RURAL ACCESS ROADS AND THE QUEST FOR AGRICULTURAL DEVELOPMENT: AN APPRAISAL OF THE CONDITIONS IN SOUTH-EAST IN NIGERIA

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ABSTRACT

This study examined the quest for agricultural development in Nigeria vis-à-vis the conditions of rural access roads in South-east Nigeria. Specifically, the study investigated the impact of the condition of the three types of rural access roads, namely, bush-paths, gravel-surfaced roads, and tarred roads on the quantity of food crops produced by smallholder farmers, their income levels, and contribution to agricultural GDP. The study adopted the quantitative research method and cross-sectional survey design. The questionnaire was validated and pre-tested. The reliability test performed on the questionnaire showed a Cronbach's Alpha Index of 0.823. Five (5) sample units comprising five chapters of the All Farmers Association of Nigeria (AFAN) in Abia, Anambra, Ebonyi, Enugu and Imo States were used to select 328 stratified random respondents. Descriptive statistics consisting of frequency counts, and percentages were used in analyzing the data. Three hypotheses were put forward for test using Simple Linear Regression and ANOVA. The findings show that bush-paths as rural access roads did not significantly increase the quantity of food crops produced by rural farmers, that gravel-surfaced roads as rural roads never increased the income level of rural farmers; and that tarred roads as rural access roads did not contribute significantly to total agricultural GDP. The study recommends that government and other major stakeholders like international agencies and other development partners should prioritize and embark on massive rural road construction and regular maintenance.

KEYWORDS: Rural roads, tarred roads, bush-paths roads, gravel-surface roads, transportation, food crops.

INTRODUCTION

Agriculture contributes significantly to Nigeria's GDP, contributing 26.95 percent to GDP in 2020 (National Bureau of Statistics (NBS), 2021). It is a key activity for Nigeria's economy after oil. The sector is characterized by smallholder farmers.

Smallholder farmers play an important role in generating national output in the predominantly oil-based economy of Nigeria. Rural farming is an important economic activity in Nigeria with a majority of the rural population depending on agriculture for livelihood. Over 70 percent of rural dwellers are subsistence smallholder farmers,

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who produce about 90 percent of Nigeria's food and fibre (International Fund for Agricultural Development (IFAD) (2016)

Rural farming is mostly rain-fed with predominance of small scale systems using traditional techniques of production could be said to be at a typical Mellor's stage II of Agricultural Development with more hardship and low productivity (Mellor, 2000). The traditional systems of land management and the high pressure on land have resulted in declining soil fertility, prompting shifting cultivation and an increase in farm distances from the village or community primary location. In view of this, agricultural intensification and the adoption of improved production techniques became necessary. But confronted with growing climate uncertainty, farmers also adopt crop and land location diversifications to minimize farming risk. The combined effects have increased hardship and daily long distances trekking/motoring to get to the farm.

The overall development of agriculture depends on various supportive rural infrastructural facilities (Usman et al., 2013). Efficient and effective rural transportation serves as one of the channels for the collection and exchange of goods and services, movement of people, dissemination of information and the promotion of the rural economy (Adedeji et al., 2014). It is also clear that the development of rural infrastructure generally contributes significantly to the quality of rural life. Countries that have developed their rural infrastructure have recorded higher and better quality of rural development than those that have failed to do so (Economic Commission for Africa, 2013).

The existence of an accessible, acceptable and efficient transportation system is a pre-condition for linking remote farm areas, located far from consumer's centres with the agricultural production process (Taiwo Akumi, 2013). The transport system is fundamental to the economic and social development of rural areas, and significant investment is required to scale up a suitable transport system in rural areas. Transportation is a key factor for agricultural development all over the world. It is the only means by which food produced at the farm can reach different homes as well as markets. The market for agricultural produce is created by transport; furthermore, transport increases the interaction among geographical and economic regions and opens up new areas to economic activity (Tunde & Adeniyi, 2012). Road transport is the most predominant mode of transportation all over the world and this is a confirmation of the crucial role transport plays in the socio-economic development of a nation (Ajiboye & Afolayan, 2019).

In Nigeria, the issue of rural transportation development has continued to be of national importance. For instance, most of the rural roads are in poor condition, and this has imposed significant costs on the nation's economy especially to the agricultural activities due to increased vehicle operating costs and travel times. The Federal Government of Nigeria has embarked on various programmes like the defunct Directorate of Food, Road and Rural Infrastructure (DFRRI), at one time or the other to ensure the provision of adequate transport facilities to meet the needs of the rural population, but these programmes have not been able to achieve the desired success. It is, therefore, against this backdrop that this study examined the quest for agricultural development in Nigeria vis-à-vis the prevailing conditions of rural roads in South-east Nigeria and its effect on agricultural productivity.

STATEMENT OF THE PROBLEM

Many rural Africans still suffer from poor access to markets, health, schooling, and high transport costs (Perschon, 2001). Inadequate rural roads make it hard for farmers to produce more and to transport any surpluses after harvest. Traffic on most rural roads still consists mainly of pedestrians often carrying head loads (DFID, 2018; Lindsay, 2015). Poor and inadequate rural roads have been the main concern by both small producers and consumers. Rural Africa has only 34% of road access covered as compared to 90% in the rest of the world (AFDE, 2010).

Rural transport infrastructure is still poorly developed in Nigeria and, therefore, it is a crucial impediment to the growth of the rural as well as the national economy. For instance, only 27% (Lulit, 2020) of the rural population has access to all-weather roads in 2011 compared to 60% in India and 61 % in Pakistan (Giz, 2013). The road density of Nigeria per thousand square km was 49 km during the same period which falls far behind the average road density of lower-middle-income countries which is about 0.3 km/sq.km (JRF, 2016; Lulit, 2020). Therefore, most places in the country especially in the rural areas are still without access roads and poor connectivity to major road networks.

Nigeria's rural road network is one of the least developed in sub-Saharan Africa. The poor tend to live in isolated villages that can become

virtually inaccessible during the rainy seasons. When there is a post-harvest marketable surplus, it is not always easy to reach the markets. Limited accessibility has also cut off small-scale farmers from sources of inputs, equipment, and new technologies. Crop productivity is, therefore, low because farmers lack these important inputs. In particular, inadequate access to fertilizer is a real problem in many parts of Nigeria where farmers have to cope with diminishing soil fertility (Fakayode et al., 2018). Consequently, efficient rural road transport infrastructure is central to raising agricultural productivity and increasing growth in Nigeria. However, evidence shows that a weak rural road transport infrastructural base has been one of the major factors militating against the attainment of Nigeria's growth and development objectives.

It is extremely difficult for most farmers who live and farm in South-east Nigeria to gain access to all-weather roads on which to transport their farm produce to home and market centres on time. In effect, the socio-economic wellbeing of the smallholder farmers is seriously affected due to the high cost of agricultural inputs and depressed prices of farm produce. Poor road conditions, high transport costs, and distant markets have been identified as factors that hamper improved market access for smallholder farmers in South-east Nigeria.

Despite being the most populous country in Africa and one of the poorest, the question of how to reverse low agricultural productivity in Nigeria is one that the research community has scarcely touched upon. To the researcher's knowledge, no attempt has been made to estimate the effects of poor rural road infrastructure on the structure of smallholder farm production in Nigeria. This paper aims to fill that gap using cross-sectional data, from the survey of 305 farmers in five States in South-east Nigeria.

OBJECTIVES OF THE STUDY

The general objective of this study was to investigate the effect of rural road transport infrastructure on the agricultural productivity of smallholder farmers. Particularly, this research was undertaken to achieve the following specific objectives:

(1) Describe the types of rural access roads available in the study area.
(2) Analyse the conditions of the rural access roads.

(3) Find out the effect of the types of roads on the quantity of food crops produced by rural farmers.
(4) Determine the effect of the types of roads on the income of rural farmers.
(5) Investigate the contribution of the types of roads on the total agricultural GDP.

Three hypotheses were equally formulated from the objectives to guide this study.

LITERATURE REVIEW

Transport is regarded as an important factor involved in agricultural development all over the world. It is the only means by which food produced at farm sites is moved to different homes as well as markets. Transport creates a market for agricultural produce, enhances interaction among geographical and economic regions and opens up new areas to economic focus. There are complex relationships that vary both spatially and over time between transport and development. However, for any development to take place, transport plays a crucial role. Ogunsanya (2018) observed that there are three types of routes in the rural areas viz: bush paths, unsurfaced rural roads and surfaced rural roads. However, the bush path is very common, but the least developed of all the routes. Bush paths link villages with farmsteads and they are usually narrowed, winding and sometimes overgrown by weeds, especially during the rainy season. In a study carried by Filani (2013) in rural areas of Nigeria, it was discovered that where motorable roads exist, they are mostly of unpaved surface narrow width, circuitous alignment and low-quality bridges. In most cases, they are either clad with potholes or characterised by depressions and sagging. Such unsurfaced roads are hardly passable during the rainy season when vehicles get stuck in mud or when the improvised bridges of cut-tree trunks get swept away by the flood.

In another study carried out by Ogunsanya (2018) on the relationship between transportation, underdevelopment and rurality, he observed that the greater the degree of rurality, the lower the level of transport development. Aderamo & Magaji (2010) noted that transportation constitutes the main avenue through which different parts of the society are linked together. Jegede (2012) cited by Ajiboye & Afolayan (2019) noted that road transport is the most common and complex network. It covers a wide range, physically convenient, highly flexible and usually the most operationally suitable and readily available means of movement of goods

and passenger traffic over short medium and long distances.

Roads and transportation are essential for the sustainability of agricultural production in sub-Saharan Africa as it impacts on positive factors such as mobility (John & Carapetis, 2020), the adoption of high yielding varieties high productivity crops and bigger farm size (Sieber, 2020).

Tracey-White (2015) noted also that mobility in rural areas could be hampered by the lack of transportation facilities and unavailability of good roads. He canvasses the need to study how transport systems affect the marketing channels and therefore the long term agricultural productivity. He noted that the mode of transportation used length and time of the journey and the costs of transport, all affect the efficiency of the marketing system and therefore, farm output. He listed benefits attached to improved transport as: (i) that agricultural surplus reach collection centres and markets timely: (ii) a reduction of a time burden for family members and (iii) a reduction in transportation damages to perishable crops. Additionally, improved transport reduces operating costs to vehicle users and provides more direct and cost-effective access to public utilities.

Transportation cost is not also unconnected with road roughness and seasonality. Ninnin (2017) found in Madagascar that wet season fares were 70% higher than dry season fares. While in Tanzania an increase in road roughness by 50% raises the truck charges by 16% and pickup charges by a little below 100% and (Starkey, 2000) empirically found as estimated cost/ton/km of $0.60, $1.30 and $0.70 for bicycle, motorcycle and pickup respectively. Oyatoye (2018) in Nigeria found that if road quality improves, farmers have lower marketing costs and gain access to wider markets. They experience little or no delay in moving their produce and hence undergo fewer losses. They also receive better market prices for their products as the realization of a new road always attracts more transportation systems and eases access to the farm.

According to Ajiboye (2014), the availability of transport facilities is a critical investment factor that stimulates economic growth through increased accessibility. Paul et al. (2009) pointed out that the impacts of road infrastructure on agricultural output and productivity are particularly important in sub-Saharan Africa for three reasons, First, the agricultural sector accounts for a large share of gross domestic product (GDP) in most sub-Saharan countries.

Second, poverty is concentrated in rural areas. Finally, the relatively low levels of road infrastructure and average travel time result in high transaction costs for sales of agricultural inputs and outputs, and this limits agricultural productivity and growth. According to Mabogunje (2014), some of the variables that determine the level of development in a given environment are easy accessibility and mobility.

Transport affects agricultural marketing because it is the only means by which farmers can transport their produce to the market. Poor transportation in the rural areas has resulted in low productivity, low income and a fall in the standard of living of rural residents and a high rate of poverty (Aloba, 2018). A strong relationship between transportation, underdevelopment and rurality was identified by Ogunsanya (2018). He stressed further that the greater the degree of rurality, the lower the level of transport development. When the distance of farm to the market is far and the road is rough, perishable crops may be destroyed and farmers may run at a loss.

METHODOLOGY
Study Area
This study was carried out in South-east Nigeria. South-east is one of the six geopolitical zones in Nigeria. The zone is made up of five (5) States, namely, Abia, Anambra, Ebonyi, Enugu, and Imo States. South-east Nigeria as its name suggests is located in the south-eastern part of Nigeria. The region is located within latitude 6'N and 8'N and longitude 4'30E and 7'30E which is described as the inland region of Nigeria. The Udi escarpment divides the Zone into two parts. Southeastern seaplanes under the Anambra/Imo River Basin, and the eastern borderlands under the Cross River Basin and the apex of Udi plateau at 300m above sea level (Ngene et al., 2018). The Zone is thickly populated and covers an area of about 40,000sq km and representing 4% of the country's landmass with its characteristic physical environment and climate (Ngene et al., 2018). South-east Nigeria is characterized by a wet tropical climate with a mean annual temperature in the range of about $27^{o}C$ and $34^{o}C$, with the highest temperature occurring around March-April. It has an average annual rainfall of 1744mm with bimodal double peaks in July and September (Offormata, 2005).

Farming is the major activity of the people of the area. Other activities include rearing of livestock, handicraft, trade and other economic activities. Traditional techniques of production and a
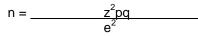
relative paucity of transportation characterize the area, while farmers are gradually incorporating intermediate modes of transport (IMT) into their farming system. Crops that are mainly cultivated in the area include tubers (yam, cassava, sweet potatoes, cocoyam), cereals (maize, guinea corn, millet) and fruits, livestock rearing, fish-farming, poultry farming etc. Three types of roads exist in the area: bush paths, gravel-surfaced roads, and a few tarred roads.

RESEARCH METHODS AND DESIGN

The research method adopted by this study was the quantitative method, while the research design is cross-sectional survey research. The data were collected with a structured questionnaire.

Sampling and Sample Size Determination

A multi-stage sampling method was used for the selection of a representative sample. This sampling method is chosen because it is an advance of the principle of cluster sampling. The method is recommended for big inquires extending to a considerable large geographical area (Kothari, 2004), like in this case, which is rural access roads and farmers in south-east Nigeria. The merits of this method are that it is easier to administer than most single-stage designs, and a large member of units can be sampled for a given cost became of sequential chartering, whereas this is not possible in most of the sample designs three states.

In the first stage, the purposive sampling technique was used to select the appropriate group in the study area that is most directly involved in the use of rural access roads in the pursuit of agricultural production, which is the farmers' group under the umbrella of All Farmers Association of Nigeria (AFAN). In the second stage, a stratified random sampling technique was used to select the individual farmers from the membership strength of all the five (5) state chapters of the said AFAN. The population of the five chapters was 2,200. From this population, a sample size for the study was determined using Kothari's Finite Population Correction Factor statistics, whose formula is given by:

$$n = \frac{z^2pq}{e^2}$$

(Kothari, 2004).

The sample size for this study was determined as 328.

DATA COLLECTION

Primary data and secondary data were collected for this study. The primary data were collected using a structured questionnaire that consist of closed-ended items. The questionnaire was piloted at three (3) sampled units for purpose of test-retest measurement. Results of the reliability test carried out on the questionnaire showed a Cronbach's Alpha Index of 0.823, which is well above 0.7 and therefore, considered good enough for the field survey. The questionnaire was administered to 328 respondents across the five states in the zone, using both self-administration and electronic means.

Data collected include those on the research constructs of the study such as the farm output of farmers, farm size, farm income, types of rural access roads, modes of transportation mostly used, and conditions and quality of access roads and their effects on the productivity levels of farmers, among others. Secondary data were collected from the operational records of the farms, official records of the farmers' associations, and various statistical bulletins, among others.

Method of Data Analysis

Responses of the farmers were first coded into data using the Excel Spreadsheet. The resulting data were analysed using descriptive statistics of percentage, frequency counts, mean, and coefficient of variation. Inferential statistics of stepwise simple linear regression was used to examine and establish the nature and degree of relationship between the conditions of rural access roads and farmers' agricultural productivity level.

Model Specification

The model for the simple linear regression analysis chosen for this study is specified as follows:

$$Y = a_0 + \beta_1 X_1 + U \text{ -------------- (i)}$$

In respect of the specific objectives, the independent and dependent variables are stated as follows:

For objective one, we have

Y = Quantity of food crops produced by rural farmers/annual (kg)

X_1 = Bush-paths as access roads (number)

Objective two, we have

Y = Farmers' farm income (Naira)

X_1 = Gravel-surfaced roads (number)

Objective three, we have

Y = Agriculture GDP (Naira)

X_1 = Tarred roads (number)

Where:

a_0 = Constant/intercept

β_1 = Coefficient of estimate

X_1 = Independent variable (bush paths, gravel-surfaced roads, tarred roads).

U = Stochastic error term

Decision Rule

Reject the null hypothesis, where $p < 0.05$, then accept the alternate hypothesis.

RESULTS AND DISCUSSION

Results of the study showed that 305 (93.0%) of the research questionnaire were returned well completed. This represented a high return rate which was considered good for the study. The remaining 23 (7.0%) were either not returned at all or rejected owing to poor handling in the completion processes. The analyses that follow in the rest of this study were based on the 305 copies of the validly completed and returned questionnaire.

Types of Roads Used by Rural Farmers

The result in Table 1 shows that 73.1% of the respondents indicated that they relied mostly on bush-paths to move their farm produce from their farms to home. In a similar vein, 20.3% stated that they relied mostly on gravel-surfaced rural access roads to transport their produce from the farm to home, while only 6.6% of the sampled farmers indicated that they use single-lane tarred roads to move produce from the farm to home. In like manner, the result also shows that 43.9% of the farmers indicated that they also relied mostly on bush-paths to move their farm produce from their homes to the market, 34.4% said they used mostly gravel-surfaced rural roads to do so; while only 21.6% said that they mostly used singly-lane tarred roads in transporting their farm produce from their homes to the markets. Overall, it is obvious rural farmers largely depended on the use of bush-paths and gravel-surfaced rural access roads in evacuating their farm produce from farm to home or from home to the market. This result is in agreement with the findings of Usman et al. (2013); Starkey (2005); Barwel (2020), who observed that most rural dwellers in Africa depend more on bush-paths and unpaved roads. Surveys such as that conducted by Usman et al. (2013) have shown that owing to the very poor condition of rural roads in Kwara State of Nigeria, only 1.1% of the respondents own personal four-wheel vehicles and hence many people are forced to depend on motorcycle and bicycle as the means of transportation. A similar work by Porter (2013) revealed the fact that since poor people rarely own motorized means of transport, walking, cycling and animal traction remain predominant means of transporting farm produce in rural areas.

Table 1: Types of Rural Access Roads used by Farmers to transport their produce from farm to Home and from Home o Markets in South-east Nigeria

Farmer's State	Type of Rural Access Roads used to move Produce from Farm to Home			Type of Rural Access Roads used to move Produce from Home to the Market		
	Bush-paths	Gravel surfaced roads	Single-lane tarred roads	Bush-paths	Gravel-surfaced Roads	Single-lane tarred roads
AFAN, Abia	51 (63.0%)	27 (33.3%)	3 (3.7%)	29 (35.8%)	31 (38.5%)	21 (25.9%)
AFAN, Anambra	46 (75.4%)	13 (21.3%)	2 (3.3%)	25 (41.0%)	21 (34.4%)	15 (24.6%)
AFAN, Ebonyi	44 (75.9%)	9 (15.5%)	5 (8.6%)	35 (60.3%)	20 (34.5%)	3 (5.2%)
AFAN, Enugu	39 (76.5%)	5 (9.8%)	7 (13.7%)	17 (33.3%)	18 (35.3%)	16 (31.4%)
AFAN, Imo	43 (79.6%)	8 (14.8%)	3 (5.6%)	28 (51.9%)	15 (27.8%)	11 (20.4%)
Total	223 (73.1%)	62 (20.3%)	20 (6.6%)	134 (43.9%)	105 (34.4%)	66 (21.6%)

Note: Figures in parenthesis are in percentage

Conditions of Rural Roads Used by Rural Farmers

Table 2 shows that only 20.3% of the rural farmers indicated that the three types of roads prevalent in the rural areas and used by them in the evaluation of produce from their farms to home are motorable all the year-round. Similarly, 12.8% indicated that these roads are usually full of rickety bridges; 24.6% said that the said roads are usually impassable during the rainy season, and 13.6% said that the roads are always full of potholes. In like manner, 12.9% indicated that the three types of roads are bumpy and full of depressions; while 15.7% said that the roads are generally too narrow and bushy. The same table also shows that in evacuating farm produce from home to the market, only 18.4% of the farmers said that they find all the three types of roads motorable all the year-round. Similarly, 5.0% of the indicated that the three types of roads are always full of rickety bridges, 23.6% indicated that these roads are usually impassable during the wet season; and that 15.1% of them revealed that the three types of road in question are full of potholes. Furthermore, 21.6% of the respondents indicated that the said types of road are generally bumpy and full of depression, while 16.7% of them indicated that they find the three types of road to be generally too narrow and bushy for evacuating their produce from their homes to the market. Apparently, the foregoing findings show that most of the rural access roads in the study area are unmotorable all year round and impassable during the rainy season. These findings are sufficiently supported by earlier studies like Tunde & Adeniyi (2012); Tamene & Megento (2017); Kassali, Ayanwale, Idowu & Williams (2012); and Ijeoma & Ali (2016), who found that most access roads in rural areas of Nigeria were mostly unmotorable, eroded and impassable and this conditions least support agricultural productivity.

Table 2: Conditions of Rural Access Roads used by Farmers in Evacuation of Farm Produce from to Home and from Home to Market

Type of Road	Conditions of Rural Access Roads used by Farmers in Evacuation of Farm Produce from Farm to their Home						Type of Rural Access Roads used to move Produce from Home to the Market					
	Motorable all the yea round	Full of rickety Bridges	Imposable during Rainy Season	Full of Potholes	Bumpy and full of Depressions	Too Narrow and Bushy	Motorable all the yea round	Full of rickety Bridges	Imposable during Rainy Season	Full of Potholes	Bumpy and full of Depressions	Too Narrow and Bushy
Bush-paths	4 (4.0%)	19 (19.2%)	30 (30.3%)	4 (4.0%)	6 (6.1%)	36 (36.4%)	2 (18.9%)	5 (4.8%)	40 (38.1%)	8 (7.6%)	9 (8.7%)	41 (39.1%)
Gravel surfaced roads	10 (11.1%)	12 (13.3%)	24 (26.7%)	20 (22.2%)	17 (18.9%)	7 (7.8%)	18 (18.2%)	3 (3.0%)	29 (29.3%)	14 (14.1%)	27 (27.3%)	8 (8.1%)
Single-lane tarred roads	48 (41.4%)	8 (6.9%)	21 (18.1%)	18 (15.5%)	16 (13.8%)	5 (4.3%)	36 (35.6%)	6 (5.9%)	4 (3.0%)	24 (23.8%)	30 (29.7%)	2 (2.0%)
Total	62 (20.3%)	39 12.8%)	75 (24.6%)	42 (13.8%)	39 (12.9%)	48 (15.7%)	56 (18.4%)	14 (5.0%)	72 (23.6%)	46 (15.17%)	66 (21.6%)	51 (16.7%)

Note: Figures in parenthesis are in percentage

Relationship between Types and Conditions of Rural Access Roads and Agricultural productivity of Rural Farmers

1. Hypothesis One
i: Bush-paths as rural access roads do not significantly increase the quantity of food crops produced by rural farmers.

Table 3: Summary of Regression and ANOVA results on hypothesis 1

Model	Coefficients	Std. Error	Beta	t-value	Sig.
(Constant)	1.697	9.663		17.566	.000
Bush-paths	-0.678	4.316	-0.403	-0.157	0.083
R	0.403				
R Square (R^2)	0.162				
Adjusted R^2	0.157				
Std. Error of the Est.	9.07299				
F-ratio	74.402				
Overall P-Value	0. 083[a]				

a.   Dependent variable: quantity of food crops produced

The result of the analysis presented in Table 3 with regard to the first hypothesis showed that bush-paths as rural access roads as the independent variable was able to account for 16.2 percent changes in the quantity of food crops produced in South-east Nigeria. This suggests that the remaining 84.3% could be attributed to some other variables not included in the model.

Table 2 showed that the explanatory variable contributed significantly to the model with an F-ratio measure of 74.402 and a p-value of 0.083. Based on this value, it is concluded that Bush-paths as rural access roads do not significantly increase the quantity of food crops produced by rural farmers (P>0.05). Thus, the null hypothesis is accepted.

2. Hypothesis two
H_{02}:   Gravel-surfaced roads as rural access roads never increased the income level of rural farmers.

Table 4: Summary of regression result on hypothesis 2

Model	Coefficients	Std. Error	Beta	t-value	Sig.
(Constant)	0.671	0.058		11.499	*
Gravel surfaced roads	0.020	0.019	0.062	1.079	NS
R	0.309				
R Square (R^2)	0.195				
Adjusted R^2	0.089				
Std. Error of the Est.	0.44567				
F-ratio	1.165				
Overall P-Value	0.281				

* indicates significant while NS indicates not significant

With regard to hypothesis 2, Table 4 shows that rural gravel-surfaced roads sufficiently explain 19.5 percent changes in the income levels of rural farmers. The positive coefficient of gravel-surfaced roads although statistically insignificant implies that any improvement of the condition of grave-surfaced roads increases the income level of rural farmers by 2 percent. More so, the model

yielded an F-ratio of 1.165 and a probability value (p-value) of 0.281, which is greater than the significance level of 0.05 (P>0.05). Based on this, we reject the alternative hypothesis and accept the null hypothesis that gravel-surfaced roads as rural access roads do not significantly increase the income level of rural farmers.

3. Hypothesis No. 3

H_{03}:   Tarred roads as rural access roads do not significantly contribute to the total agricultural GDP.

Table 6: Summary of Regression Result on Hypothesis 3

Model	Coefficients	Std. Error	Beta	t-value	Sig.
(Constant)	1.651	2.601		6.346	*
Tarred roads	-19.395	21.471	-0.462	-0.903	NS
R	0.462				
R Square (R^2)	0.214				
Adjusted R^2	0.209				
Std. Error of the Est.	2.29686				
F-ratio	2.816				
P-Value	0.433				

* indicates significant while NS indicates not significant

The results of the analysis with respect to hypothesis three as presented in Table 5 shows that tarred roads as the explanatory (predictor) variable was able to explain about 201.4% changes to total agricultural GDP. The result equally gave rise to an F-ratio of 2.816 and a P-value of 0.433, which is greater than 0.05 stipulated a significance level of 0.05 (P > 0.05). Going by this result, the null hypothesis was accepted that tarred roads as rural access roads do not significantly contribute to the total agricultural GDP of Nigeria.

The dominant a priori belief is that good quality rural access roads have a strong positive correlation with higher agricultural productivity. Contrary to this belief, the findings of this study show that the three types of rural access roads examined and their conditions do not significantly contribute to agricultural productivity in terms of food crops output, income growth and growth to agricultural GDP. The findings are at variance with previous studies such as Ashagidigbi et al. (2018), who reported a significant and positive correlation between the category of road access and economic productivity of farmers' output. Similarly, by using time series data for 256 districts in India, Narayanamoorthy and Hanjra (2016) found a strong and positive relationship between road infrastructure development and agricultural productivity. These lines of reasoning have been supported by many African and Asian studies (Kassali et al., 2012; 2014; Tunde & Adeniyi, 2012; Felloni et al, 2000). More so, Obayelu et al. (2014) noted the importance of paved or good gravelled roads for the evacuation of agricultural produce. The observed correlation between the two variables might be explained by the fact that the growth of farm productivity is

linked closely to the type and quality of rural road infrastructure in place. This means that countries that will provide adequate affordable and accessible road infrastructure in rural areas will succeed in increasing their agricultural productivity.

Nigeria runs a three-tier federal structure government comprising federal, state, and local governments (Mwalimu, 2009). Each tier of government has constitutionally guaranteed autonomy in the area in which it operates. Roads construction and maintenance fall on the residual legislative list, which is assigned to all tiers of government. Local government is the third-tier of government and constitutionally vested with the responsibility of constructing and maintaining rural roads (UN-Habit, 2019), however, the usurping of local government powers and federal allocations by the State Government under what the Joint State and Local Governments Allocation has rendered the third tier of government incapacitated to discharge her constitutional responsibilities (Sanusi, Tabi'u and Mohamed, 2013). Thus, the poor conditions of rural roads due to the inability of the councils' government to discharge her constitutional mandates contributed to this finding.

CONCLUSION

This study examined the quest for agricultural development in Nigeria in the face of the conditions of rural access roads, with a special focus on South-east zone of the country. The study established that there are three types of rural access roads in the area: bush-paths, gravel-surfaced roads, and tarred roads. It was also found that only a very few numbers of rural access roads exist across the length and breadth

of the entire zone. Even at that, the very few roads in existence are in very deplorable conditions. The study equally established that rural access roads did not significantly increase the quantity of food produced in South-east zone, Nigeria. Again, the study found that gravel-surfaced roads as rural access roads in South-east Nigeria never improved the income level of rural farmers in the zone. The study also found that tarred roads as rural access roads did not contribute significantly to the total agricultural GDP of Nigeria. The study concludes that it is abundantly clear that on account of both its limited number and the deplorable nature of the existing ones, rural access roads in South-east Nigeria militated against the quest for agricultural development in the region. However, given the critical importance of roads to the effective and efficient transportation of rural farm produce; it becomes vital that measures be taken to ensure that the deployable condition of rural access roads in Nigeria is urgently addressed.

RECOMMENDATIONS

Firstly, major stakeholders in the agricultural sector of the Nigerian economy, led of course by the government should prioritize and embark on massive construction and regular maintenance of rural access roads in the country as part of the comprehensive programme of agricultural development. In this regard, it is recommended that a special agency that will be in the form of the defunct Directorate of Food, Road, and Rural Infrastructure (DFRRI) be established by the government. This agency when established will be made to have branches or functional presence in each State capital and each of the 774 LGAs in the country.

South-east region should do everything within their powers to ensure that the various States in the Zone benefit from the subsequent phases of the World Bank-sponsored Rural Access and Mobility Project (RAMP) programme to improve the conditions of the rural access roads in rural communities.

It is also recommended that government and other major stakeholders such as the international development partners like the World Bank, UNDP, and FAO should pay special priority attention to the issue of subsidizing construction and maintenance of rural access roads by such poorly funded sub-authorities like State and Local Governments and community associations. Such subsidies can go to the critical areas of procurement of heavy earth-moving equipment and automobiles, bitumen, and

chippings, among other road construction materials.

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