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Effect of Rural Infrastructure on Agricultural Production in Emohua LGA, Rivers State, Nigeria

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Abstract

This study examined The Effect of Rural Infrastructure on Agricultural Production in Emohua LGA, Rivers State, Nigeria. The objectives of this study were to describe the socioeconomic characteristics of the farmers in the study area, identify the types of agricultural enterprises practiced by the farmers, determine the extent of availability of the rural infrastructures in the study area, determine the perceived effects of rural infrastructure on agricultural productivity in the study area and identify the constraints to agricultural production in the study area. With the aid of copies of structured questionnaire, data for the study were collected using multi-stage sampling procedure. Data were analyzed using descriptive statistics and inferential statistics (mean scores). Result from the study showed that majority (53.2%) of the respondents were female, most (62.6%) of the farmers in the area were married, majority (41.8%) of the respondents had household size between 5-7 persons, majority (48.2%) of the sampled respondents had farming experience of above 12 years', majority of the respondents (26.6%) acknowledged cassava farming as the main type of agricultural enterprise carried out in the study area. The most available rural infrastructure in the study area are pipe-borne water ($\bar{x}$ 2.71), and educational institutions ($\bar{x}$ 2.56) were perceived to be available in the study area. Tarred roads ($\bar{x}$ 3.29), electricity ($\bar{x}$ 3.41), pipe-borne water ($\bar{x}$ 3.30), processing facilities ($\bar{x}$ 2.65), health facilities ($\bar{x}$ 2.75), educational institutions ($\bar{x}$ 2.51), and telecommunication ($\bar{x}$ 2.56) were agreed to have significant effect on agricultural productivity. Inadequate infrastructure ($\bar{x}$ 3.44), low technology ($\bar{x}$ 2.91), limited finance ($\bar{x}$ 3.15), poor access to market ($\bar{x}$ 2.79), and land tenure ($\bar{x}$ 2.80) were agreed to be the major constraints to the agricultural productivity of farmers in the study area. The study concluded that rural infrastructure has perceived effect on agricultural production in the study area and recommended that more infrastructure should be sited in the rural areas; and the already existing infrastructure should be improved to standard as it has been shown to have significant effects on agricultural production.

Keywords: *Agriculture, Rural Infrastructure, Agricultural Production*

INTRODUCTION

The agricultural sector is considered as one of the most important sectors of an economy and this sector is particularly important in terms of its employment generation, contribution to the gross domestic product (GDP), and export revenue earnings. Despite Nigeria's rich agricultural resource endowments, the agricultural sector is seen to be growing at a very low pace; and less than 50% of the country's cultivable agricultural land is under-cultivated. This would suggest that there is the need to explore the enormous potential inherent in the agricultural sector and use it to achieve sustainable economic growth of the country (CBN, 2008; Onunwo and Amadi-Robert, 2022). Orji, Ogbuabor, Anthony-Orji and Alisigwe (2020) mentioned that a high proportion of those engaged in agricultural practices are rural dwellers with low levels of education, these rural dwellers make up about half of the Nigerian population, yet rural poverty is on the increase. Rural dwellers find it very difficult to access useful information in their acquisition of necessary inputs needed to increase output this abnormality can be attributed to the absence of basic rural infrastructure in such areas.

Rural infrastructural is the basic physical and organizational structures needed for the operation of a society or enterprises, or the services and facilities necessary for an economy. Infrastructure is a set of investments that include rural roads, water supply, rural housing, rural electrification, sanitation, energy and telecommunication, and agricultural processing (Anija-Obi, 2001). These facilities enhance the standard of living of rural farmers. The improvement of rural infrastructure is highly related to agricultural production in various ways. For instance, it is one of the several subjects of activities that are essential for rural transformation. Thus, the existence of poor quality or inadequate infrastructure will inevitably have a negative impact on agriculture (Patel, 2014). The rural infrastructure in areas such as this play a major role in the motivation of the practice of farming in the rural areas of Nigeria. Pinstrup-Anderson and Simokawa, (2006) opined that infrastructure is a major determinant of agricultural productivity, chiefly because it would reduce the cost of input and output market.

The farm practice in rural areas lack adequate infrastructure, which limit the productivity and competitiveness of agricultural production. The neglect of rural infrastructures (such as roads) impedes the profitability of agricultural production, and marketing of agricultural commodities and prevents farmers from selling their produce at reasonable prices due to spoilage (Akpan, 2012). Fan and Zhang (2004) revealed that rural infrastructure and rural development are connected to reducing rural poverty and increasing the standard of living through agricultural productivity improvement, employment opportunities, and non-farm employment. Rural infrastructure plays a vital role in supporting agricultural production. Investing in rural infrastructure and organizations can help rural communities increase their productivity, reduce poverty, and generally contribute to economic growth. More so, economic development theorists have identified infrastructure as important in agricultural production. This means that agricultural production capacity is greatly connected to adequate infrastructure. Thus, it becomes imperative to examine the effect of rural infrastructure on agricultural production.

OBJECTIVES OF THE STUDY

The broad objective of this research was to investigate the effect of rural infrastructure on agricultural production in Emohua LGA, Rivers State, Nigeria. The specific objectives were to:

i. describe the socioeconomic characteristics of the farmers in the study area;
ii. identify the types of agricultural enterprises practiced by the farmers;
iii. determine the extent of availability of the rural infrastructures in the study area;
iv. determine the perceived effects of rural infrastructure on agricultural productivity in the study area; and
v. identify the constraints to agricultural production in the study area.

THEORETICAL LITERATURE

Boserup Theory of Agricultural Development

Boserup theory of agricultural development was developed as a concept by a female Danish economist named Ester Boserup in 1965 in Denmark. Boserup occupies a place of pride in the task of discussing the problems and processes of agricultural development. Boserup attributed agricultural development to the factor which so far has been described as irrelevant but it demolished a theory propounded by the classical economist Malthus. Boserup also suggested that changes in agricultural production could also be induced by external factors, such as government policies, technological advances, and access to markets and capital. She argued that, in order to achieve sustained levels of economic growth, it is critical to understand the complex linkages between population growth, agricultural productivity, and economic development. The relationship between infrastructure and productivity has been examined by various researchers and policymakers. Most economies that are primarily agrarian in nature have sought to investigate how agricultural productivity can be augmented through specific investments in infrastructure. Improvement in rural roads affects agricultural development followed by the development of social services. It is observed that roads tend to have a greater initial impact on the production where cash crops are grown, because food crops, grown by small farmers have a lower price elasticity of supply than cash crops (USAID, 1972).

MATERIALS AND METHODS

The study was conducted in Emohua Local Government Area (LGA) of Rivers State, Nigeria. Emohua Local Government Area is one of the four Local Government Areas which make up the lkwerre ethnic nationality in Rivers State. The choice of Emohua Local Government Area for this research was due to its notable agricultural activities in the State. The Local lies in the geographical coordinates of 4° 53’ 2 N, 6°51’38” Its headquarters are in the town of Emohua. It has an area of 831 km2 (321 sq m) and a population of 201,901 according the 2006 census (NPC, 2006).

Analytical descriptive survey research design was adopted for the study, where structured questionnaire was used to generate data from the sample size for the purpose of the study. The research population comprised of communities of agricultural farmers comprising of crop farming, fisheries, and mild livestock production all in the study area. There are 8060 registered farmers in Emohua Local Government Area of Rivers State according to the Agricultural Development

Programme in Rivers State. The sample size of 381 famers was obtained from the Taro Yamane formula (Yamane, 1973). However, for the sake of equal allocation, it was increased to 385 farmers. The Taro Yamane formula is given as:

$n = \frac{N}{1+N(e^2)}$ $n = \frac{8060}{1+8060(0.05^2)}$ n = 381 famers

Where:
n= sample size, N= sample population and e = margin of error

Multi stage sampling procedure was used in the selection of the respondents. The first stage was the purposive sampling of seven (7) clans out of the twelve (12) clans in Emohua L.G.A. because of security concerns. The second stage was the simple random sampling of fifty-five (55) farmers across the seven clans (Emohua, Ndele, Elele Alimini, Ibaa/Obelle, Odegu, Ogbakiri, and Egbeda) respectively. The sample size of 381 farmers was increased to 385 farmers on the basis of equal allocation to avoid bias. However, out of the 385 questionnaire which were administered, 342 of them were retrieved and on this basis, 382 was adopted as the actual sample size of this study. Primary data was collected using well-structured questionnaire and interviews. The questionnaire was divided into sections to capture the specific objectives of the study.

Objectives (i) and (ii) were analyzed using descriptive statistics such as frequency count, mean and percentages. The mean score was employed in analyzing objectives (iii), (iv), (v), and (vi) through Likert scale rating technique. This study used the 4-point scale which involved: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1, as well as Very High Extent:4, High Extent:3, Low Extent:2, Very Low Extent: 1. The benchmark was 2.50 such that any mean score less than 2.50 was considered unfit/unimportant by the study.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

Result on the socio-economic characteristics of the farmers is presented in the Table 1.

Table 1: Distribution of the Respondents according to their Socio-economic Characteristics

Characteristics	Frequency	Percentage	Mean
GENDER			
Male	160	46.8	
Female	182	53.2	
Total	**342**	**100**	
AGE (Years)			
18 – 30	59	17.3	
31 – 43	116	33.9	42.9 years
44 – 56	104	30.4	
>56	63	18.4	
Total	**342**	**100**	
MARITAL STATUS			

Married	214	62.6	
Single	96	28.1	
Widowed	32	9.3	
Total	**342**	**100**	
HOUSEHOLD SIZE (Person)			
>2 – 4	95	27.8	
>5 – 7	143	41.8	
>8 – 10	79	23.1	6 persons
>10	25	7.3	
Total	**342**	**100**	
EDUCATIONAL ATTAINMENT			
No formal education	36	10.5	
Primary education	34	9.9	
Secondary education	198	57.9	
Tertiary education	74	21.6	
Total	**342**	**100**	
YEARS OF EXPERIENCE (Years)			
>1 – 4	49	14.3	
>5 – 8	55	16.1	
>9 – 12	73	21.3	10.6 years
>12	165	48.2	
Total	**342**	**100**	
MONTHLY INCOME (₦)			
10000 – 40000	123	36	
41000 – 80000	89	26	
81000 – 120000	69	20.2	₦70071.64
>120000	61	17.8	
Total	**342**	**100**	

Source: Field Survey, 2023

From Table 1, majority (53.2%) of the respondents were female while 46.8% of them were male. The implication is that men dominate agricultural production in the area. This finding agrees with that of Daud, Omotayo, Aremu and Omotoso (2018) in their study of the influence of infrastructure on the profitability of food crop production among rural farming households in Oyo State. The result further demonstrates that women are economically active and tend to play a role in supporting the economic wellbeing of their families (Ekine, Chukuigwe, Okidim, Chukuigwe, and Agbagwa, 2023). Entries on age show that the mean age of the farmers was 42.9 years. This means that the farmers were mainly middle aged. This finding is in agreement with that of Tauer (1994) in the study of age and farmer productivity where he found that the middle-aged farmers were 30 percent more productive than the youngest and oldest groups. Furthermore, 62.6% of the farmers in the area were married, 28.1% were single and 9.3% were widowed. This implies that since majority of the farmers were married, they perhaps shared their time between family and the farm

and in some sense, the quest to meet family obligations could serve as a force of motivation in their farming operations since it is a means of earning a living. The results also showed that mean household size of six (6) persons was recorded in the study area. This suggests that the study area was made up of farmers that mainly had large household size. Large household size can serve as a great source of farm labour which is predominantly manual in Nigeria and thus contribute to agricultural production in the community. Entreies on farmers' educational attainments showed that 10.5% of the farmers had no formal education; while about 9.9% of them attained only primary education. Also, 57.9% attended secondary education while only 21.6% of them attended tertiary institutions. This result suggests that with majority of the farmers being educated, the adoption of new farming technology and innovation will be quicker and less difficult to the farmers. Table 1 further shows that the mean years of experience and mean monthly income level were 10.6 years and ₦70071.64. The value of 10.6 years in the mean years of experience is impressive and it suggests that farmers in the study area are particularly knowledgeable about the intricacies of farming. Years of experience in agricultural production is handy in lowering risk suffered by farmers (Amadi-Robert, Chukuigwe, Agbagwa, and Uwem, 2023).

Types of Agricultural Enterprises Practiced

Table 2 shows summary statistics of the types of agricultural enterprises practiced by the respondents in the study area.

Table 2: Distribution of the Respondents according to the Types of Agricultural Enterprises Practiced in the Study Area

Farm Enterprise	Responses		Percent of Cases (total Cases = 342)
	Freq.	Percentage	
Poultry farming	66	7.40%	19.30%
Goat farming	69	7.80%	20.20%
Snail farming	14	1.60%	4.10%
Fish farming	92	10.30%	26.90%
Plantain farming	110	12.40%	32.20%
Cassava farming	237	26.60%	69.30%
Yam farming	121	13.60%	35.40%
Maize farming	138	15.50%	40.40%
Other	43	4.80%	12.60%
Total	**890**	**100.00%**	**260.20%**

NB Multiple response (i.e. respondents were allowed to choose one or more answers from the list)
Source: Field Survey, 2023

The results from Table 2 shows that the total response by the respondents was 890 and the total number of cases was 342. Furthermore, Table 2 indicates that majority of the respondents (26.6%) acknowledged cassava farming as the main type of agricultural enterprise carried out in the study

area. In second place was maize farming as it was acknowledged by 15.5% of the respondents; 13.6% engaged in yam farming, 12.4% engaged in plantain farming, 10.3% engaged in fish farming, 7.8% engaged in goat farming, 7.4% engaged in poultry farming, while 4.8% indicated their engagement in other agricultural enterprises. Only 1.6% engaged in snail farming. This implies that cassava farming is the most practiced agricultural enterprise in the study area and snail farming is the least practiced.

Types of Rural Infrastructures Available in the Study Area

Table 3 shows the summary statistics of rural infrastructure available in the study area using frequency and percentage distribution.

Table 3: Distribution of the Respondents according to the Types of Rural Infrastructures Available in the Study Area

Infrastructure	Responses		Percent of Cases
	Freq.	Percentage	(total Cases = 342)
Tarred Roads	221	15.60%	64.62%
Electricity	172	12.10%	50.30%
Pipe-borne water	259	18.30%	75.70%
Processing Facilities	61	4.30%	17.80%
Health Facilities	143	10.10%	41.80%
Educational Institutions	221	15.60%	64.62%
Bank services	81	5.70%	23.70%
Telecommunication	233	16.40%	68.10%
Other	26	1.80%	7.60%
Total	1417	100.00%	414.24%

Multiple response (i.e. respondents were allowed to choose one or more answers from the list)
Source: Field Survey, 2023

Table 3 shows the available types of rural infrastructure in the study area; such that, 15.6% of the respondents acknowledged tarred roads as a type of rural infrastructure available in the study area, 12.1% acknowledged electricity, 15.6% acknowledged educational facilities, 16.4% acknowledged telecommunication, and 10.1% acknowledged health facilities. More so, 1.8% indicated the availability of other rural infrastructures. While the majority (18.3%) acknowledged pipe-borne water, only few (5.7%) and (4.3%) acknowledged bank services and processing facilities respectively. This implies that the most available rural infrastructure in the study area is pipe-borne water while the least available are bank services and processing facilities. An implication of the lack of processing facilities results in a decrease in the agricultural value chain.

Level of Availability of Rural Infrastructures in the Study Area

Table 4 shows the summary statistics of the level of availability of rural infrastructure in the study area using the mean score, standard deviation, and remark.

Table 4: Level of Availability of Rural Infrastructures in the Study Area

Infrastructure	N	Mean	Std. Deviation	Remark
Tarred Roads	342	2.6404	0.89437	Highly available
Electricity	342	2.0205	1.01724	Poorly available
Pipe-borne water	342	2.7193	0.90786	Highly available
Processing Facilities	342	1.8772	0.75201	Poorly available
Health Facilities	342	2.0614	0.86596	Poorly available
Educational Institutions	342	2.5643	0.85638	Highly available
Bank services	342	1.8772	0.96696	Poorly available
Telecommunication	342	2.4035	0.83949	Poorly available

Criterion Mean: ≥ 2.50
Source: Field Survey, 2023

The result in Table 4 shows the level of availability of the ascertained available rural infrastructure in the study area. With the mean criterion of 2.50, tarred roads (2.64), pipe-borne water (2.71), and educational institutions (2.56) were perceived to be available in the study area, as the mean scores for these rural infrastructure were above the benchmark. On the other hand, electricity (2.02), processing facilities (1.87), health facilities (2.06), bank services (1.87), and telecommunication (2.40) were perceived to be poorly available or unavailable as the mean scores for these rural infrastructure were below the benchmark.

Perceived Effect of Rural Infrastructure on Agricultural Productivity

Table 5 shows summary statistics of the perceived effects of rural infrastructure on agricultural productivity using mean score analysis**.**

Table 5: Effect of Rural Infrastructure on Agricultural Productivity

Infrastructure	N	Mean	Std. Deviation	Remark
Tarred Roads	342	3.2982	0.87918	Agree
Electricity	342	3.4181	0.74882	Agree
Pipe-borne water	342	3.3012	0.74247	Agree
Processing Facilities	342	2.6550	1.01497	Agree
Health Facilities	342	2.7515	0.97155	Agree
Educational Institutions	342	2.5117	0.96486	Agree
Bank services	342	2.4912	1.11439	Disagree
Telecommunication	342	2.5614	1.04476	Agree

Source: Field Survey, 2023
Criterion Mean: ≥ 2.50

The results from table 5 showed the mean agreement of the respondents. With the mean criterion of ≥ 2.50, it was agreed that bank services have no significant effect on agricultural productivity,

given that it was the only variable with a mean score less than the 2.50 benchmark. The other variables; tarred roads (3.29), electricity (3.41), pipe-borne water (3.30), processing facilities (2.65), health facilities (2.75), educational institutions (2.51), and telecommunication (2.56) were agreed to have significant effect on agricultural productivity.

Constraints to Agricultural Production in the Study Area

The summary statistics of constraints to agricultural production in the study area are shown in table 6.

Table 6: Constraints to their Agricultural Production

Constraint	N	Mean	Std. Deviation	Remark
Inadequate infrastructure	342	3.4415	0.71501	Agree
Low technology	342	2.9152	0.97857	Agree
Climate change	342	2.2047	1.23449	Disagree
Limited finance	342	3.1520	0.85296	Agree
Lack of storage and processing facilities	342	2.2661	1.04557	Disagree
Poor access to market	342	2.7982	0.90790	Agree
Land tenure	342	2.8012	0.98743	Agree

Source: Field Survey, 2023

Farmers in the area were faced with some challenges which constrained agricultural production in the study area. However, the mean score of 2.50 and above was used as a decision rule, which implies that any challenge with mean value equal to or greater than 2.50 was considered a serious constraint in the study area. The results from table 6 revealed that inadequate infrastructure (3.44), low technology (2.91), limited finance (3.15), poor access to market (2.79), and land tenure (2.80) were agreed to be the major constraints to the agricultural productivity of farmers in the study area as they all had mean scores above the 2.50 benchmark respectively.

CONCLUSION AND RECOMMENDATION

The study concludes that rural infrastructure has perceived effect on agricultural production in the study area. Furthermore, in view of the findings from the study, the followings are recommended: In order to ensure increased agricultural productivity in the rural areas, more infrastructure should be sited in the rural areas; and the already existing infrastructure should be improved to standard as it has been shown to have significant effects on agricultural production. Processing facilities for agricultural products should be established in the rural areas as lack of these facilities inhibit the engagement in several areas of the agricultural value chain. Bank services should be made readily available in the rural areas to enable the ease of wide range sales of agricultural products and easy accessibility to credit as the inadequacy has been shown to be a major constraint to the productivity of farmers in these areas.

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