis using two time periods where he observed a positive impact of 'social development'. Within the 'social development' factors, the surfaced road length and electricity turned out to be the crucial indicators in the development of agriculture. Binswanger et al (1998). Used micro data along with random selection methods to estimate the direct impacts of road infrastructure. Majumdar (2002). Mainly used regression analysis and time series to examine the importance of infrastructure. Thorat and Sirohi (2002). Used larger pooled data (a combination of time series data and cross sectional data) in their analysis where they used ten explanatory variables to assess the impacts of agric infrastructure on outputs. Antle (1983). Also used cross sectional data mainly on a global scale to establish the linkages between infrastructural growth and sustained output. Ashok et al (2006) Made use of total factor productivity along with Cobb- Douglas production function in evaluating the impacts of agriculture infrastructure in terms of investments on output growth.

### **3.1 METHODOLOGY AND DATA**

Taking the nature of the research topic into consideration the study engaged in the use of explanatory, statistical and secondary data research design types. The sources of data to be used

will be most specifically from the National Bureau of Statistics (NBS). The main method of research data that is used to conduct this research work are mostly secondary data, they take the role of analyzing explaining and combining the information from the primary source with additional information.

### **3.1 THE MODEL**

As earlier mentioned above, the purpose of the study is to determine the relationship between agricultural infrastructure and Agricultural output from 1985 to 2010. This period was chosen because the federal government adopted various macroeconomic policies so as to achieve its macroeconomic objectives most especially in the revamping of agriculture which were centered mostly on agricultural infrastructure (inputs) so as to induce outputs (productivity). Examples of such policies are the operation feed the nation (OFN) introduced by the then Military Ruler, Gen. Olusegun Obasanjo, structural adjustment programs (SAP) amongst others coupled with the increased investments on infrastructures which in turn had impacts directly or otherwise on agricultural productivity, most especially since the return of civilian rule in 1999. Therefore, in order to analyse the data obtained for this study, descriptive analysis, and other econometric tools will be used to test based on the equation below:

$$AO = f (DAINF)..... (1)$$

$$AINF = f (RT + EL + rainfall + MT)..... (2)$$

Substituting (2) into (1)

$$AO = F (RT + EL + rainfall+ MT)..... (3)$$

Against this background, the model for the study is specified as:

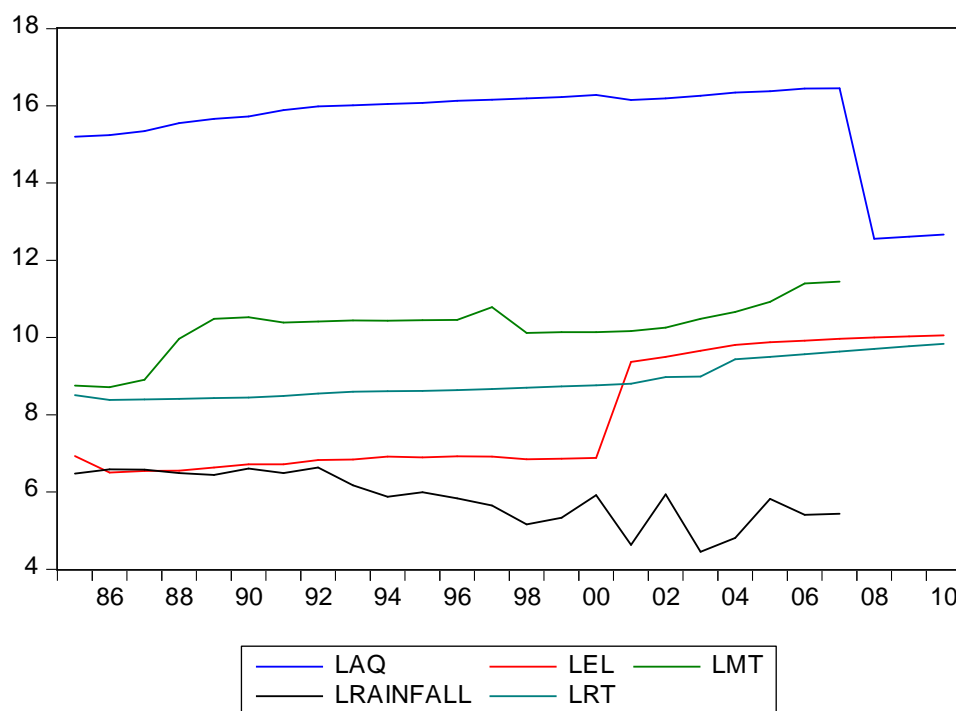
$$\log AO = a_0 + a_1 \log RT + a_2 \log EL + a_3 \log rainfall + a_4 \log MT \mu.....(4)$$

**Where;** AO =Agricultural output; DAINF = Determinant of agriculture infrastructure; RT = Road transport; EL =Electricity; and WA =Water for irrigation;  $\mu$  = Error term.

$a_0 > 0$ ;  $a_1 > 0$ ;  $a_2 > 0$ ; and  $a_3 > 0$

#### 4.1 DATA ANALYSIS AND INTERPRETATION

##### 4.1.1 Graph 1: Data Diagnostic and Findings



Source: Authors Computation, 2012.

As specified earlier, the variables to be employed in this study in line with the model specifications are: log AO (Agric output), and log EL (Electricity provided). Log RT (road transport infrastructure), log rainfall (a proxy for water irrigation) and log MT (value of machinery and transport equipment to agriculture). A graphical diagnostic representation of the behavior of the economic variables used in this study (in their log forms) is presented in the graph above, see graph 4.1.1.

**Table 4.1: Augmented Dickey-Fuller Unit Roots Test: 1985-2010**

Variables	At Level	1 <sup>st</sup> Difference	Order of Integration
AOP	-2.986225	-2.991878***	I (1)
EL	-2.986225	-2.635542***	I (1)
MT	3.004860	-3.012363***	I (1)
RT	-2.991878	-2.998064***	I (1)
Rainfall	-2.991878	-3.029970***	I (1)

*Source: Author’s Computation, 2012.*

Note: \*\*\* stationary at 1%; \*\* stationary at 5%; \* stationary at 10%; Note: Variables are defined above

**Table 4.2: Co-Integration Test (Granger Procedure)**

Trend assumption: Linear deterministic trend  
 Series: LAQ LEL LMT LRainfall LRT  
 Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.899756	102.5121	69.81889	0.0000
At most 1 *	0.648239	54.20907	47.85613	0.0113
At most 2 *	0.605321	32.26817	29.79707	0.0255
At most 3	0.411386	12.74486	15.49471	0.1245
At most 4	0.074029	1.615168	3.841466	0.2038

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

**Table 4.3: Stage I: Ordinary Least Squares (OLS) Estimate**

Dependent Variable: LAQ  
 Method: Least Squares

Sample (adjusted): 1985 2007  
 Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.73739	1.363071	8.610986	0.0000
LEL	-0.085582	0.056128	-1.524767	0.1447
LMT	0.296441	0.060169	4.926808	0.0001
LRAINFALL	-0.252281	0.062835	-4.014971	0.0008
LRT	0.381435	0.208626	1.828322	0.0841
R-squared	0.878950	Mean dependent var		15.99766
Adjusted R-squared	0.852050	S.D. dependent var		0.372221
S.E. of regression	0.143172	Akaike info criterion		-0.859877
Sum squared resid	0.368969	Schwarz criterion		-0.613030
Log likelihood	14.88858	Hannan-Quinn criter.		-0.797796
F-statistic	32.67465	Durbin-Watson stat		1.414635
Prob(F-statistic)	0.000000			

**Table 4:4: Stage II: Error Correction Mechanism Based In Co-Integration Regression on Eagle-Granger Procedure**

Dependent Variable: LAQ  
 Method: Least Squares  
 Sample (adjusted): 1988 2008  
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.44102	15.45641	1.969476	0.0896
LEL(-1)	-0.539408	0.490790	-1.099063	0.3081
LEL(-2)	0.809229	0.622473	1.300022	0.2348
LEL(-3)	-1.268510	0.836673	-1.516135	0.1733
LMT(-1)	-0.306897	0.948468	-0.323572	0.7557
LMT(-2)	-0.584597	0.757951	-0.771287	0.4658
LMT(-3)	0.888108	0.755649	1.175292	0.2783
LRAINFALL(-1)	0.096102	0.615602	0.156110	0.8804
LRAINFALL(-2)	1.004795	0.737332	1.362744	0.2152
LRAINFALL(-3)	-1.963712	0.671512	-2.924312	0.0222
LRT(-1)	10.03702	4.563145	2.199584	0.0638
LRT(-2)	-7.275273	3.403397	-2.137650	0.0699
LRT(-3)	-3.034223	2.470885	-1.227990	0.2591
ECM(-1)	-3.067981	3.298439	-0.930131	0.3833
R-squared	0.779639	Mean dependent var		15.93854
Adjusted R-squared	0.370398	S.D. dependent var		0.812606
S.E. of regression	0.644782	Akaike info criterion		2.194914
Sum squared resid	2.910211	Schwarz criterion		2.891262
Log likelihood	-9.046593	Hannan-Quinn criter.		2.346039
F-statistic	1.905083	Durbin-Watson stat		2.167339
Prob(F-statistic)	0.199185			

Table 4.2 above presents the cointegration result for the combined variables. Here, it is observed that the variables in the equation are cointegrated; the existence of this cointegration implies that there is a long-run equilibrium relationship existing between the variables in the equation. This is to say that if a set of variables are cointegrated, the effects of a shock to one variable spread to the others, possibly with time lags, so as to preserve a long-run relationship between the variables. The existence of this long-run relationship is the basis for the short-run disequilibrium adjustment in the model generally known as error correction mechanism (ECM), the result of which is presented in table 4.4 above.

It is observable from the results, given the value of the  $R^2$  (adjusted), that the independent variable in the model significantly explain changes in agricultural output position of Nigeria as about 37 percent to 77 per cent of changes in the agricultural output of the country are attributed to the independent variable. The model is overall significant given the probability value of the F-statistic. The Durbin-Watson statistic only corroborates findings that the residual of the model contains insignificant serial correlation.

Coming down to the variables in the model, it is evident from thence that the inclusion of the immediate past period lagged of the dependent variable captures part of the changes in agricultural output accumulation.

The result for electricity consumption to agriculture is positive and significant in the second period but for the first and third period lags that is otherwise. As regards the effect and significance of these variables on Nigeria's agricultural output Growth incidence (AO), the result found out is in line with the anticipation of this study that power generation increases with time the output of agricultural output. The estimated results shows that road transport (RT) has a positive relationship with agriculture output variable in the first and second periods, indicating

that a unit increase in road transport will cause a significant increase in agriculture outputs. This complies with the a priori expectation. Regarding the inputs of agricultural machinery to output, this does not show a significant result in the first period, but it is significant in the third period with the expected signs. Finally, the rainfall variable which was used as a proxy for water infrastructure for irrigation, this shows a positive relationship in the first and second period, but not too significant in the third period. Conclusively, from the above results, it can further be observed that electricity usage (EL), machinery and transport equipments (MT), rainfall (RF) and road transport facilities (RT) in period three are all significant at 10 per cent level of significance, while rainfall (RF) in the third period and road transport facilities (RT) are significant at 5 percent level of significance.

## **5.0 CONCLUSION**

The objectives of this study was to explore empirical the relationship between agricultural outputs and agricultural infrastructural provision for agriculture growth in Nigeria. Data were collected from secondary sources analyzed with the aim of achieving the stated objectives. From the findings of the study the following can be inferred: From our findings, there is a positive relationship between agriculture outputs and the infrastructure variables. This implies that, an increase in any of the explanatory variables will bring about an increase in the dependent variable and vice versa. This therefore confirms our A priori expectation.

In summary, agriculture infrastructure is not just necessary, but a sufficient condition in the attainment of aggregate agricultural outputs in the agricultural sector, which leads to an improved and increased agricultural development in the Nigerian economy.

Massive investment is needed, so as to boost the development of infrastructures, in the agricultural sector as this will lead to enhanced living standards, social and economic development of the farmers who are the main recipients and direct beneficiaries as a result of their productive efforts through the use of available infrastructures.

Once again based on our analytical and empirical findings, it is obvious that agricultural infrastructure has a large and positive impact on productivity and as result this has the potential to transform the existing traditional or subsistence agricultural system in Nigeria into a modern commercial and dynamic agricultural system.

Hence given all these benefits, the country as a whole stands the chance of becoming a diversified and industrialized economy due to its developed agricultural, sector which in turn can boost economic growth and development.

## **5.1 POLICY RECOMMENDATIONS**

From the results carried out road transport acts as an engine to agricultural growth and development, because it has a positive relationship with agricultural outputs supports the claim by (Han, Binswanger et al 1998) that road transport contributes directly to the growth of agricultural outputs. Here the Nigerian government is encourage to open up more road networks most especially in the rural areas and around the agricultural locations so as to boost productivity of the farmers by helping to move finished or processed farm produce to the end users or consumers.

Furthermore, since access to and usage of electricity has a positive relationship with agriculture output which supports the motion of (Thorat and Sirohi 2002) where they indicated electricity

(power) as a critical component among other infrastructures such as road transport water etc. affects agricultural productivity in a significant manner. Then it will not be out of place to have a stable and dedicated power dedicated for agricultural farms and estates. Although they argued that there were complementarities between electricity and transport, in the sense that accessibility to road is normally followed by accessibility to electricity. Hence by implication the federal, states and local government needs to improve and invest adequately in electricity generation as it plays a crucial role in agriculture development and output growth most especially through private partnership (PPP). But in order to realize this potential gains the Nigerian government at all levels needs to create an enabling environment that is conducive to private investors and also strive to improve its institutions or agencies. As regards agricultural machinery, this cannot be overemphasized as a well mechanized agricultural system will help to increase agricultural yield in record time and thereby increase in the output available for both consumption and for export to gain foreign exchange for the country.

Conclusively the results of the regression analysis also supports (Thorat and Sirohi 2002) views that improved water (proxy by rainfall) infrastructure in the form of irrigation coupled with research input, enhanced agricultural outputs. Here this must be accompanied by the appropriate schemes and policies such as the irrigation schemes, setting up of a special water agency that solely dedicated to agriculture, so as to enhance agricultural productivity and development.

The precise mix of other policies relating to agriculture infrastructure strongly depends on the political will of the Nigerian government, adequate investments, adequate and increased budgetary allocations coupled with the right implementation of its schemes and policies so as to get the best in terms of aggregate output arising from agriculture infrastructures. Besides this will

help in poverty reduction, employment generation and most importantly will lead to economic development.

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