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Impact of Road Network on the Marketability of Agricultural Produce

Onajite Ezewu
Department of Agricultural Economics and Extension
Benson Idahosa University, Benin City, Nigeria

Abstract: This paper examines the impact of road network conditions on the marketability of agricultural produce in Nigeria, with particular focus on how transportation infrastructure affects agricultural output, income, and food distribution. Drawing on a review of empirical studies conducted across multiple Nigerian states and Sub-Saharan Africa, the paper finds that poor road infrastructure significantly reduces farmers' income, increases post-harvest losses, and constrains market access for rural agricultural producers. The study identifies poor road quality, inadequate transport vehicles, high freight costs, and the absence of feeder roads as key structural impediments to efficient agricultural marketing. The paper recommends targeted government investment in rural road construction and rehabilitation, provision of subsidised transport for farmers, and the establishment of agricultural produce collection centres. These findings carry broader implications for rural development policy and food security strategy in developing economies.

Keywords: road network; agricultural marketing; rural transportation; food distribution; post-harvest losses; Nigeria; rural development

I. INTRODUCTION

Road transport plays a pivotal role in agricultural development. It is the principal means by which agricultural produce is conveyed from farms to markets and to various urban communities, and it is widely regarded as a critical factor in agricultural development globally. Transport creates markets for agricultural produce, facilitates interaction among geographical and economic regions, and opens up new areas to economic activity (Tunde, 2012).

Rural inaccessibility remains a persistent challenge in Nigerian agriculture. Government and transport policy makers are therefore called upon to intensify efforts to improve road infrastructure, which constitutes the most common and widely used mode of transportation in the country. Collective and individual efforts must be directed towards alleviating hunger by providing transport facilities and services capable of improving food supply and distribution.

In Nigeria, road infrastructure represents the most important transport network, yet the country's diverse terrain — marked by sharp contrasts in climate, soil, and vegetation — continues to hinder agricultural progress. In many areas, roads essential for evacuating produce from farms to markets remain inaccessible throughout the year. Most feeder roads are unsurfaced, narrow, poorly drained, and winding, preventing easy access to hinterland communities where the majority of farmers are located.

Even where roads exist in fair condition, problems persist: poor maintenance, inadequate construction capacity, unsuitable materials, and weak management undermine their utility. All of these factors contribute to low agricultural output in Nigeria. If agriculture is to respond to the growing demands of the rural population, a well-developed rural road network is indispensable — one capable of reducing the cost of transporting agricultural commodities and enabling meaningful contributions to overall economic growth.

II. SIGNIFICANCE OF THE STUDY

The implications of food spoilage are significant and cannot be overlooked. Spoilage can be traced to the mode of transportation, methods of harvesting, handling, storage, and distribution — all of which play a material role in initiating deterioration. The purchase of damaged or overripe crops at reduced prices reflects income losses for marketers and reduced nutritional value for consumers.

Poor road conditions create delays in supply chains, thereby shortening the effective shelf-life of perishable produce. Prolonged transit over bad roads increases the acidity of fruit crops, reduces marketable quality, and depresses farm-gate prices.

This study highlights the effect of rural road network conditions on the income of agricultural produce marketers. It examines how the marketing of agricultural produce — from farmers to consumers — can be optimised in terms of form, time, and place utility, and identifies ways to improve transport efficiency through targeted road investment. The study also considers how improved road infrastructure would facilitate the development of marketing standards, giving farmers, marketers, and consumers greater confidence in the system.

Specifically, improved infrastructure would catalyse the expansion of distribution channels, reduce transport operating costs, lower freight tariffs, improve coordination across the supply chain, and increase the incentive for value addition throughout the agricultural value chain.

III. AGRICULTURAL MARKETING

Agricultural marketing encompasses the full range of services involved in moving an agricultural product from the farm to the consumer. These include planning production, growing and harvesting, grading, packaging, transport, storage, agro-processing, distribution, advertising, and sale. Such activities are heavily dependent on the availability of suitable finance and transportation, and cannot function effectively without the exchange of market information.

Agricultural marketing is an integral dimension of agricultural production; without it, the sector risks stagnation. It determines how frequently farmers will increase output, and a well-functioning marketing system harmonises demand and supply, stimulating further production. Increased output without a developed marketing system leads to post-harvest losses rather than economic gains (Amao et al., 2011).

According to Malcolm (1999), analysis of post-harvest losses in Nigeria reveals that plantain suffers up to 80% post-harvest loss, followed closely by pineapple (70%) and pawpaw (60%). These figures raise serious questions about the profitability of agricultural marketing, and underscore the strategic importance of efficient transport infrastructure in reducing losses (Alufohai, 2002).

In the production-marketing chain, marketing is the stage at which producers convert their inputs and labour into returns, and assess the viability of their enterprises. Marketing costs — determined by the performance of marketing intermediaries — directly influence returns to producers. Farmers are expected to operate efficiently, maximising output from available inputs. When inefficiencies persist, it is often a consequence of structural barriers such as poor road access rather than producer behaviour alone.

The main marketing challenges confronting Nigerian farmers include access to finance, transportation constraints, and price fluctuations. Even where production technology is advanced, failure to improve marketing infrastructure simultaneously renders yield increases largely unrealisable.

A. Marketing Functions

The marketing system operates through two distinct dimensions: the institutions and enterprises that participate in markets, and the functions those participants perform. Kohl and Uhl classify agricultural marketing functions under three categories:

(A) Exchange Functions: Buying, Selling, Storage.

(B) Physical Functions: Transportation, Processing, Standardisation.

(C) Facilitating Functions: Financing, Risk-bearing, Market Intelligence.

Each function adds value to the product and incurs cost. As long as the value added exceeds cost, entrepreneurs will find it viable to compete in providing the service. Transportation, classified as a physical function, is foundational to the efficient operation of all other marketing functions.

IV. ROAD NETWORK SYSTEM IN NIGERIA

Transportation is an essential component of human activity and forms the basis of all socio-economic interactions. No two locations can interact effectively without viable means of movement. In many developing countries — Nigeria among them — inadequate transport facilities are the norm rather than the exception (Gilbert et al., 2013).

Nigeria holds the largest road network in West Africa and the second largest south of the Sahara, with approximately 108,000 km of surfaced roads as of 1990. Yet since independence in 1960, the country's transport system has been characterised by deteriorating roads and insufficient vehicle fleets. Road transport remains the most commonly used mode of transportation in Nigeria, encompassing the conveyance of passengers, animals, farm produce, merchandise, and mobile services.

Decaying infrastructure is one of the central deficiencies that Nigeria's National Economic Empowerment Development Strategy (NEEDS) was designed to address. Despite federal government investment in expanding road coverage over the past two decades, many constructed roads have fallen into serious disrepair — particularly in rural areas (Walker et al., 2013).

In Edo State, road networks — particularly those leading to Edo South — are in a general state of disorder. This condition has exacted a considerable toll on the local population: rising transport fares, frequent vehicle breakdowns, inaccessibility, and serious impediments to agricultural marketing. Farmers in Edo State reportedly lose 20% to 30% of their produce to poor road conditions (Report of the State Ministry of Agriculture and Natural Resource, 2002).

Ogunsanya (1981) identified three categories of rural routes: bush paths, unsurfaced rural roads, and surfaced rural roads. Bush paths — the most common but least developed — are narrow, winding, and often overgrown during the rainy season. A study by Filani (1993) found that where motorable roads exist in rural Nigeria, they are mostly unpaved, narrow, and circuitous, with low-quality bridges susceptible to flooding. Ogunsanya (1988) further identified a strong inverse relationship between rurality and transport development: the greater the degree of rurality, the lower the level of transport provision.

V. ROLE OF ROAD TRANSPORTATION ON AGRICULTURAL MARKETING

From basic economic theory, production is never complete until output reaches the final consumer — and it is through transportation that this objective is achieved (Nwokoye, 1981). In agricultural contexts, transportation by road encompasses a range of vehicle types: cars, lorries, buses, and tippers for longer distances, and head porterage for short intra-village routes.

Titiola and Igben (1999) observed that beyond poor road conditions, all forms of carrier services — lorries, boats, and trains — remain inadequate and ill-equipped. Transport charges are not standardised and vary with road condition, produce type, season, and the prospect of a return load. There is also a notable absence of regulation in the carrier trade, particularly regarding the distinction between passenger transport and goods transport. The authors conclude that the primary requirement of an efficient transport service is not only that costs be minimised, but that goods be moved quickly, with minimum delay. Rural road provision is therefore a prerequisite for the prompt evacuation of produce from farms to markets.

Adirika (2002) observed that the construction of rural roads can induce an immediate response in improved agricultural output, particularly where roads are built through fertile areas inhabited by enterprising farming communities. However, he cautioned that roads alone are insufficient: in the absence of viable markets, inputs, or institutional support, road construction alone will yield limited development impact. Multiple enabling factors must operate in combination for infrastructure investment to translate into agricultural gains.

Aderamo (1991) noted that the present state of transport in Nigeria is poor and discourages increased agricultural production. Transport services make it difficult to move agricultural products from farm gates to areas of demand, thereby encouraging waste of products, time, and money. The volume of marketable surplus that actually reaches markets is directly linked to the availability and quality of motorable feeder roads (Titiola and Igben, 1999).

According to Aderamo and Magaji (2010), transportation constitutes the main channel through which different parts of society are linked. Jegede (1992), cited by Ajiboye and Afolayan (2009), noted that road transport is the most complex and widespread network, offering physical convenience, high flexibility, and suitability for movement of goods and passengers over short, medium, and long distances. Ajiboye (1994) further argued that availability of transport facilities is a critical investment factor that stimulates economic growth through increased accessibility.

Paul et al. (2009) highlighted the particular importance of road infrastructure for agricultural output in Sub-Saharan Africa. Three considerations are central: first, agriculture accounts for a large share of GDP in most Sub-Saharan countries; second, poverty is concentrated in rural areas; and third, low levels of road infrastructure and long average travel times result in high transaction costs, limiting agricultural productivity and growth. Mabogunje (1971) similarly identified accessibility and mobility as key determinants of the level of development in any given environment.

Poor rural transportation has been linked to low productivity, low income, reduced standards of living, and elevated poverty rates among rural residents (Aloba, 1986). When farm-to-market distances are long and roads are deteriorated, perishable

crops are often destroyed in transit, forcing farmers to absorb significant losses.

VI. EMPIRICAL EVIDENCE

A study by Tunde and Adeniyi (2012) on the impact of road transport on agricultural marketing in Ilorin East Local Government Area, Kwara State, documented the modes of transportation used by farmers to convey produce to markets. The study found that road transport was the predominant and most readily available mode, encompassing head porterage (38%), motorcycles (22%), pick-up vans (18.7%), bicycles (16.7%), and lorries (4.6%). The predominance of non-motorised and semi-motorised transport is itself a reflection of the poor condition of roads connecting farms to markets.

Table 1: Means of Transportation of Agricultural Produce from Farm to Market

Settlements	Head Porterage	Bicycle	Motorcycle	Taxi	Pick-up	Lorries	Total
Agbeyangi	8	7					15
Ile-Apa	4	5	6				15
Oke-Oyi	6	3	2	4			15
Iponrin	3	3	2	7			15
Panada	9	1	3		2		15
Apado	4		5	6			15
Tepele	10		2		3		15
Marafa	3	2	6	3	1		15
Eleshinmeta	2	2	4	7			15
Oke-Ose	8	2	3	1	1		15
Total	**57 (38)**	**25 (16.7)**	**33 (22)**	**28 (18.7)**	**7 (4.6)**		**150 (100)**

Note: Percentages are in parentheses. Source: Ethiopian Journal of Environmental Studies and Management (EJESM) Vol. 5, No. 3, 2012.

The study further revealed that transport charges carry a major impact on production and farmer income, varying with crop type, transport efficiency, distance travelled, and road condition. As shown in Table 2 below, a significant proportion of farmers' annual income is absorbed by transportation costs — costs that are inflated by poor road infrastructure.

Table 2: Annual Cost of Transportation of Produce to Market

Settlements	<₦20,000	₦21,000–₦40,000	₦41,000–₦60,000	₦60,000–₦80,000	Total
Agbeyangi		3	5	7	15
Ile-Apa	1	2	10	2	15
Oke-Oyi		4	6	5	15
Iponrin		1	6	8	15
Panada	5	4	6		15
Apado	6	3	4	2	15
Tepele	2	7	3	3	15
Marafa	3	8	2	2	15
Eleshinmeta		2	11	2	15
Oke-Ose	4	7	3	1	15
Total	**21 (14)**	**41 (27.3)**	**57 (38)**	**31 (20.7)**	**150 (100)**

Note: Percentages are in parentheses. Source: Ethiopian Journal of Environmental Studies and Management (EJESM) Vol. 5, No. 3, 2012.

The data indicate that 14% of farmers spent less than ₦20,000 annually on transportation, while 27.3% spent between ₦21,000 and ₦40,000. A further 38% spent between ₦41,000 and ₦60,000, and 20.7% between ₦60,000 and ₦80,000. The study concluded that improvements in road transport would lead directly to increased agricultural production.

Inoni and Omotor (2009) examined the effect of road infrastructure on agricultural output and rural household income in Delta State. Their findings confirmed that rural roads have a significant positive effect on agricultural output, reduce transportation costs, stimulate demand for rural labour, and improve farmer income. Notably, a 10% improvement in road quality was associated with a 12% increase in agricultural output and a 22% increase in farmer income — a particularly compelling finding for infrastructure investment policy.

Hine and Ellis (2001) examined the relationship between road accessibility, agricultural marketing, and rural development. They argued that transport costs play a critical role in linking accessibility to agricultural development, estimating that replacing a footpath with a vehicle track may yield a benefit to farmers more than one hundred times greater than upgrading an existing earth track to a gravel road. Their comparative research between Africa and Pakistan also identified substantial scope for reducing road freight costs across the continent.

Ajiboye and Afolayan (2009) investigated the impact of transportation on kolanut production in Nigeria, finding that improved transportation encourages farmers to increase rural production, adds value to produce, reduces spoilage, and has positive impacts on income, employment, and poverty reduction. The study was based on 100 randomly selected respondents from Remo land, Ogun State, and employed descriptive statistical analysis.

Olagunju et al. (2012) studied the effect of rural roads and marketing infrastructure on the income of farming households in Osun State. Using multistage random sampling of 260 respondents, the study employed descriptive statistics, regression analysis, ANOVA, and T-test. Results revealed that 75% of respondents considered transportation cost to affect income, and that the availability or absence of a tarred road, the condition of roads from farm to market, and the distance from the market all significantly affected annual income. The study recommended policy attention to farmers' access to rural market services, with emphasis on the clustering of services to stimulate rural and agricultural development.

VII. FINDINGS

The evidence surveyed in this review consistently identifies poor road infrastructure as a primary constraint on agricultural marketing in Nigeria. The following factors have been found to directly and indirectly impede the effective marketing of agricultural produce:

First, poor road network conditions — including unsurfaced, narrow, and poorly maintained roads — substantially increase transport costs and transit times, reducing farm-gate prices and discouraging production. Second, the absence of motorable feeder roads in rural areas forces farmers to rely on head porterage and other inefficient modes of transport, limiting the volume of surplus that can be evacuated to markets. Third, the resulting high transaction costs suppress incomes, reduce standards of living, and perpetuate rural poverty.

Road transportation is a necessary condition for the efficient physical distribution of agricultural products in Nigeria. Without it, the incentives and capacity to produce food at scale are fundamentally compromised, leading to scarcity and market inefficiency.

VIII. CONCLUSION AND RECOMMENDATIONS

This paper has demonstrated that road transport infrastructure is inextricably linked to the performance of agricultural marketing in Nigeria. The evidence drawn from empirical studies across multiple states and regions confirms that poor road network conditions reduce agricultural output, increase post-harvest losses, suppress farmer income, and undermine food security.

Improving road transport infrastructure would generate increased income for farming communities, raise the standard of living of rural inhabitants, and improve the overall efficiency of food distribution across Nigeria. Community participation in road construction and maintenance should be actively encouraged alongside government investment.

Based on the findings of this study, the following recommendations are made:

(i) Government, private companies, and communities should jointly ensure that rural feeder roads are constructed to link agricultural communities. Where roads are in poor condition, rehabilitation should be prioritised to facilitate the timely evacuation of agricultural produce, thereby creating time and place utility.

(ii) Roads linking rural communities where plantain and other perishable crops are produced should be made motorable to enable prompt farm-to-market transit and reduce post-harvest losses.

(iii) Specialised vehicles designed to minimise quantitative and qualitative losses should be made available to marketers through government provision, reducing the deterioration in produce quality that currently results from poor road conditions.

(iv) Government should establish agricultural produce collection centres in strategic locations from which government or contracted vehicles can consolidate and transport produce to rural and urban markets. This approach would reduce individual transport costs and improve supply chain efficiency.

(v) Government should provide vehicles to farmers either free of charge or at heavily subsidised rates, and where this is not immediately feasible, facilitate coordination between farmers and transport operators within local government areas to develop cost-sharing arrangements that reduce transport costs and improve distribution efficiency.

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