DETERMINANTS OF TRANSPORTATION COST OF PLANTAIN AMONG MARKETERS IN OKIGWE LOCAL GOVERNMENT AREA OF IMO STATE, NIGERIA

By

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Abstract

The key to efficient marketing of agricultural products is efficient transportation. Low transport costs make products affordable to consumers and also helps farmers earn a profit margin. Hence, the study assessed the determinants of transportation cost of plantain among marketers in Okigwe Local Government Area of Imo State. Multi-stage sampling technique was employed in selecting (96) ninety-six respondents. Descriptive statistics such as frequency, percentage, mean count as well as inferential statistics involving the use of ordinary least square regression were used to analyze data. Results showed that the foremost transportation mode employed by the plantain marketers were vehicles ($\bar{x}$ = 3.46), head portage ($\bar{x}$ = 2.98) and tricycle (keke) ($\bar{x}$ = 2.67). The major challenges faced by the plantain marketers were high transportation cost ($\bar{x}$ = 4.052), poor access road ($\bar{x}$ = 3.770), seasonal price fluctuation ($\bar{x}$= 3.552), and high market charges ($\bar{x}$ = 3.270).The ordinary least square regression result showed that the coefficients of distance to market (0.369), gender (532.641), nature of road (-96.580), high cost of fuel (70.018), and income (0.005) significantly influenced transportation cost of plantain at varying levels. The study recommended elimination of overhead costs or unnecessary operating expenses on transporters and resistance of transporters who restrict service for the purpose of increasing profit. Roads linking the rural communities where plantain is being produced should be made more motor-able to enhance prompt movement of goods from the farms to the market.

Key words: marketers, nature of road, plantain, transportation cost

INTRODUCTION
Plantain belongs to the family *Musaceae* and the genus *Musa*. They are tree-like perennial herbaceous plants 2m to 9m tall, with underground suckers. The physical appearance of plantain is greenish in color (the outer covering pod), it is slightly curved in length and when ripe, has dark or yellowish color with dark patches (Ayanwale, Fatunbi, and Ojo, 2016). Plantain is one of the important staple food crops for millions of people both in

developed and developing countries, a fact reflected in the gross value of its production. It reaches its greatest importance in parts of East Africa where annual consumption is over 200kg per capita and in West and Central Africa where more than 10 million tons are produced annually and are traded locally (**Ariyo *et al*., 2013).** The economic importance of plantain lies chiefly in its contribution to subsistence economy. The continuous availability of harvested bunches from established areas make it possible for the crop to contribute to all year round food security for consumers and income among marketers and producers. Thus, the availability of harvested bunches has triggered the attention of farmers on the best ways of marketing plantain products (Egbodion and Ilavbarhe, 2014). Plantain is found in the diet of many Nigerian families. It is a good source of carbohydrate no matter what form it is consumed. It is also contains protein, minerals and vitamins. When plantain is peeled, the inner fruit is slightly yellowish and cannot be eaten raw except it is cooked or allowed to go through the process of ripening (Ajayi, 2013). It can be cooked, roasted, baked or fried depending on the mode applied for preparation and intended form to be eaten (Ayanwale *et al.,* 2016). It can be boiled and consumed directly or taken in convenient forms like *Dodo* (fried ripe pulp), Chips (fried unripe pulp) or processed to products such as plantain flour, local beer (plantain baby food), as well as *Dodo Ikire* (produced from over-ripped plantain). Plantain also possesses medicinal properties (Ajayi, 2013).

Distribution of agricultural products especially plantain among towns, states and nations is made easy and smooth because of transportation system. This implies that the importance of transportation in distribution of agricultural products, business activities and other activities that affect human beings cannot be over emphasized. Transportation plays a very crucial role in both the production and marketing process of agricultural produce, which is not complete until the commodity is in the hands of final consumers. Availability of transport facilities is a crucial management factor that stimulates economic growth through increased accessibility, its efficiency and effectiveness (Ikejiofor and Ali, 2014). Dewey and Nelson, (1940) opined that in the current agricultural structure, transportation bridges the gap between the producers of agricultural commodities and the market in which these products are sold and also that between the producers and their sources of farm supplies. Furthermore, it affects the basic function of production, distribution, marketing and consumption in many ways. Transportation influences the cost of commodity consumed and the purchasing power of the consumers. This is because the nature of roads through which goods pass determine the time of delivery quality of such goods. However, if these products reach the final consumers in record time and in good quality it will attract more money for the producers and vice versa (Ikejiofor and Ali, 2014).

Transportation is a key aspect of marketing activities as it helps to solve the location problem of marketing. Plantain marketing in Nigeria presently is being heavily affected by transportation in terms of manner as well as means. There is presently no organized or specialized approach towards transportation of plantain as it is with most other fruits or easily perishable commodities in Nigeria. Many are transported using any available vehicle and they are packed in such manner as to suggest little concern for its easy perishability. Hence, many of the transported plantain gets crushed and spoilt even before they get to their various destinations (Ayanwale et al., 2016).

According to Akinyemi, Aiyelagbe, and Akyeampong, (2010), plantain distribution is rather complex in Nigeria. In the first place, farmers whose farms are nearer to major roads harvest the crop at the mature green stage and display at the roadside or move them to a nearby market, where small scale wholesalers, retailers and consumers can purchase directly. On the other hand, trade collectors move around farms, collect the produce from farmers and transport to the cities where they hand them over to wholesalers, who in turn pass on to retailers /vendors for sale to consumers. Plantain transportation in Nigeria is by road, usually in open or partially closed vehicles. Fruits are packed in bunches or hands, and stacked without any form of protection. Small-scale wholesalers and retailers transport fruits by bicycles, wheelbarrows, trucks, pick-ups and taxis. Generally, postharvest distribution and marketing of plantain in the last 20 years has not been very efficient, as there are no established quality and quantity standards for plantain transportation and marketing. Plantain fruits are subjected to adverse conditions during handling and transportation. Rough handling, usually leading to splitting, vibration, abrasion and compression, coupled with late delivery, that affects plantain quality during distribution (Ayanwale et al., 2016).

Most of the rural communities in Nigeria which constitute the major producers of food crops including plantain are besieged with the problem of inaccessible roads. According to Tunde and Adeniyi (2012), the bad condition of the roads affect cost of transportation of agricultural produce which in turn affect the rural farmers' income. Musa, Reuben and Magaji, (2013) added that after the problem of inadequate credit facilities, transport is the second problem of marketing of milled rice in Taraba State, Nigeria. The implication is that poor state of roads slow down the development of supply system, farmers travel and food distribution (Musa, *et al.* 2013). Despite the stringency of the problem of transportation and its associated effect on the marketing cost of plantain and other agricultural crops especially in Okigwe Local government of Imo State, no adequate research has been done to determine the factors affecting the transportation cost of plantain. A lot of empirical reviews have been done on the transportation of agricultural products generally and effects of transportation on agricultural development (Ikejiofor and Ali, 2014), Musa, *et al*, (2013), Thomas and Eforuoku, (2020), Akinyemi *et al*. (2010) among others, but none has specifically looked at the factors affecting the transportation cost of plantain marketing

specifically looked at the factors affecting the transportation cost of plantain marketing especially in Okigwe, Imo State. Hence, the aim of this study is to analyze the determinants of the transportation cost of plantain marketing in Okigwe Local Government Area of Imo State. Specifically, the study identified the mode of transportation employed by the plantain marketers, ascertained the challenges faced by the plantain marketers and analyzed the factors affecting the transportation cost of plantain.

METHODOLOGY

The study was conducted in Okigwe Local Government Area (LG A) of Imo State. The Local Government Area is located between Longitude $7^{o}44'$ and $7^{o}26'$E Greenwich Meridian and Latitude $5^{o}30'$ and $5^{o}57'$N of the Equator. Okigwe Local Government Area covers an area of about 360km2. The 2016 projected population of the area is estimated at 182,700 people (https://citypopulation.de/php/nigeria-admin.php?adm2id=NGA017019). The area has tropical climate with annual rainfall of about 1800mm-2000mm, mean temperature of about 28° - 42°C and relative humidity of 65%. The main crops cultivated in the area are cocoyam, yam and cassava. Livestock produced include: sheep, goat, pig and poultry. The people also engage in other economic activities such as stone breaking, hunting, tailoring, barbing, petty trading, automobile mechanics, hair dressing and civil services plantain is one of the common commodities marketed in the area.

Multi-stage sampling technique was employed in selecting the sample for the study. The first stage involved a purposive selection of six (6) communities out of the twelve communities in the area. This was based on the intensity of plantain marketing in the area. In the second stage, two villages were randomly selected from each of the selected communities giving a total of twelve (12) villages. From each of the selected villages, eight plantain marketers were randomly selected thus making a total of ninety six (96) marketers. Primary data used for the study was obtained through the use of structured questionnaire and interview schedule administered to the respondents. Mean, frequency, tables, ordinary least square regression analysis were used to analyze the data. The mode of transportation employed by plantain marketers was realized using four points likert scale categorized as always (4), sometimes (3), rarely (2), never (1). The mid-point of 2.5 was used as basis for making decision. The challenges faced by plantain marketers in the study area was realized using five points likert scale. This was categorized as strongly agree (5), agree (4), neutral (3), disagree (2), strongly disagree (1). The mean score of 3.0 was used as the basis for making decision regarding the constraints. The factors that affect the transportation cost of plantain was realized using ordinary least square regression analysis. The model was tried on the four functional forms of linear, exponential, double-log and semi-log in other to make choice for the lead model.

The functions were explicitly specified thus:

Linear function $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 \ldots \ldots \ldots \ldots .. + b_6X_6 + ei$ (1)

Semi-log function $Y = b_0 + b_1lnX_1 + b_2lnX_2 + b_3lnX_3 \ldots \ldots .. + b_6lnX_6 + ei$ (2)

Double log function $lnY = b_0 + b_1lnX_1 + b_2lnX_2 + b_3lnX_3 \ldots \ldots .. + b_6lnX_6 + ei$ (3)

Exponential function $lnY = b_0 + b_1X_1 + b_2X_2 + b_3X_3 \ldots \ldots \ldots \ldots .. + b_6X_6 + ei$ (4)

Where Y = Transportation cost (in Naira)

Implicitly, the model is specified as:

$Y = F (X_1, X_2, X_3, X_4, X_5, X_6, \ldots \ldots \ldots \ldots ..X_n, ei)$ (1)

Where Y = Transportation cost (in Naira)

$X(s)$ are the independent variables. Where:

X_1 = Distance to market (km)

X_2 = Age (Years)

X_3 = Gender (Male = 1, Female = 0)

X_4 = Nature of road (Good =1, Bad = 0)

X_5 = Volume of goods (kg)

X_6 = Cost of fuel (Naira)

X_7 = Income from plantain marketing (Naira)

X_8 = Cooperative membership (Yes =1, No = 0)

X_9 = Availability of vehicle (1 = sufficient, 0 = not sufficient)

X_{10} = Education (Years)

X_{11} = Market Experience (years)

MODE OF TRANSPORTATION EMPLOYED BY THE RESPONDENTS IN THE STUDY AREA

Table 1 shows the mode of transportation employed by the plantain marketers in the study area.

Table 1: Mode of Transportation Employed by the Respondents in the Study Area

Transportation Modes	Always=4	Sometimes=3	Rarely=2	Never=1	Total	Mean
Head Portage	40(160)	26(78)	18(36)	12(12)	286	2.98
Wheel Barrow	17(68)	28(84)	29(58)	22(22)	232	2.42
Bicycles	1(4)	3(9)	8(16)	84(84)	113	1.18
Motor Cycle	7(28)	30(90)	34(68)	25(25)	211	2.20
Tricycle (*Keke*)	25(100)	35(105)	15(30)	21(21)	256	2.67
Vehicle (Buses, Lorries, Pick-Up)	68(272)	12(36)	8(16)	8(8)	332	3.46
Grand Mean						**14.91**
Average Mean						**2.484**
Benchmark						**2.50**

Source: Survey Data; 2020

The result revealed that vehicles which include buses, Lorries, pick-up vans etc. were the foremost transportation mode used by the marketers in the marketing of plantain in the study area ($\bar{x} = 3.46$). This is followed by head portage ($\bar{x} = 2.98$) and tricycle (*keke*) ($\bar{x} = 2.67$). Vehicles and tricycles are usually used in transporting plantain from the place of purchase to the market where the plantains are sold especially for long distance movement. While head portage and wheel barrows are usually used in transporting within short distances, this is evident among hawkers. However, the least used transportation mode for the marketing of plantain among the marketers in the study area were motor cycle ($\bar{x} = 2.20$) and bicycles ($\bar{x} = 1.18$). This could be as a result of the bulkiness of the product. This is in line with the findings of Afolabi *et al* (2016) who discovered that over (70%) of their respondents used vehicles (pick-up vans and cars) to convey their products to the market.

FACTORS AFFECTING THE TRANSPORTATION COST OF PLANTAIN IN THE STUDY AREA

In a bid to analyze the factors affecting the transportation cost of plantain marketing in the study area, the multiple regression model was employed and the linear regression function was chosen as the lead equation based on pre-considered econometric parameters which include intensity of the value of R^2 and F-ratio as well as the number of significant variables in conformity with a *prior* expectations. From the Table, the co-efficient of determination (R^2) value of 0.727 entails that 72.7% of the variations in transportation cost were explained by the explanatory variables. The F-ratio of 4.023 which was significant at 1% significant level indicates the goodness-of-fit of the model.

Table 2: Multiple Regression Estimates of Factors Affecting Transportation Cost of Plantain in Okigwe Local government area of Imo State

Variables	+Linear	Exponential	Semi-Log	Double Log
(Constant)	1022.494 (4.969)***	6.671 (11.303)***	47.428 (4.473)***	8.175 (2.706)***
Distance	0.369 (2.187)**	0.002 (2.115)**	137.371 (1.855)*	0.305 (1.712)*
Age	-18.694 -(1.696)*	-0.013 (-1.041)	-602.444 (-1.162)	-0.328 (-0.572)
Gender	532.641 (2.653)**	0.536 (2.347)**	469.379 (2.145)**	0.520 (2.148)**
State of Road	-96.580 (-2.443)**	-0.244 (-1.984)*	-236.026 (-1.855)*	-0.073 (-1.766)*
Volume of plantain goods	0.500 (0.732)	0.001 (0.747)	124.864 (0.873)	0.194 (1.222)
cost of fuel	70.018 (2.318)**	0.072 (1.789)*	66.438 (1.267)	0.035 (1.127)
Income	0.005 (2.797)***	4.76E-6 (2.496)**	304.933 (2.090)**	0.293 (1.815)*
Mem.of coop. Association	25.515 (1.086)	0.209 (0.886)	189.552 (0.847)	0.224 (0.903)
Availability of vehicle	131.901 (0.626)	0.325 (1.358)	203.302 (0.889)	0.375 (1.481)
Education	49.324 (1.470)	0.015 (0.645)	463.323 (1.687)*	0.143 (0.471)
Marketing experience	28.355 (1.190)	0.031 (1.140)	96.146 (0.534)	0.217 (1.090)
R-square	0.727	0.680	0.704	0.709
Adjusted R-square	0.615	0.562	0.577	0.583
F-ratio	4.023***	3.519***	3.606***	3.659***

Source: Survey Data, 2020

The result shows that the significant factors affecting transportation cost of plantain in the study area were distance to market, age, gender, state of road, cost of fuel, and income. The co-efficient of distance to market (0.369) was positive and significant at 5% significance level. This implies that the farther the distance to the market, the higher the transportation cost. This is due to the fact that long distance trips attract higher

transportation cost and vice versa. **Ikejiofor and Ali, (2014) discovered that distance to market was positive and significantly related to marketing cost of agricultural produce.**

The co-efficient of gender (532.641) was positive and significant at 5% significance level. This implies that the transportation cost of plantain tends to increase among the male respondents than the females. This could be due to the fact that females have more bargaining power than males which culminates in their paying less than their male counterparts. The co-efficient of nature of road (-96.580) was negative and significant at 5% alpha level. This implies that the transportation cost of plantain will most likely decrease given the type of road being plied, that is if the road is a bush path, surfaced or unsurfaced. Meaning that the more our rural roads are surfaced or tarred and smooth, the lower the transport cost and vice- versa. This however is not the case as Ogunsamya (1987), observed that the paths that link villages with farmsteads are usually winding and a times overgrown by weeds especially during the rainy season. Moreover, where motorable roads exist, they were mostly of untarred, narrow, with low quality bridges. Such untarred roads are hardly passable during the rainy season. All these lead to increase in transportation cost of plantain. The co-efficient of cost of fuel (70.018) was positive and significant at 5% alpha level. This implies that the higher the price of fuel, the higher the transportation cost of plantain. High cost of fuel is always associated with increase in transportation cost due to additional cost incurred. This is a typical of our current society. The co-efficient of income (0.005) was positive and significant at 1% alpha level. This implies that the higher the income from plantain marketing, the higher the transportation cost. This could be due to higher purchases of plantain, which increases the volume of the product to be transported. Age, however was sparingly significant.

CHALLENGES FACED BY PLANTAIN MARKETERS IN THE STUDY AREA
Table 3 shows the challenges faced by plantain marketers in the study area.

Table 3: Distribution of Challenges Faced by Plantain Marketers in the Study Area

Challenges	Strongly Agree=5	Agree= 4	Neutral= 3	Disagree =2	Strongly Disagree=1	Total	Mean
High transportation cost	36(180)	40(160)	14(42)	1(2)	5(5)	389	4.052
Seasonal price fluctuation	16(80)	47(188)	11(33)	18(36)	4(4)	341	3.552
Poor access road	27(135)	37(148)	20(60)	79(14)	5(5)	362	3.770
High market charges	14(70)	40(160)	10(30)	22(44)	10(10)	314	3.270
Rapid deterioration in quality/spoilage	**7(35)**	**37(148)**	**19(57)**	**21(42)**	**12(12)**	**294**	**3.063**
Inadequate capital	1(5)	26(104)	9(27)	26(52)	12(12)	200	2.083
High purchasing price	3(15)	21(84)	18(54)	34(68)	20(20)	241	2.510
Grand Mean							**22.3**
Average Mean							**3.186**
Benchmark							**3.00**

Source: Survey Data; 2020

The results revealed that the foremost challenges faced by the plantain marketers in the study area were high transportation cost ($\bar{x}$ = 4.052), poor access road ($\bar{x}$ = 3.770), seasonal price fluctuation ($\bar{x}$ = 3.552), and high market charges ($\bar{x}$ = 3.270). This findings corroborates with the findings of Ariyo et al (2013) where high transportation cost and seasonality price fluctuation were found as the foremost challenges in plantain marketing.

CONCLUSION AND RECOMMENDATIONS

Transportation bridges the gap between producers of farm products and the markets where these commodities are sold, in the present agricultural structure. Whether provided by commercial agencies or the farmer, it is necessary to the economic functioning of agriculture. Having examined the determinants of transportation cost of plantain among marketers in Okigwe Local Government in Imo State, it was discovered that the plantain marketers mostly use vehicles and head portage in transporting their products (plantain). The foremost challenge being faced in the marketing of plantain include high transportation cost, poor access road, and seasonal price fluctuation among others. The significant factors affecting transportation cost of plantain were distance to market, gender, nature of road, cost of fuel, and income. Also (72%) of the total variation in transportation cost were explained by the explanatory variables .Hence, the following

transportation cost were explained by the explanatory variables .Hence, the following recommendations were made; government should set modalities towards reducing the transportation cost of the marketers, through elimination of overhead costs or unnecessary operating expenses on transporters and resistance of transporters who restrict service for the purpose of increasing profit. Roads linking rural communities where plantain is being produced should be made more motor-able to enhance prompt movement of goods from the farms to the market. Finally, when choosing mode of transport, marketers should consider the distance, accessibility of the market and the volume of goods to be transported, this will help reduce deterioration while on transit.

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