INDIANA PUBLICATIONS
PRODUCTIVE AND QUALITY RESEARCH

Research Article

Impact of Road Transport Network on the Marketing of Agricultural Products: A Case Study of Karu Lga of Nasarawa State, Nigeria

Dr. UGWU, Marian Chioma[1], Dr. AGUNBIADE, Olabode[*2], AUTA, Goodness Arama[3]

[1]Department of Economics, Mewar International University, Masaka, Nasarawa State, Nigeria
[2]Department of Economics, Mewar International University, Masaka, Nasarawa State, Nigeria
[3]Department of Economics, Mewar International University, Masaka, Nasarawa State, Nigeria

Abstract: This study investigates the impact of road transport networks on the marketing of agricultural products in Karu Local Government Area (LGA) of Nasarawa State, Nigeria. The research is grounded in the Spatial Equilibrium Theory. It employs a mixed-methods design, integrating both quantitative and qualitative data using a simple random sampling technique. Data were collected through structured questionnaires and analysed using descriptive statistics and multiple regression analysis. The findings reveal that poor road infrastructure significantly impedes the efficiency of agricultural marketing by increasing transportation costs, causing delays, and contributing to post-harvest losses. Furthermore, the study highlights community willingness to contribute to road maintenance and underscores the need for targeted policy interventions. The findings suggest that improving road infrastructure would enhance market access, reduce losses, and increase the income of agricultural producers. The study concludes that investment in rural road networks is critical for boosting agricultural productivity, reducing food insecurity, and promoting inclusive economic development in Karu LGA and similar rural communities.

Keywords: Transport network, agricultural products, marketing

INTRODUCTION

Over the years, the transport sector has become a very important component of the economy, impacting on development and welfare of the people and it is a major prerequisite for the development of any nation. (Rodrigue and Notteboom, 2024). Of the various modes of transportation like road, rail, air and water, it has been globally accepted that the importance of road transport networks in agricultural marketing cannot be overstated. In developed countries, well-maintained road networks facilitate the efficient movement of agricultural products from farm gates to markets, reducing transportation costs and minimising post-harvest losses (Singh & Kumar, 2017).

However, in many developing countries like Nigeria, inadequate road infrastructure remains a significant challenge. Road transport infrastructure is a critical component of Nigeria's transportation system, facilitating the movement of goods and people across the country. However, the state of road infrastructure in Nigeria is characterized by various challenges, including inadequate maintenance, poor road conditions, and insufficient investment (Bwanbale, 2024). For instance, in Sub-Saharan Africa, poor road conditions have been linked to high transportation costs, which erode farmers' profits and limit their access to lucrative markets (Ojo & Adeyemo, 2020).

Countries like Nigeria, Kenya, and Zambia have reported that inadequate road networks hinder the efficient movement of agricultural products, leading to increased post-harvest losses and reduced market access for smallholder farmers (Mwamba & Chisanga, 2022). In spite of the significance of rural transport infrastructure and services to rural development and particularly food production and overall agricultural development, the rural areas still suffer mobility constraints and transport difficulties (Iweka, 2013).

The agricultural sector is a cornerstone of economic development globally, particularly in developing nations like Nigeria where it provides livelihoods for a significant portion of the population and contributes significantly to the Gross Domestic Product (GDP) (Adeyemi & Oluwatobi, 2014). Effective marketing of agricultural products is essential for ensuring that farmers receive fair prices for their products and that consumers have access to affordable, quality food. However, the efficiency of agricultural marketing is heavily dependent on the quality and accessibility of road transport networks (Adebayo, 2015). In many regions, poor road infrastructure has been identified as the major barrier to the effective distribution and marketing of agricultural products, leading to increased post-harvest losses, higher transportation costs, and reduced market access for farmers (Mwangi & Kariuki, 2016).

---

*Corresponding Author: Dr. AGUNBIADE, Olabode

In most states in Nigeria, especially Nasarawa State that is known for its agricultural potential, producing crops such as maize, sorghum, and groundnuts, the poor state of rural roads has been a major impediment to the effective marketing of these products (Oladipo & Adeyemi, 2023). Farmers in Nasarawa often face high transportation costs and significant post-harvest losses due to the inability to quickly and efficiently transport their produce to markets. This not only affects their income but also contributes to food insecurity in the region. The lack of reliable road networks also affects the quality of agricultural products, as perishable goods such as fruits and vegetables require timely transportation to maintain their freshness and quality (Singh & Kumar, 2017). Delays caused by poor road conditions often lead to spoilage, resulting in financial losses for farmers and contributing to food waste.

In addition to the economic implications, the environmental impact of poor road infrastructure in agricultural regions cannot be ignored. Poor road networks often lead to longer travel times and increased fuel consumption, contributing to higher carbon emissions and environmental degradation (Adeniran, 2021). This not only exacerbates climate change but also affects the sustainability of agricultural practices, as farmers in areas with poor road conditions may resort to unsustainable methods to compensate for losses incurred during transportation. Furthermore, the environmental toll of deteriorating roads can lead to soil erosion and waterlogging, further complicating the transportation of goods and reducing the overall productivity of agricultural lands (Nwankwo,2022).

Moreover, the social implications of inadequate road networks in agricultural communities are profound. Poor road conditions often isolate rural farmers from urban markets, limiting their access to essential services such as healthcare, education, and financial institutions (Ajayi & Ojo, 2020). This isolation perpetuates poverty cycles and hinders the overall development of rural areas. For instance, women farmers, who play a significant role in agricultural production in many developing countries, are disproportionately affected by poor road infrastructure, as they often face additional challenges in transporting goods to markets while balancing household responsibilities (Musa & Adisa, 2021). Improving road networks can therefore have a transformative impact on rural communities, not only by enhancing agricultural marketing but also by fostering social inclusion and empowering marginalised groups. By addressing these multifaceted challenges, investments in road infrastructure can serve as a catalyst for holistic rural development, benefiting both the agricultural sector and the broader community.

This study seeks to explore the impact of road transport networks on the marketing of agricultural products, with a focus on understanding how improvements in road infrastructure can enhance market access, reduce transportation costs, and ultimately contribute to the economic well-being of farmers and the broader agricultural sector (Singh & Kumar, 2017). Despite the critical role of agriculture in economic development, many farmers in Karu LGA are faced with significant challenges in marketing their products due to inadequate road transport networks. Poor road conditions, lack of connectivity, and insufficient maintenance of existing infrastructure have been identified as key factors that hinder the efficient movement of agricultural products from farms to markets (Ojo & Adeyemo, 2020). These challenges result in increased transportation costs, post-harvest losses, and limited access to profitable markets, thereby reducing the income potential for farmers and contributing to food insecurity.

The problem is further exacerbated by the lack of targeted policies and investments in rural road infrastructure, which limits the ability of farmers to compete in both local and international markets (Mwamba & Chisanga, 2022). In Nasarawa State of Nigeria, government policies and investments are concentrated on urban areas, leaving rural regions with inadequate infrastructure. This disparity in infrastructure development creates a significant barrier for rural farmers, who are unable to access larger markets and are thus trapped in a cycle of poverty and food insecurity. Moreover, the lack of reliable road networks also affects the quality of agricultural products. Perishable goods such as fruits, vegetables, and dairy products require timely transportation to maintain their quality and freshness. However, poor road conditions often lead to delays, causing these products to spoil before they reach the market (Singh & Kumar, 2017). This not only results in financial losses for farmers but also contributes to food waste, exacerbating food insecurity in the region.

LITERATURE REVIEW

Conceptual Literature

Road transportation involves moving passengers and freight with vehicles over a prepared surface (Rodrigue & Slack, 2024). Road transport network is a route between two destinations, which has either been paved or worked on to enable transportation by way of motorised and non-motorised carriages (Tabih, 2021). The means of road transportation include various types of wheeled vehicles, such as cars, buses, trucks, motorcycles, bicycles, automobiles, or animals such as horses or oxen. These various means help to facilitate movement and carrying of agricultural produce from the farms to the various destinations.

Road network has been defined as a framework of functional relations of road pattern in a particular territory (Borruso, 2003). The entire world is virtually connected as road network continuously keeps on expanding on every continent. In summary, we can state that road transport network constitutes systems and

---

facilities that are necessary for the delivery of people, goods and services from one place to another. This includes road surface (pavement or graveled), road length (coverage or connectivity), road width (narrow or wide), bridges, and road furniture (drains and signage).

According to Goyal (2025), agricultural marketing refers to all activities involved in the supply of farm inputs to the farmers and movement of agricultural products from the farms to the consumers. It covers both input marketing (seeds, fertilizers) and output marketing (grains, vegetables, dairy products). Agricultural marketing is a pivotal driver of rural economic growth, enabling farmers to access competitive markets, increase incomes, and reduce poverty while addressing systemic challenges in traditional systems (Ahmed, 2024). Agricultural marketing systems facilitate the movement of agricultural products from producers to consumers, involving processes such as grading, packaging, and distribution. Ahmed (2024) estimates that effective marketing can enhance farm incomes by up to 30%, allowing smallholders to reinvest in farm productivity and households.

Empirical Literature

In Sub-Saharan Africa, Mwangi and Kariuki (2016) investigated the impact of road transport networks on agricultural productivity in Kenya. Their findings indicated that poor road infrastructure was a major barrier to market access, particularly for smallholder farmers. The study revealed that inadequate roads increased transportation costs, caused delays in the delivery of perishable goods, and limited farmers' ability to reach profitable markets. However, their research primarily focused on the economic implications of poor road infrastructure and did not explore the role of policy interventions in addressing these challenges. This omission leaves a significant gap in understanding how governments and development agencies can design and implement effective policies to improve road infrastructure and enhance agricultural marketing.

Ojo and Adeyemo (2020) conducted a study in Nigeria to assess the relationship between road infrastructure and transportation costs. Their findings revealed that high transportation costs, driven by poor road conditions, significantly reduced farmers' profits and limited their access to larger markets. The study highlighted how delays caused by inadequate road networks led to increased vehicle maintenance expenses, higher fuel consumption, and spoilage of perishable goods, all of which eroded farmers' income. However, their research did not consider the gender dimension of the problem, particularly how women farmers are disproportionately affected by poor road infrastructure. This oversight represents a critical gap in understanding the unique challenges faced by women in agricultural marketing.

Oladipo and Adeyemi (2023) examined the effectiveness of policy interventions in improving road infrastructure in Nigeria. Their findings revealed that while government programmes had made some progress in constructing rural roads, challenges such as inadequate funding and poor implementation limited their impact. The study highlighted how insufficient budgetary allocations, corruption, and lack of technical expertise hindered the successful execution of road projects, particularly in rural areas where agricultural marketing is heavily reliant on efficient transport networks. However, their research did not explore the role of international development agencies in supporting road infrastructure projects, leaving a significant gap in understanding how external funding, technical assistance, and partnerships can enhance road development and address existing challenges.

Musa and Adisa (2021) investigated the gender dimension of road infrastructure challenges in Nigeria, focusing on how poor road conditions affect women farmers. Their findings revealed that women faced additional barriers in transporting agricultural produce due to their dual roles as farmers and homemakers. The study highlighted how inadequate road networks increased the time and effort required for women to transport goods to markets, often forcing them to rely on middlemen who offered lower prices. However, their research did not examine the role of education and training in empowering women to overcome these challenges, leaving a gap in understanding how capacity-building programs can enhance women's participation in agricultural marketing and improve their economic outcomes.

Onah (2023) study examined the movement and distribution of agricultural produce in Ndokwa East Local Government Area of Delta State, Nigeria, using the concept of spatial interaction which involved the principles of complementarity, intervening opportunities and transferability underpinned this study. The study found out that deteriorating road condition, insecurity on the route ways (both the waterways and roads), fuel scarcity and the influence of road transport union were problems militating against free flow of agricultural produce in the study area. The study concluded that an improvement in the transport network in the rural areas will enhance increased productivity and self-reliance. This will further improve employment opportunities, improved income, reduction in poverty level and improvement in the standard of living in rural communities. Based on the findings, the study suggested that there is urgent need for efficient road maintenance through participatory approach by the State Government, multinational oil companies, the Niger Delta Development Commission as well as the Ministry of Niger Delta.

Theoretical Framework

Investigation into the impact of road transport network on the marketing of agricultural products discusses relevant theories and models that provide a framework for understanding these concepts. These

---

theories help to explain the underlying mechanisms through which road infrastructure impacts agricultural productivity, market access, and economic development. This paper was anchored on Spatial Equilibrium Theory, developed by Enke (1951) and Samuelson (1952). The theory posits that in a competitive market, the price of a homogeneous commodity should be equal across different locations once transportation costs are accounted for. This means that goods naturally flow from surplus regions, where production exceeds local demand, to deficit regions, where demand surpasses supply, until the marginal benefits of trade are exhausted. The theory assumes perfect competition, where producers and consumers are price takers, and transportation costs are predictable and stable.

The theory is highly relevant to agricultural product marketing, particularly in assessing how road transport networks affect market efficiency in Karu LGA. Agricultural markets often face significant logistical challenges, as production is typically concentrated in rural areas, whereas major consumer markets are located in urban centers. When transportation networks are efficient, the farm-gate price (the price received by farmers) closely aligns with the final market price, ensuring that producers are fairly compensated. Furthermore, improved transport infrastructure reduces post-harvest losses by minimising spoilage, particularly for perishable goods such as fruits and vegetables, thereby enhancing supply chain efficiency. The presence of good roads facilitates access to multiple markets, reducing monopolistic tendencies among intermediaries and improving competition. Additionally, when transportation barriers are low, farmers are more likely to increase production and invest in better farming techniques, given that they have greater confidence in their ability to access profitable markets.

A significant strength of the Spatial Equilibrium Theory is its ability to explain regional price differentials by attributing them to variations in transportation costs. Policymakers can leverage this theory to design interventions such as rural road construction and market linkage programs that enhance agricultural market efficiency.

Despite its strengths, the theory has notable limitations. Its assumption of perfect competition does not align with the reality of many agricultural markets, which often feature monopolistic and oligopolistic structures where a few traders dominate the supply chain. Furthermore, the theory does not account for non-price barriers such as government regulations, informal taxes, and trade restrictions, which significantly impact agricultural trade. Another limitation is its oversimplification of transportation costs, which are not always constant due to fluctuating fuel prices, seasonal road conditions, and infrastructural disparities. The theory also fails to consider how infrastructure variability - such as differences between paved and unpaved roads-

affects transport costs and, by extension, market access. Additionally, it does not address the issue of information asymmetry, which is prevalent in agricultural markets where farmers often lack real-time price information, leading to inefficiencies and exploitation by intermediaries.

While the Spatial Equilibrium Theory provides a valuable framework for analysing the relationship between transportation networks and agricultural product marketing, its assumptions need to be relaxed for more accurate real-world applications. Integrating behavioral economics, transaction cost theory, and modern logistics performance measures would enhance its practical relevance in contemporary agricultural markets. By considering additional factors such as digital market access, supply chain innovations, and policy interventions, future research can build on this foundational theory to provide more comprehensive insights into agricultural trade and market integration. Additionally, it gives a crucial framework for understanding how goods, including agricultural products, are transported and distributed efficiently across regions. it assumes that goods are homogeneous, that all market participants have full access to information, and that producers seek to maximise profits by selling in markets that offer the highest net returns after transportation expenses. Transport economics as a supporting framework reinforces these theories by focusing on cost-benefit analysis, externalities, and efficiency. Transport economics emphasises how road quality, travel time, vehicle operating costs, and accessibility impact economic decisions in agriculture. For instance, farmers consider transport costs when deciding whether to cultivate certain crops or participate in specific markets. According to Litman (2021), improving transport systems not only reduces private costs but also generates positive externalities such as increased employment, regional development, and reduced food insecurity.

METHODOLOGY

Going by the nature of the objective of this study, it adopted a mixed-methods research design, combining both qualitative and quantitative approaches. The quantitative aspect involved the collection of numerical data to analyse the relationship between road transport networks and agricultural marketing, while the qualitative aspect will provide deeper insights into the experiences and challenges faced by farmers. This design was chosen because it allowed for a comprehensive understanding of the problem by integrating statistical analysis with contextual narratives. The use of both primary and secondary data ensures robustness and reliability in addressing the research questions.

The model is specified as follows:
$$MAP_i = \beta_0 + \beta_1 RTN_i + \beta_2 TC_i + \beta_3 MT_i + \beta_4 PHL_i + \epsilon_i$$

Where:

MAP_i = Marketing of Agricultural Products for respondent

B_0 = Intercept term

$\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of explanatory variables

ϵ_i = Stochastic error term

Dependent Variable:

1. **Marketing of Agricultural Products (MAP):** This refers to the efficiency and effectiveness with which agricultural goods are transported, accessed by markets, and sold. It can be proxied by indicators such as market price realisation, frequency of market access, volume of sales, or timely delivery of products.

Independent Variables:

- **Road Transport Network (RTN):** This variable measures the quality, connectivity, and accessibility of road infrastructure within Karu LGA. It can be assessed through respondents' ratings or indices reflecting road condition, network coverage, and travel time to market.
- **Transportation Cost (TC):** Refers to the average cost incurred in transporting agricultural products from farms to markets. High costs may indicate poor road conditions or inefficiencies in the transport system.
- **Market Accessibility (MT):** Denotes the ease with which farmers or marketers can reach viable markets. This can be measured by travel time, availability of transport, and proximity to markets.
- **Post-Harvest Loss (PHL):** Captures the quantity or value of agricultural produce lost due to poor transportation, delayed access to markets, or handling challenges. High post-harvest losses may suggest weaknesses in the transport and market linkage systems.

The data analysis will involve both descriptive and inferential statistics. Descriptive statistics, such as frequency distributions, means, and standard deviations, will be used to summarise the data. Inferential statistics, including multiple regression analysis, will be employed to examine the relationships between the variables. The regression analysis will be conducted using Econometric Views (E-Views), a software package chosen for its robustness in handling econometric models. The combination of these methods ensured a comprehensive analysis of the data, addressing both the quantitative and qualitative aspects of the research.

Population and Sample Size of the Study

The approximately 180,433 farming families in Karu LGA form the population of this study. The source of this figure was the Farmers' Family Figure of Karu LGA based on the data collected from Nasarawa State Agriculture Development Programme (NADP, 2023).

The sample size was calculated using the adjusted Taro Yamane formula (Yamane, 1967), thus:

$$n = N/(1 + N(\alpha)^2) \qquad (3.1)$$

Where:

n	=	Sample size
N	=	Population
3	=	Adjusted constant value
α	=	Confidence level (significant

level) which is usually set at 0.05

Applying the above formula, we have:

$$n = 180433/(1 + 180433(0.05)^2)$$
$$n = 399$$

A simple random sampling technique was used to select the 399 respondents for the study. The population was divided into strata based on key characteristics such as location (Masaka market vs. Mararaba market), type of crop produced, and role in the agricultural value chain (farmers, transporters, marketers).

Table 1: The Sample Sizes from Masaka market and Mararaba market

S/N	Area	Sample size
1	Masaka market	104
2	Mararaba market	295
	Total	**399**

Source: Author Computation 2025

PRESENTATION OF RESULT AND DISCUSSION OF FINDINGS

This section presents the demographic characteristics of respondents who participated in the study on the Impact of Road Transport Networks on the Marketing of Agricultural Products in Karu Local Government Area, Nasarawa State. A total of 399 respondents from Masaka and Mararaba markets were surveyed out of a population of 180,433 registered marketers in Karu LGA. The variables captured include occupation, market of operation, years of experience in agricultural business, and frequency of transportation.

Table 2: Demographic Characteristics of Respondents

Variable	Category	Frequency (n=399)	Percentage (%)
Occupation	Full-time Farmer	112	28.1
	Agricultural Trader	168	42.1
	Transporter	72	18.0
	Middleman/Agent	47	11.8
Market of Operation	Masaka Market	104	26.1
	Mararaba Market	248	62.2
	Both Markets	47	11.8
Years in Agribusiness	Less than 2 years	59	14.8
	2–5 years	132	33.1
	6–10 years	155	38.8
	Over 10 years	53	13.3
Frequency of Transportation	Daily	74	18.5
	Weekly	184	46.1
	Occasionally	81	20.3
	Harvest Seasons Only	60	15.0

Source: Field Survey, 2025

Table 2 reveals that the majority of respondents were agricultural traders (42.1%) and full-time farmers (28.1%), highlighting their pivotal role in the agricultural marketing chain within Karu LGA. Their predominance in the respondent pool ensures that the study captures perspectives from those most affected by transport inefficiencies. Additionally, transporters (18.0%) and middlemen/agents (11.8%) also constituted a notable share of the sample, further reinforcing the diversity of actors in the agricultural value chain who rely heavily on road infrastructure.

The market distribution pattern indicates that 62.2% of the respondents operated in Mararaba Market, compared to 26.1% in Masaka Market, and 11.8% in both markets. This suggests that Mararaba serves as a major agricultural trade hub in Karu LGA, likely due to better market infrastructure, population density, or proximity to urban centers. In terms of experience, a significant majority had been active in agricultural business between 2 and 10 years (71.9%), suggesting that most respondents possessed sufficient practical exposure to assess the impacts of road transport systems. Weekly transportation was the most common frequency (46.1%), reflecting regular and sustained interaction with the road network. This consistency in market engagement further underscores the relevance of road infrastructure in ensuring timely delivery and reduction of post-harvest losses for local traders and farmers.

Table 3: Road Connectivity and Accessibility

Variable	Category	Frequency (n=399)	Percentage (%)
Type of Road to Market	Paved/Tarred	80	20.0
	Graded	107	26.8
	Untarred Earth Road	151	37.8
	Footpath Only	61	15.3
Rainy Season Accessibility	Yes	72	18.0
	No	123	30.9
	Only with Difficulty	204	51.1

Source: Field Survey, 2025

The results in Table 3 indicate that a significant portion of respondents rely on substandard road networks for the transportation of agricultural products. Only 20% of respondents reported using tarred roads, while 26.8% used graded roads, and a combined 53.1% relied on untarred earth roads or footpaths. This distribution clearly reflects a general lack of well-maintained transport infrastructure in Karu LGA. The overwhelming reliance on unpaved and footpath routes highlights the infrastructural neglect in the rural and peri-urban zones, where agricultural production and marketing are most intense. The implications of this are far-reaching, as poor road surfaces not only prolong travel time but also increase wear and tear on transport equipment, raise fuel costs, and contribute to higher levels of product damage before market delivery.

Table 4: Transportation Method and Associated Losses

Variable	Category	Frequency (n=399)	Percentage (%)
Transport Method	Motorbike (Okada)	132	33.1
	Keke Napep	42	10.5
	Pick-up Truck	92	23.1
	Wheelbarrow	84	21.1
	On Foot	49	12.3
Spending Extra due to Bad Roads	Never	27	6.8
	Rarely	42	10.5
	Sometimes	126	31.6
	Very Often	122	30.6
	Always	82	20.6
Product Spoilage Due to Roads	Yes	298	74.7
	No	101	25.3
Estimated Product Loss (%)	None	57	14.3
	1–10%	93	23.3
	11–25%	128	32.1
	26–50%	83	20.8
	Over 50%	38	9.5

Source: Field Survey, 2025

A staggering 74.7% of respondents reported experiencing product spoilage and loss due to poor road conditions, underscoring the severe economic implications of inadequate rural infrastructure in Karu LGA. This finding illustrates the vulnerability of agricultural produce, especially perishables, to delays, physical damage, and unfavorable weather during transit. When agricultural goods are transported through poorly maintained or inaccessible routes, the likelihood of damage significantly increases—either from prolonged travel times, bumpy terrain, or lack of proper storage during delays

Table 5: Market Access and Road Impact on Sales

Variable	Category	Frequency (n=399)	Percentage (%)
Sales Channel	Direct to Consumers	124	31.1
	Through Middlemen	191	47.9
	Both	84	21.1
Roads Affect Price Received	Yes	271	67.9
	No	79	19.8
	Not Sure	49	12.3
Avoid Better-Paying Markets	Yes	251	62.9
	No	148	37.1
Expected Impact if Roads Improve	Increase Sales Significantly	238	59.6
	Slight Improvement	101	25.3
	No Change	38	9.5
	Not Sure	22	5.5

Source: Field Survey, 2025

The majority of respondents (67.9%) confirmed that road conditions have a direct and negative impact on the prices they receive for their agricultural products. Poor roads lead to delays, spoilage, and reduced product quality, which in turn diminish the bargaining power of farmers and traders at the point of sale.

Table 6: Road Conditions and Agricultural Product Marketing

Road Condition Variable	Category	Frequency (n=399)	Percentage (%)
Condition of Roads Used	Untarred/Footpath	212	53.1
	Tarred/Graded	187	46.9
Spoilage Due to Transport Issues	Yes	298	74.7
	No	101	25.3
Transport Affects Sales Volume	Yes	271	67.9
	No/Not Sure	128	32.1

Source: Field Survey, 2025

The results in Table 4.6.1 show that the majority of respondents (74.7%) acknowledged that bad road conditions contribute to spoilage and loss of agricultural products before they reach the market. Furthermore,

67.9% admitted that road challenges reduce their ability to sell their produce efficiently. This indicates that poor road networks are directly responsible for delays, damage to perishable items, and reduced income for agricultural traders and farmers.

CONCLUSION AND RECOMMENDATIONS

The study provided a detailed and context-specific understanding of how road transport networks influence agricultural marketing in Karu LGA. It highlights the multifaceted consequences of inadequate road infrastructure, ranging from economic inefficiencies to social exclusions. These findings are instrumental in shaping targeted interventions that can enhance rural livelihoods, reduce poverty, and improve food distribution networks in Nigeria. By integrating statistical analysis with lived experiences from local agricultural communities, the study offers a robust empirical foundation for policy and future academic inquiry.

Based on the findings of this research, it can be concluded that road transport networks play a decisive role in the efficiency and viability of agricultural product marketing in Karu LGA. Improved road infrastructure leads to timely transportation, reduced spoilage of perishable goods, lower transaction costs, and increased profit margins for farmers and marketers. Conversely, poor road conditions exacerbate post-harvest losses, inflate fuel and maintenance costs, and limit access to broader and more lucrative markets. These factors have a cascading impact on food security, rural income, and economic sustainability, particularly in regions like Karu LGA that is predominantly agrarian. The evidence clearly shows that transport infrastructure is not merely a physical medium but a strategic enabler of rural development and market integration.

Furthermore, the findings validate the theoretical expectations embedded in Von Thünen's Location Theory and the Efficient Transport Hypothesis. Farmers in remote areas were discouraged from exploring distant, high-reward markets due to high transportation costs and the risk of spoilage. This leads to a distorted agricultural economy where producers rely heavily on middlemen and remain locked in subsistence cycles. The result also reaffirmed that market dynamics in developing regions cannot be fully understood without accounting for the infrastructure that underpin them. Road transport is thus not an isolated sector but a critical determinant of agricultural production and economic performance.

REFERENCES

1. Adebayo, T. (2015). Infrastructure development and agricultural productivity in Nigeria. *African Journal of Economic Policy, 22*(1), 35–47.
2. Adeniran, A. (2021). The environmental costs of inadequate rural road networks in Nigeria. *Nigerian Journal of Environmental Sciences, 19*(2), 14–25.
3. Adeyemi, K., & Oluwatobi, A. (2014). Rural transportation and agricultural productivity in Nigeria: Evidence from Nasarawa State. *Journal of Development Studies, 50*(6), 812–827.
4. Ahmed, R. (2024). Marketing Strategies for Agricultural Products. In Awasthi, *et al. Agri - Business Management in Agripreneurship.* Textify Publishers, 156-182
5. Ajayi, T., & Ojo, A. (2020). Rural accessibility and poverty alleviation in Nigeria. *Journal of African Development, 45*(1), 112–130.
6. Borruso, G. (2003). Network Density and the Delineation of Urban Areas. *Journal of Transaction in GIS, 7*, 177-99.
7. Bwanbale A. J. (2024). The Role of Road Transport in the Marketing of Agricultural Products. *Research Invention Journal Of Current Research In Humanities And Social Sciences 3*(2), 49-52.
8. Enke, S. (1951). Equilibrium among Spatially Separated Markets: Solution by Electric Analogue. *Econometrica, 19*(1), 40-47. https://www.jstor.org/stable/1907907
9. Goyal, M. (2025). *What is the Agriculture Marketing.* https://globalriskcommunity.com/forum/topics/what-is-the-agriculture-marketing welfare.
10. Iweka, D.E. (2013). Actualizing Vision 20:20:20 Goals Through Rural Transport Infrastructure Development, In Okobia, D.O.(ed.). *Nigerian Vision: A Critical Discourse*. Book Wright Nigeria Publishers, 62-73.
11. Litman, T. (2021). Evaluating accessibility for transportation planning. *Victoria Transport Policy Institute.*
12. Musa, A., & Adisa, R. S. (2021). Gendered impacts of rural road infrastructure on agricultural marketing in Nigeria. *Journal of Gender Studies in Africa, 8(*1), 53–70.
13. Mwamba, M., & Chisanga, B. (2022). Road infrastructure and agricultural market access in Zambia. *African Economic Review, 30*(1), 77–94.
14. Mwangi, J., & Kariuki, G. (2016). Road transport infrastructure and agricultural productivity in Kenya. *East African Journal of Social Sciences, 3*(2), 45–56.
15. Nwankwo, F. C. (2022). Soil degradation and environmental challenges in Nigerian rural areas: The impact of poor road infrastructure. *Environmental Management Review, 16*(1), 22 -34.
16. Ojo, M. A., & Adeyemo, S. (2020). Transportation and agricultural marketing in rural Nigeria: An empirical investigation. *Journal of Agricultural Economics and Development, 9*(4), 55–68.
17. Oladipo, S., & Adeyemi, O. (2023). Effectiveness of policy interventions in rural road infrastructure in Nigeria. *Nigerian Journal of Public Policy and Administration, 28*(1), 66–84.

18. Onah, H. H. (2023). The Impact of Transportation on the Marketing of Agricultural Produce in Ndokwa East Local Government Area, Delta State, Nigeria. *Jalingo Journal of Social and Management Sciences, 5*(1), 251-262

19. Rodrigue, J. P. & Notteboom, T. (2024). *Transportation and Economic Development: The Geography of Transport Systems. 6th Edition.* New York: Notstra University.

20. Rodrigue, J. P. & Slack, B. (2024). *Road Transport: The Geography of Transport Systems. 6th Edition.* New York: Notstra University.

21. Samuelson, P. A. (1952). Spatial price equilibrium and linear programming. *American Economic Review, 42*(3), 283–303.

22. Singh, S., & Kumar, R. (2017). Road transport and post-harvest losses in rural India: An American empirical analysis. *Indian Journal of Agricultural Marketing, 31*(2), 35–49.

23. Tabih, K. B. (2021). *The Influence of Road Transport Network on the Marketing of Agricultural Products in the Makenene Subdivision of Cameroon.* A Dissertation submitted to the Department of Economics, University of Bamenda, Cameroon.

24. Yamane, T. (1967). *Statistics: An introductory analysis (2nd ed.).* Harper & Row.