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Analysis of Transportation and Distribution of Yam Produce in Nasarawa-Egon Local Government Area of Nasarawa State, Nigeria

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ABSTRACT

Transportation and distribution are very critical in the production process of agricultural produce. Poor transportation and distribution often result in spoilage and wastages, thereby reducing farmers' income and adversely impacts food security. This study attempts to examine the transportation and distribution of yam produce in Nasarawa-Egon local government area of Nasarawa state, Nigeria. Questionnaire survey was used to elicit information from farmers, transporters and traders on modes, means and cost of transportation, distribution channels, frequency of distribution as well as problems associated with transportation and distribution of yam produce. The data collected were analyzed descriptively and it was found that farmers used mainly cars, pickup trucks and vans for transportation of yam produce. They jointly constituted 79.5% of modes of transportation of yam produce in the study area. Also, 59.09% of farmers sell their yam produce on market days and markets are the major channel of yam distribution particularly the regional market, which constitutes 56% of the channel of yam distribution. Moreover, yam transportation and distribution is found to be associated with numerous problems, the worst of all is bad road constituting over 35% of the problems as perceived by all the stakeholders in yam production, transportation and distribution. Based on these findings, some recommendations were made, which include road rehabilitation, providing of packaging standard for yam transportation, provision of storage facilities to reduce wastage; and adequate regulations of freight charges to reduce farmers' exploitation and enhance farmers' income.

Keywords: yam produce, transportation, distribution, agriculture and marketing

INTRODUCTION

Transportation is defined in diverse ways but all with a unique concept of moving people, goods and services from location of lower value to a location of higher value. Transportation has gained significance in the society and this has led to a more effective system of physical distribution of products, which spreads across all modes. Transportation systems of different modes continue to be of vital importance to the physical distribution of agricultural

produce (Oluwole et al., 2017). No wonder, Ajiboye (2009) asserts that transportation is a major contributor to all forms of development such that there is almost no sector of development that does not require transportation as a key factor for its survival.

Interestingly, distribution embraces the idea of physical change in location of products mostly from the area of production where it possesses less or almost zero value to the area of consumption where their potentials are fully utilized. This generally connects to the concept of transportation. Wikipedia defines distribution as the process of making a product available for the consumer or business user who needs it. In other words, distribution serves as the critical function which enables the transfer of products from the production end to the consumption end. A wide range of activities is attributed to the physical distribution and circulation of a product such as material flow for production functions, transportation, provision for storage, wholesale and retail sales and also the provision of consumer goods and other related information to households. Physical distribution is the key to getting the right product to the right place in the right quantity, quality and condition, at the right time and cost (Musa, 2011). By implication distribution can be considered to mean the spread of products throughout the marketplace such that it is readily available to users. In achieving this a good transportation system is needed.

Transportation and distribution joined together forms the basis for the growth and development of any product in the market as it serves as the major link between production and consumption. Every product produced needs to be consumed by a consumer, hence the need for a means of product transfer between the parties i.e. the producer and the consumer. This critically applies to agricultural products, especially to its growth and development generally all over the world (World Bank, 2008).

Agricultural produce are the major sources of food and the significance of food to human life and survival can never be laid out of sight. Agricultural products include a wide range under the classification of plants, animals and other life forms. Their production involve a series of operational activities such as planting/rearing, harvesting, threshing/winnowing and different forms of processing, bagging, storage, transportation and so on before they reach the market (Tinsley, 2009; Lebot, 2009). However, transportation plays a vital role in achieving all these activities. Transportation serves as the major link by which produce harvested from farm site is moved to different homes, storage areas as well as markets. Transport creates market for agricultural produce and enhances geographical and economic interaction among regions and creating greater economic focus (Tunde & Adeniyi, 2012). This is best brought about by efficient and adequate transportation and distribution system (Adedotun, Yakubu & Adedotun, 2015).

In Nigeria, road transport serves as the major mode of transportation and distribution of agricultural produce. It is used for the movement of farm produce from the farm to the markets as well as urban centres. In Nigeria, majority of the farming activity is done in the rural areas and therefore the need for such farm produce to be transported and distributed to urban areas, rural transportation system has become a very important factor in the agricultural system. Poor road condition and unreliable transport services constrain the level of agricultural activity in the country (Ali & Asogwa, 2018). However, rural road transportation poses high potentials in enhancing agricultural production, while Orakwe et al. (2015) also observe that rural accessi-

bility helps improve productive performance and encourage rural agriculture as well as reducing middlemen exploitation of the farmers.

The issue of transportation and distribution of agricultural products is very crucial. Poor rural transportation is the major problem of the agricultural sector in Nigeria (ADB, 2010). Among these problems are lack of access road to a significant number of rural areas, inadequate mobility due to poor public transport system, and low rates of vehicle ownership (ADB, 2010). The zeal to farm and produce agricultural products in several rural areas is affected by poor and inefficient transportation services, which affects the ability of rural farmers to freely and effectively transport and distribute the products to urban areas and as well transport their farming equipment to the rural areas (Adedotun, 2013). This in a way may affect the total cost of transporting and also the availability of the products in the market (Adedotun, 2013). Transportation and distribution affect the basic function of production, storage, marketing and consumption of agricultural products in many ways and causes multiplier effects on regional development (Adedotun et al., 2015).

LITERATURE REVIEW

In agriculture, there is no escaping transportation as it is the only means by which produce is moved from farm site to settlement (or storage area) as well as to the market, Mumby (cited in Adedotun et al., 2015). The China is the world's biggest food producing and consuming country and that transportation is the sole means of moving produce from the farm to the tables of over one billion consumers all over the country and beyond. In the study, food products spoilage in China is in an estimated rate of 30% of total production and this is closely attributed to a less efficient transportation system (ADB 2016). On the other hand, transport cost of food products accounts for about 20% of the nation's GDP, implying that with an improvement in the agricultural transportation and distribution system there will be also an increase in the nation's GDP. From these results the study provides policy options for the improvement of the efficiency of the nation's agricultural transportation and distribution system.

According to Gebresenbe and Bosona (2012), there are two main demand objectives for agricultural and food distribution chain—quality and safety maintenance of produce and reducing transportation cost. The concept of agricultural transportation and distribution is becoming an important type of logistics to achieve the objective of raw materials and food quality maintenance, reducing transportation cost and perhaps create more value-adding activity in food distribution. It is now crucial for stakeholders in relation to globalization of marketing systems to reduce transporting cost in order to attain competitive advantage. Therefore, developing an effective and efficient agricultural transportation and distribution system is very necessary and essential.

In the Nigerian context, Ajiboye and Afolayan (2009), regard transportation as a crucial factor in improving productivity in the agricultural sector. In their study on the impact of transportation on agricultural production in a developing country, they discover that an improved transportation system improves rural productivity, as farmers will work harder which increases production scale. This improved transportation system will also help add more value to their

products, reduce wastage and spoilage, which consequently increases income and reduces poverty levels in the rural areas.

According to Afolabi et al (2016) the physical condition of rural roads is of great concern in the transportation and distribution of produce. Their studies reveal that the bad roads of Ijebu North is a major hindrance to the effective movement of produce within and outside the rural area. These conditions have led to the recommendation of massive rehabilitation of the rural roads and the provision of sufficient modern freight transport services in order to enhance the transportation and distribution of agricultural produce.

Ojekunle et al (2019) aver that a proper understating of the flow of produce in an area in terms of production and distribution is key to the spatial development and planning of that area, they thus estimate volume of produce generated in rural markets and their distribution pattern and found that the cost of transportation and the volume of goods to be transported are key factors of consideration in the transportation and distribution of rural produce including agricultural produce. They recommend that measures be put in place by government to reduce the cost of transporting rural products by improving the condition of rural roads and enhancing the accessibility of rural markets.

Adedotun et al. (2015) examined the transportation and distribution of produce in Igbomina region of Osun state. The study identified the various sources, types, and spatial distribution of produce in the study area, also the modes of transportation often used in the region and the challenges associated with the transportation and distribution of agricultural products in the study area. Finding from the study shows that agricultural products farmed in the region include maize, cocoa and yam and that commercial buses and motorcycles are the major means of transportation in the area, and that the road condition in the region is bad, thereby making the transportation system inefficient for the effective distribution of produce.

Ojekunle and Oluwole (2018) examine the spatial flow pattern of rural freight and the vehicular traffic characteristics created by rural market activities. They stress that this is very crucial to the understanding of the transportation and distribution structure of local products in rural communities and how the available transportation system can affect these structures. The study identifies two primary flow patterns of rural freight, which include goods demanded within the region (state) and outside the region (to other states). This to a large extent affects the transportation and distribution of rural freights in terms of quantity and quality of transportation means to be used. The study also reveals several challenges bedeviling these flow patterns, including poor road conditions and insecurity and the absence of adequate vehicles to cater for the volume of goods, especially outbound goods. However, it is recommended that better transportation facilities and other ancillary services such as modern freight handling facilities, storage houses and sheds should be provided at major local products distribution centers to help improve rural freight.

Oluwole et al. (2017) observe that in the rural areas, human carriage, motorcycles, buses, pick-up vans, cars, canters and trucks are the predominant means of transportation and that these vehicles are old, rickety and unsuitable for such purposes and combined with the challenges of fuel scarcity, maintenance and general operating cost of vehicles, ticketing and extortion from

tax agents, frequent checkpoints leading to harassment and delays by law enforcement agents (FRSC and police). Based on these results and findings, they recommend that government as well as private investors should pay more attention in the transportation and distribution of agricultural produce by investing to improve road conditions and current levels of transport services provided, enhancing security along highways to protect against highway robbery, and also modern tax collection systems in order to eliminate extortion by tax agents. This will improve agricultural development, a necessity for the survival of rural communities and human life in general.

Interestingly, all these studies (Musa, 2009; 2011; Ojekunle, 2004; Barnabas, 2017; Orakwe et al., 2015; Tunde & Adeniyi, 2012; Ali & Asogwa, 2018) stress the importance of transportation to the development of agriculture in rural areas through enhancing the marketing and distribution of produce within and outside rural communities. From the empirical literatures reviewed in this section, there is no doubt that transportation system of an area highly affects the effectiveness of the physical distribution and marketing of agricultural produce. Therefore, an improvement in the transportation system will in turn improve the distribution system of rural products, especially agricultural produce and also yam produce, which is the main focus of this study.

STUDY AREA

Nasarawa Eggon is one of the 13 local government areas (LGAs) of Nasarawa state, Nigeria. It is located between latitude 8°51'N and longitude 5°05'E, and covers a land mass of about 1,208km². It shares boundaries with Lafia from the south and Akwanga in the north, while Wamba is to the east and Kokona to the west. Nasarawa Eggon has a population of about 148,405 as of 2006, projected to reach about 200,300 in 2016 (Census, 2006). The LGA has a population density of 165.8/km².

Nasarawa Eggon comprises of three districts (Umme, Alongani and Mada Station) consisting of over 40 communities. The major settlers of the communities are the Eggon even though you may still find a number of other ethnics such as the Mada, Alago and Hausa, with majority being farmers and traders. Common crops cultivated are sorghum, maize, yam, rice, cassava and sweet potato, while tree crops mostly grown in the area are mango, cashew, guava, orange and palms. The climate, type of soil, hydrology of the area allow for the cultivation of plants, animal grazing, fishing and forestry.



Fig.1: Nigeria map showing Nasarawa State



Fig. 2: Nasarawa Eggon LGA

METHODOLOGY

A quantitative research method and survey is deployed to examine the distribution characteristics and channels of distribution of agricultural produce, specifically yam, in the study area and the factors that influence the distribution system using essentially descriptive method. The research make use of primary data types, which include the socio-economic characteristics of the yam farmers, cost of transportation, types of vehicles used for transportation, challenges associated with transporting of yam produce in the study area, market price ranges, channels of distribution, distribution pattern, frequency of conveyance. The population of the study

area consist of 42 communities. Two-stage sampling technique was used to select sample size. First, a systematic sampling technique is used to select 20 communities out of the 42. The sampling technique is used to ensure an even coverage throughout the population. Furthermore, within the selected 20 communities, 300 farmers, 120 transport operators and 120 yam traders were randomly selected to form a sample size of 540.

Instrument used for data collection include structured questionnaire, oral interview, focus-group discussions, and field observations to source primary data, while secondary data were gotten online from published journals, articles and texts. The researcher used the structured questionnaires and interview questions to acquire necessary data from respondents. The questionnaire targeted three categories of respondents—farmers, transport operators, and traders. Three categories of questionnaire were used to source needed information from farmers, traders and transporters, which were administered in 20 communities within the study area. They include Alizaga, Alushi, Arikyia, Arugbadu, Atamala, Awunza, Eva, Gaji, Gako, Gudi, Kagbu, Mada Station, Nasarawa Eggon, Tawa Galle, Tudu Igga, Ubbe, Umme, Wakama, Wangibi, and Washo. Fifteen questionnaires were administered in each of the communities selected for farmers, while 3 questionnaires each were administered to both transporters and traders within the different markets in the communities. The data collected were analyzed using descriptive statistics such as frequencies, tables and percentages.

RESULT AND DISCUSSIONS

Yam transportation and distribution characteristics

The yam transportation and distribution characteristics discussed here include the types of vehicles used by farmers, frequency of distribution, distribution patterns, cost factors, channels of distribution and problems associated with transportation and distribution of yam produce in the study area.

Vehicle used by farmers

Table 1 shows the frequency of usage of different types of vehicles being used by farmers for the transportation of yam produce. As seen from the table, the pickup truck has the highest frequency of 254, representing 31.9%, which implies that farmers make use of pickup vehicles in transporting and distributing their yam produce more than any other mode. The next most frequently used is vans, especially J5, which records 196 frequency (24.7%). The third most frequently used mode of transport is the car, mentioned 182 times, representing 22.9%. Commonly used cars for transportation and distribution are Volkswagen Sharon and Toyota Carina. Truck is the least mentioned mode, representing about 13.2%. Meanwhile other means such as motorcycle, bicycle, human portorage, in some cases tractors and animals, constitute only about 7.3%. This can be based on the available options, distance, or quantity of yam to be transported. However, it is seen that pickup vehicles are the most used in the study area. The study also shows that the only mode of transportation used in the study area is road.

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Table 1: Types of vehicle used by farmers

Vehicle type	Frequency	Percentage
Car	182	31.9
Pickup	254	24.7
Van	196	22.9
Truck	105	13.2
Others	58	7.3
Total	795	100

Source: Authors' field survey, 2019

ANALYSIS OF FREQUENCY DISTRIBUTION OF YAM PRODUCE

The study examines the frequency at which farmers transport and distribute their yams to the markets for sale. Table 2 shows the details of the analysis.

Table 2: Frequency distribution of yam produce

Distribution	Frequency	Percentage
Everyday	47	17.03%
Every other day	25	9.06%
Every market day	163	59.06%
Others	41	14.86%
Total	276	100%

Source: Authors' field survey, 2019

From Table 2, 47 farmers (17.03%) distribute their yam produce on a daily basis, 9.06% transport their produce every other day, while 59.06% farmers convey their yam to the markets only on market days, and the remaining 14.86% convey their produce only when necessary. It can be observed that most of the farmers only move their yam produce on the market days, as a result of the availability of vehicles on the market days and higher tendency to sell more since there will be more potential buyers.

Yam distribution channels

From the survey as shown in figure 3, 37% of the farmers convey their yam to local markets and collection points, which are cooperative or individual stores. They are operated by dealers who collect small quantities from farmers in order to trade them in bulk, either within or outside the region, while 56% of the farmers convey their produce to specific markets within the region for sale which are mostly market days. Markets within the region in which the farmers usually trade include the Nasarawa Eggon main market, Keffi yam market, Akwanga central market, Wamba market, and Lafia market. On the other hand, 7% of the farmers sampled claimed to distribute their produce to markets outside the region such as Kano, Sokoto, Warri, Enugu, Calabar, Lagos, etc. These are mostly large-scale farmers.

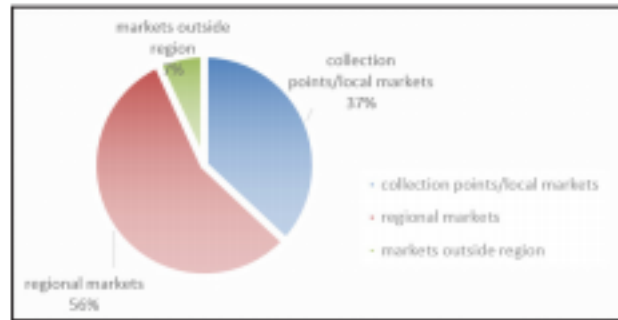


Fig 3: Distribution channels of yam produce. Source: Authors' field survey, 2019

Cost factors in yam transportation and distribution

The analysis of factors of the cost of transportation of yam produce by farmers is presented below.

Table 4: Factors determining the cost of transportation

Factors	Frequency	Percentage
Quantity to be transported	15	19.74
Distance	21	27.63
Road condition	30	39.47
Others	10	13.16
Total	276	100

Source: Authors' field survey, 2019

According to the analysis in Table 4, most of the respondents (39.47%) agree that road condition is the primary factor in determining the cost of transportation in the study area, while 27.63% claim it is the distance to be covered that determines cost of transportation; 19.74% consider quantity as another factor determining transportation cost in the region; however 13.16% are of the opinion that factors such as fuel cost and government policies such as taxes and levies collected on the roads are also responsible factors in determining the cost of transportation system in the study area. From the transporters' response one can conclude that transportation system in the area is not good enough since road condition determines the cost of transporting produce in the area.

Yam produce channels and distribution pattern

The distribution of yam in the study area follows a short but complex channel. Yams are often moved from the farm to farmers' settlements, then to markets (rural/urban market) and to the final consumer. However, there are collection points within the channel, where yam produce is gathered for consolidation from the farm, settlement and rural markets by yam dealers in

order to sell them in the major urban markets. Also, there are minor urban markets to which yams are supplied directly from rural markets or in smaller quantities from the urban markets. Within the channel, there are situations where farmers sell their produce themselves to consumers either in the rural markets or urban markets or even from the settlement, or when farmers sell their produce to dealers, wholesalers or retailers, in this case the farmers are not the actual traders of the commodity. Therefore, it can be said that, within the channel of distribution of yam produce in the study area, two conditions hold. They are:

- Direct channel: When the farmer is the actual trader (seller) of the commodity, or
- Indirect channel: The farmer sells the commodity to an actual trader (dealer, wholesaler or retailer)

The channel of distribution in the study area is depicted in fig 4

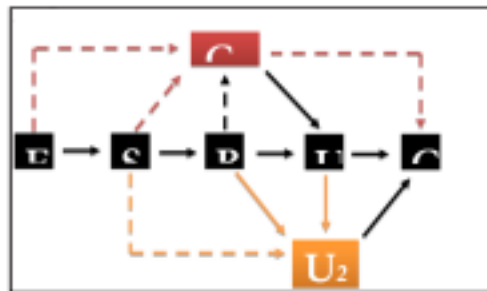


Fig 4.3: Distribution channel of yam produce in Nasarawa

Key: F – Farm; S – Settlement/Store House; R – Rural Market; U – Urban Market; U₂ – Minor Urban Market; C – Consumers; C.P – Collection Point; —> Major Link; - -> Minor Link. Source: Authors Field Survey, 2019

- o Farm – this is where the commodity is produced and harvested
- o Settlements – these are farmers’ storage facilities, mostly located within the farmers’ residential compounds, and these are usually in the form of huts and empty rooms designated for storing.
- o Markets – they are simply points of sale, categorized as rural and urban markets
- o Rural markets – these are small marketplaces within the rural communities in the study area where yam trading activity takes place.
- o Urban markets –larger markets located at urban areas, including urban central markets within and outside the state.
- o Minor urban market –small markets found within urban areas.
- o Traders – dealers, wholesalers and retailers.
- o Dealers – big sellers; they solicit yam produce in small quantities to make bulk for sale; often sell outside state or country
- o Wholesalers –people who buy large quantities of yam either from farmers or dealers for sale in urban markets to large-scale consumers
- o Retailers –small-scale traders who buy from farmers or wholesalers to sell in smaller quantities. They are found everywhere: rural markets, urban markets, roadside sellers.

- Consumers –either small or large-scale buyers that require the commodity for consumption purpose (either domestic or industrial).

Table 5 shows that 33.33% of the respondents involve in the trading of yam produce (traders) in the study area are retailers, while 40% are wholesalers and the remaining (26.67%) are dealers who trade at national and international levels. Meanwhile fig 4.4 reveals that 67% of the traders sampled are farmers while 33% are only traders that don't farm.

Table 5: Types of traders

Distribution	Frequency	Percentage
Retailers	40	33.33
Wholesaler	48	40.00
Dealers	32	26.67
Total	120	100

Source: Authors' field survey, 2019



Source: Authors' field survey, 2019

Fig 4: Types of yam distributors

Farmers' perspectives of problems of yam transportation and distribution

The problems encountered in the transportation and distribution of yam produce in the study area is assessed in three stakeholder perspectives –farmers', traders' and transporters'.

Table 6: Transportation problems experienced by farmers

Distribution	Frequency	Percentage
Vehicle Scarcity	61	22.10
Transit delays	39	14.13
Bad roads	107	38.77
Transport cost	19	6.88
Others	50	18.12
Total	276	100

Source: Authors' field survey, 2019

The study reveals in table 4.8 that according to the sampled farmers 22.1% (61) of the farmers associated the transportation problems in the region to vehicle scarcity, 14.13% (39) associated to delays on the road, 38.77% (107) to bad roads, 6.88% (19) linked to cost charged by transporters, and 18.12% (50) linked transportation problems with other factors such as packing and distance to market, which is a function of transportation cost. From interviews conducted with the farmers on possible reasons to their response, it was discovered that problems such as delays on the road is as a result of harassment by enforcement and tax agents or sometimes due to vehicle breakdowns. While factors such as distance to market increases transport costs and farmers still have to sell their produce at the same price as those closer to the market. Packaging also poses a serious problem in the transportation and distribution of yam produce, as absence of packaging causes easy pilferage and theft of the produce in transit.

Traders' perspective of transportation and distribution problems

Table 7: Transportation problems experienced by traders

Distribution	Frequency	Percentage
Timely delivery	49	40.83
Vehicle scarcity	11	9.17
Bad roads	35	29.17
Transport cost	10	8.33
Others	15	12.50
Total	120	100

Source: Authors' field survey, 2019

Table 7 shows that 40.83% of the traders considered timely delivery as the major transportation problem encountered in the study area, 9.17% associated the problem to scarcity of transportation services, 29.17% linked the problems of transportation and distribution of yam produce in the region to bad roads, while 8.33% viewed transportation cost as a problem of transportation. However, the remaining 12.5% linked transportation problems to other factors such as packaging and overloading of vehicles in order to reduce number of trips made.

From the analysis it is seen that timely delivery is highly considered by the traders, while other factors such as packaging problems and overloading were also identified.

Transporter perspective of transportation and distribution problems

Table 8: Transportation problems experienced by transporters

Distribution	Frequency	Percentage
Accidents	13	17.11
Bad roads	28	36.84
Traffic delays	9	11.84
Armed robbery attacks	7	9.21
Others	19	25.00
Total	76	100

Source: Authors' field survey, 2019

As can be seen from Table 8, the transporters experienced various transportation problems during their operations in the study area include bad roads (36.84%), traffic delays and extortion by tax agents and law enforcement officers (police and FRSC officers) constitute 11.84%, accidents 17.11%, armed robbery attacks 9.21%, and others (25%) such as vehicle breakdown due to bad road and fuel shortage.

Bad road is the major problem faced by transporters as regards the transportation and distribution of yam produce in the study area. Other problems are vehicle breakdowns in transit. Poor packaging also affects easy handling of the produce and makes loading and unloading more time-consuming, and if not properly done results in the falling-off of the freight in transit.

From the analyses of the problems associated with yam transportation and distribution as expressed by farmers, traders and transporters, these problems are numerous and need to be addressed by appropriate authorities. For the farmers, bad road is a major problem, while traders consider timely delivery a more serious problem, while transporters also consider bad roads a major challenge. However, it is interesting to note that that packaging, though less severe, is identified by all stakeholders as a common problem.

CONCLUSION

This study examines the transportation and distribution of yam produce in Nasarawa-Eggon, to other places in Nigeria and beyond. The findings show that Nasarawa-Eggon is one of major sources of yam produce in Nasarawa state. However, the transportation and distribution of this product is often bedeviled by many challenges such as bad roads, delay in delivery, poor availability of transport services, in security on highways, fuel scarcity, packaging, traffic congestions, lack of storage facilities, accidents, among others. Despite these obstacles, the demand for yam production is increasing and hence the need for better transportation system to ensure efficient distribution of agricultural produce. As transportation plays a vital role in the distribution and marketing of agricultural produce, its improvement is therefore necessary to reduce yam spoilage and wastage as well as increasing production not only in the study area but in the entire state.

POLICY IMPLICATIONS AND RECOMMENDATIONS

The above findings have some policy implications, one of which is that yam production and marketing are intricately related to availability of good transportation. Secondly, yam distribution in the study area has so many channels but their effective and efficient functioning also depends on the quality and adequacy of transportation system. Based on these implications the following recommendations are hereby made:

1. Due to the important role of transportation in the distribution and marketing of agricultural produce, federal, state and local governments should provide adequate and efficient transportation system to enable the smooth movement from place of production to the place of consumption. For example, the local government should set a standard for yam packaging and provide loading and storage facilities in rural markets
2. The state and local governments should rehabilitate all roads in the area.

3. Enabling public-private partnership aimed at providing modern freight transport services to handle the movement of yam and other produce farmed in rural areas.
4. The cost associated with transportation should be minimized through regulation of freight charges by local authorities.
5. Finally, there should be a better synergy in the distribution channels in order to fully maximize the potentials of yam business in the locally and beyond.

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