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IMPACT OF RURAL ROAD TRANSPORTATION INFRASTRUCTURE ON THE DISTRIBUTION OF AGRICULTURAL PRODUCE IN OSUN STATE FARM SETTLEMENTS

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ABSTRACT

Distribution of farm produce has been a major problem for rural farmers due to the lack of rural road infrastructural facilities. This study therefore sets out to examine the impact of rural road transportation infrastructure on the distribution of agricultural produce in Osun State farm settlements.

The purposive sampling method was used to select three hundred and eighty-five rural farmers from all the nine farm settlements in Osun State, while structured questionnaires were administered to the selected farmers. Factor analysis was used to evaluate the impact of rural road transportation infrastructure on distribution of agricultural produce.

Factor analysis revealed Kaiser-Meyer-Olkin measure of sampling adequacy = 0.792, $p = .000$ while four factors were extracted with a total variance of 66.346%. Furthermore, results from regression analysis using the factor scores generated from factor analysis as independent variables indicated that rural road transport infrastructure has significant effect on the distribution of agricultural produce in the studied area ($R = 0.793$; F -statistics = 147.888; $p < 0.05$) while all the four independent variables are significant with beta contributions of distance (14.6%), accessibility (11.8%), available means of transport (68.2%) while mode of transport ownership made the least significant contribution of 25.5% at $p < 0.05$.

The study concluded that rural road transport infrastructure has significant effect on the distribution activities of agricultural produce in the studied area. The study therefore recommended that the use of intermediate means of transportation should be encouraged in farm settlements.

KEYWORDS: Distribution, Rural roads, Farmers, Transport and Agricultural produce.

INTRODUCTION

The distribution of agricultural produce is an important factor for rural farmers as they require transportation to move their farm produce from the farms to the right place and at the right time. Distribution involves planning, implementing and controlling the physical flow of materials, final goods and related information from point of origin to point of consumption to meet customer requirements satisfactorily. According to Agbigbe (2016) distribution enhances place and time utility, that is, by moving goods from one place to another and by making the goods available for consumption when it is needed, thus adding place and time utility. Furthermore, movement of goods to the consumers in convenient shape, unit size and packaging adds convenience value. Hence, effective and efficient distribution system is particularly essential in moving perishable agricultural produce from point of production to the point of consumption due to the nature of the products (Oguzor, 2011).

In Nigeria, studies have shown that agricultural sector employs at least 80 percent of the rural area population. The smallholder sub-sector plays an important role in generating livelihood in the predominantly agro-based economy of the rural area. The agricultural sector also accounts for more than a third of gross domestic product and generates more than 90 percent of export earnings (Worku, 2011).

However, the development of agriculture depends on numerous supportive rural infrastructural facilities (Usman Adefila & Musa 2013). Rural transportation system serves communities outside urban areas. Rural transport is important for the evacuation and marketing of farm produce and the delivery of farm inputs and extension services. It also aids innovation diffusion, expand production and raise incomes (Olukotun, 2007). Efficient and effective rural transportation serves as one of the ways for the collection and exchange of goods and services, movement of people, sharing of information and the propagation of rural economy Adedeji, et al., and (2014). In any rural society, impact of rural road on the patronage of rural markets plays a pivotal and often a definitive role in determining the overall productivity and development of a rural economy as well as the standard of living of its populace (Fakayode et al., 2008). According to the African Development Bank, (2010) rural Africa has only 34% of road access covered as compared to 90% in the rest of the world. In the light of the above, this study takes a cursory look at the impact of the rural road infrastructure on the distribution of agricultural produce in farm settlements in Osun State, Nigeria.

STATEMENT OF THE HYPOTHESIS

H₀: Rural road transport infrastructure has no impact on agricultural produce distribution in the study area.

LITERATURE REVIEW

Transport infrastructure is of necessity for the development of any location particularly in accessing healthcare facilities and other human activities in space. Several researchers have discussed the

challenges facing the rural dwellers particularly in the area of spatial mobility, which is very crucial to the economic and social survival of any community or society. Annabel (2000) based on his research in Zambia states that transport infrastructures appear to be a significant concern for villagers. Manohar (1989) studies the roads and their socio-economic impact on the rural community and found that the road development has bestowed a package of benefits on the village people in agricultural sector. Furthermore, the study found that the development of road network has resulted in faster and more equitable distribution of marketing of products. Allied agricultural and non-agricultural activities have also started growing with expanding road communication. Small trade and business establishments have come up in some of the villages linked with roads. Manohar (1989) also observes that the rural road network generates a better access to facilities for schooling, health, banking and postal services to the rural people. Thus, there is a clear indication that the development of rural roads has become a necessity to accelerate socio-economic transformation of rural society (Kantharajappa, 1998).

Yagana et al., (2014) studied channels of distribution of agricultural produce in Nigeria and found out that perishability of farm produce sometimes compels farmers to make use of direct distribution channels and concluded that with the high risk involved in agricultural production in Nigeria, there is the need for the channels of distribution to buy produce from farmers at a rate that would compensate for their efforts and continue to keep them in business.

Somuyiwa et al., (2020) appraise the outbound logistic of rural farmers food products in Ekiti State with a view to examine distribution patterns and factors affecting transport cost of rural farmers. Thirteen (13) rural settlements from one hundred and seventy-one (171) identified rural settlements in Ekiti State and found out that the prominent rural farmers' modal choice was motor bike, distance between farm location and market, state of transport route, for farmers and mode of transport adopted by rural farmers' influenced transport cost. The study therefore concluded that the more rural settlements roads are neglected, farmers' cost of transportation will increase overtime. Thus, modal choice of farmers was affected the state of transport route.

Furthermore, Tunde and Adeniyi (2012) examined rural transport and marketing of agricultural produce. The study reveals that the use of van and lorry are preferred in transporting agricultural produce. Farmers' use different types of vehicles such as pick up and buses in the transportation of farm products. However, lack of motorable roads linking farm to market and rural to urban areas, high cost of transportation and the poor state of transportation facilities constrained transportation of agricultural produce and bad roads contributes to high costs of fare charged by transporters.

Afolabi et al., (2018) studied transportation factors in the distribution of agricultural produce to urban center in Nigeria. The findings reveal that roads in the study area are in deplorable condition and the type of vehicles used by farmers and traders depend on the volume of agricultural produce.



Olorunfemi (2020) conducts a study on rural road infrastructural challenges, An impediment to agricultural development in Idanre Local Government Area of Ondo State, Nigeria. The research make use of (200) farmers across 20 villages in the study area. Descriptive statistics was used to analyses information elicited from respondents, while inferential statistics (Step wise regression) was used to test postulated hypothesis. The study reveals that high cost of transportation, poor state of roads and irregular transportation services have hindered effective agricultural development. Thus, resulting to post harvest loss because of restrictive capacity of motorcycle which is the predominantly used means of transportation. The study recommended that construction and rehabilitation of dilapidated road infrastructure in order to enhance agricultural development.

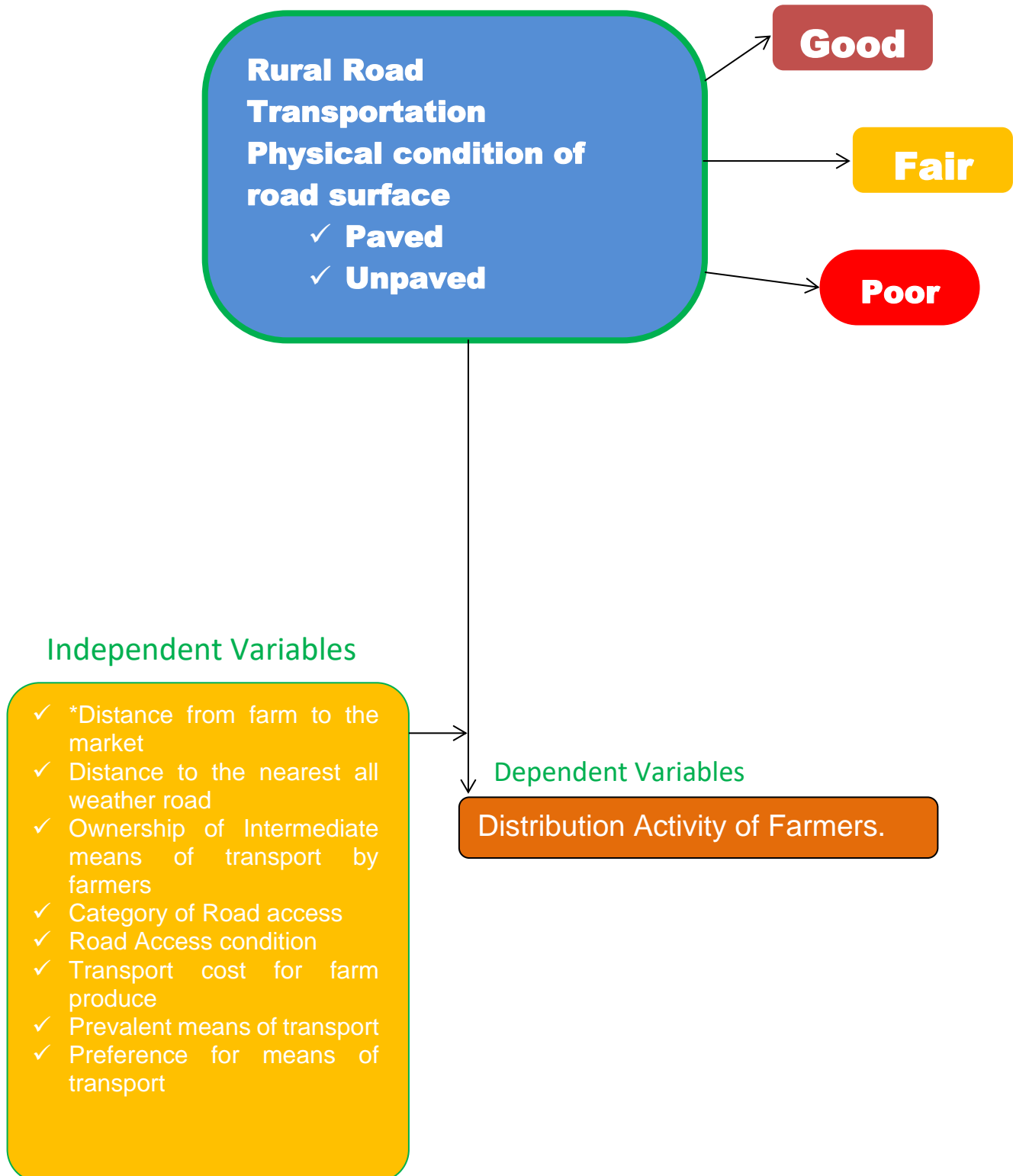


Figure 1: Conceptual Framework of the Impact of Rural Road Transportation on Distribution.
Source: Author’s Conceptualization (2024).

METHODOLOGY

The study was conducted in Osun State. Osun State is an inland State in South-Western, Nigeria. Its capital is located in Osogbo. Osun State consists of 30 Local Government Areas which covers a total of 3,572 square kilometres of land mass and a population of 3,423,535 according to the 2006 National Population Census. Random sampling was adopted to select the respondents for questionnaire administration. This technique was used in order for all the farmers to have equal chances of being selected. Therefore, a sample size of five hundred and five farmers was selected from the study population (See Table 1). This study adopted 1% sample size for the study. The 1% sampled is adequate for this study because the population is homogenous.

Table 1: Sample size determination

S/n	Name of Farm Settlements	Number of Questionnaires Administered	Number of Questionnaires Completed and Returned
1	Osogbo (Oke Osun)	76	41
2	Ago Owu	87	58
3	Oyere	73	56
4	Mokore	62	59
5	Ila	54	39
6	Esa-Oke	25	21
7	Akinleye (Iwo)	74	36
8	Igbaye	42	35
9	Ifon-Orolu.	12	9

Source: Author’s Field Survey (2024).

Both descriptive and inferential statistics were employed for the purpose of data analysis. Factor analysis was adopted to analyze the impact of rural road transport infrastructure on distribution activities of farmers in the study area.

RESULT AND DISCUSSION OF FINDINGS

Table 2 presented the impact of rural road transportation infrastructure on distribution activities of agricultural produce in the study area.

H₀1: Rural road transport infrastructure has no impact on agricultural produce distribution in the study area.

This hypothesis was analyzed using factor analysis to reduce the large number of variables into a smaller number of variables. Factors with high loadings are extracted. Thereafter factor scores were generated and were used in the multiple regression model. The golden rule is that if critical p-value is lower than the 0.05 level of significance then the null hypothesis is rejected and the alternative hypothesis is accepted. Since the critical p-value is $0.000 < 0.05$ then the null hypothesis that rural road transport infrastructure has no effect on the distribution activity of farmers in the study area is rejected while the alternative hypothesis that rural road transportation has effect on distribution of agricultural produce in the study area is accepted.

Consequently, the responses of the farmers to the 15 variables on rural road transport infrastructure and distribution activities in the study area were subjected to factor analysis. The principal component analysis method was used to extract the components and varimax (orthogonal) rotation of factors. As seen in Table 2 only the first four components displayed eigen values greater than 1 and the result of a scree test also suggested that only the first four components were meaningful for discussing factors that determine the impact of rural road transport infrastructure on distribution activities of farmers in the study area. Therefore, only the first four components were retained for rotation. The result of the analysis of the varimax rotated components is presented in Table 2. The 15 variables have been reduced to four components with the initial eigen value of between 1.122 and 5.342 were extracted with 66.346 percent of the total variance explained. Upon rotation, the first four factors were retained with eigen value between 1.387 and 5.202 and 66.346 percent of the total variance explained. The value of each item in the four factors produced exceeds the value of 0.4. In table 3, out of the 15 variables, 14 items load on the four factors and they have high loadings ranging from 0.464 – 0.938 as shown in table 4.15. Using the criteria, eight items were found to load on the first factor. It has an eigen value of 5.202 and contributes 34.677 percent of the total variance explained. The items are transport cost, condition of road access, number of intermediate means of transport, preference for means of transportation, road transport influence on timely delivery, rural road transport contribution to distribution activities, rural transport contribution to timely sales of agricultural produce and condition of access roads linking settlements. However, three items loaded on the second factor with an eigen value of 1.722 and contributes 11.487 percent of the total variance explained. The items are distance from settlements to farm, distance from financial institution and mostly means used of transportation. The third factor has two items loaded on it with an eigen value of 1.641 and contributes 10.940 percent of the total variance explained. The items are intermediate means of transport ownership and preference for intermediate

means of transport. Finally, the fourth factor has only one item loaded on it which is major means of transportation, with an eigen value of 1.387 and 9.248 percent of the total variance explained.

Table 2: Total Variance Explained of the Impact of Rural Road Transportation Infrastructure on Distribution Activities of Farmers in the Study Area.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.342	35.615	35.615	5.342	35.615	35.615	5.202	34.677	34.677
2	2.073	13.823	49.438	2.073	13.823	49.438	1.722	11.481	46.157
3	1.414	9.428	58.866	1.414	9.428	58.866	1.641	10.940	57.098
4	1.122	7.480	66.346	1.122	7.480	66.346	1.387	9.248	66.346
5	.986	6.570	72.916						
6	.788	5.254	78.170						
7	.767	5.113	83.283						
8	.634	4.228	87.511						
9	.591	3.940	91.451						
10	.417	2.781	94.231						
11	.339	2.263	96.494						
12	.261	1.739	98.233						
13	.141	.942	99.176						
14	.067	.448	99.623						
15	.057	.377	100.00						

Notes: Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .792, $\lambda = 3285.114$, Df = 105; Bartlett's test of sphericity = .000

Source: Author's Field Survey (2024).

Table 3: Rotated Component Matrix of the Variables of Rural Road Transportation Infrastructure and Distribution Activities of Farmers in the Study Area.

Variables	Component			
	1	2	3	4
Distance from settlement to farm. (DSF)		.614		
Transport cost from settlement to market (TCM).	.464			
Distance from all-weather road (DAWR).				
Condition of road access (CRAC).	.938			
Distance from financial institution (DFI).		.793		
Major means of transportation (MMT).				.847
Mostly used means of transportation (MUMT).		-.698		
Intermediate means of transport ownership (IMTO)			.862	
Number of intermediate means of transportation (NIMT).	-.602			
Preference for intermediate means of transport (PIMT).			.740	
Preference for means of transportation (PMT).	.631			
Road transport enhance timely delivery of produce (RTTD).	.923			
Rural road transport contribution to growth of farming activities (RRTC).	.882			
Rural transport enhances timely sales of farm produce (RRTS).	.902			
Condition of access roads linking settlements (CARL).	.880			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Source: Author’s Field Survey (2024).

Furthermore, the regression model in Table 4 was used to predict the effect or contribution of the four underlying factors (accessibility, distance, transport ownership and available means of transport). Table 4 shows the regression coefficients for rural road transport infrastructure and distribution activities. The result shows that all variables have positive influence on distribution activities. Distance with value of ($\beta = 1.464$) has the greatest impact on distribution activities of the farmers in Osun State. This is followed by accessibility ($\beta = 1.184$), available means of transport ($\beta = .682$) and transport ownership ($\beta = .255$) having the least impact. The R2 for this model indicate that 62.9 percent of the variation in distribution activities are explained by distance, accessibility, available means of transport and transport ownership (See Appendix III).

Hence, rural road transport infrastructure has a significant effect on distribution agricultural produce in the study area. This is in consonance with the earlier findings of Sileshi et al. (2017) where it was established that rural road transport infrastructure has significant impact on farmers’ agricultural productivity in Ethiopia.

Distance to the nearest all weather road influences farmers’ distribution of agricultural produce by the farmers as it enhances time and place utility. This is in line with the findings of Obayelu et al., (2014); Kasali et al. (2012) that distance to the nearest all weather road positively influence farmers distribution of farm produce in Kwara State, Nigeria.

Also, the findings further reveal that road accessibility condition enhances agricultural produce distribution. As the road access condition increases from gravel and earth road to asphalt laid road, the distribution efficiency of the farm produce increases thereby providing time and place utility which in turn also increases farmers income since they are able to get their produce to the market at the right place and at the right time. Thus, farmers will be unhindered in a bid to reach markets where their produce will be sold at better price. This finding is supported by the findings of Adedeji et al., (2014); Aderamo et al., (2010); Ashagidigbi, et al., (2011) which found out that good road quality is a positive attribute of transportation system.

Table 4: Coefficients of the Extent of Rural Road Transportation Infrastructure on Distribution Activities of Farmers in the Study Area.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	-2.450	.255		-9.618	.000
AC	-1.229	.131	-1.184	-9.363	.000
DI	2.310	.145	1.464	15.972	.000
TO	.188	.040	.255	4.741	.000
AV	.643	.050	.682	12.809	.000

Note: $R^2 = .629$, $F = 1858.727$; $df = 353$; $p = .000$

a. Dependent Variable: Distribution activities

Source: Author’s Field Survey (2024).

In the same vein, ownership of intermediate means of transport (IMTO) affects the distribution of agricultural produce. The more farmers use intermediate means of transportation, the higher the expected level of farm produce distribution of will be enhanced. Intermediate means of transportation complements the available motorized means of transportation, thus, enhancing distribution of agricultural produce in the study area over short distances. Furthermore, intermediate means of transport are appropriate for transporting small and medium agricultural produce instead of using human portorage. This is supported by the findings of World Bank (1988); Ojo and Afolabi (2003) which stated that farm distance to major infrastructure affects agricultural distribution performance of farmers.

Available means of transport especially motorized means of transportation has the capacity of enhancing distribution of farmers' produce and mobility level. Farm produce is produced mostly where they have low utility value because there is homogeneity of occupation in the rural area, that is, farmers are likely to produce closely related farm produce. Hence, this could lead to surplus. This surplus produce especially the perishable farm produce must be moved in a quick and timely manner to the market where they are to be sold. Motorized transport especially the ones with high carriage capacity such as trucks, pick up vans and lorries can move large quantities of produce, thereby enabling the produce to be at the right place and at the right time, reducing shortages that would have accrued from the perished produce which ought to have reached the market if transport means have been available. Furthermore, many farmers can come together to benefit from reduction of transport costs and maintenance of vehicle as a result of the usage of a single truck that can convey plenty farm produce at once to the market. This is in line with the findings of Akinola, (2003); Oyatoye, (1994) that ownership of viable means of transportation will serve as a catalyst for movement. Also, farmers that own means of transportation that have high carrying capacity tends to farm more as they will be able to sell their farm produce where they have high utility at better prices than farmers that sells their produce in very close by markets where it is possible to sell at lower prices as a result of surplus farm produce in markets close to source of production.



Plate 1: Showing washed off portion on the main road leading to Osogbo farm settlement.



Plate 2: Showing access road in Esa Oke farm settlements.



Plate 3 Showing earth road leading to Ifon Orolu farm settlements



Plate 4: Showing access road leading to Esa-Oke farm settlements.

CONCLUSION

This study has been able to examine the impact of rural road transport infrastructure on distribution activities of farmers in Osun State farm settlements.

The study was conducted in all the nine farm settlements in Osun State. Five hundred and five (505) copies of the questionnaire were randomly administered on the farmers in the farm settlements. The instrument for data collection was the questionnaire and the interview schedule.

Data generated were analyzed using both descriptive and inferential statistics.

Factor analysis was employed to reduce rural road transport variables. Fifteen variables were factorized out of which eight variables loaded into factor one, two variables loaded into factor three while one variable loaded into factor four in the bid to identify the extent to which rural road transportation infrastructure has influenced distribution activities.

The result from regression analysis shows that rural road transport infrastructure has a significant effect distribution activity of farmers in the study area, as indicated by $R = 0.793$, $R^2 = 0.629$, $F = 147.888$ and $p < 0.000$. Furthermore, four independent variables were significant. The distance to the nearest all weather road (DI) made the highest significant contribution of 14.6 %, Accessibility (AC) with a contribution of 11.8%, followed by Available Means of Transport (AV) with a significant contribution of 6.82% while Intermediate Means of Transport Ownership (IMTO) make the least significant contribution of 2.55%.

The study revealed that means of transport ownership, accessibility and distance to the nearest all weather roads have significant effect on distribution activities of farmers in the study area. It was recommended that the State government should ensure adequate provision of good roads in the study area and improve on the existing ones to enhance distribution of agricultural produce.

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