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Transaction Costs-Market Participation Nexus: Evidence from Cassava Farmers in Osun State, Nigeria

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Abstract: This study examined the effects of transaction cost variables on market participation among cassava farmers in Osun State, Nigeria. This was with a view to providing insight into how these variables can be managed to ensure that cassava farmers in Osun State participate more in the market for the purpose of promoting cassava production as a means to poverty alleviation in the rural community. Transaction costs were measured by access to market information, transport cost, non-farm work, road condition, credit availability, access to telecommunication facilities, personal transport, farm size, farming experience, price of cassava, market distance, dependency ratio, as well as age. The study made use of primary data by administering copies of a well-structured questionnaire to 100 cassava farmers drawn from three local governments in the State. Data analysis was done using descriptive and inferential tools such as frequencies, tables, simple percentages, pie charts, bar charts as well as logit regression model. Results obtained from the logit regression showed that access to market information and farm size have significant positive effects on cassava farmers' participation in the market ($p < 0.05$). Findings also revealed that cost of transportation and dependency ratio have weakly significant negative effects on the likelihood of cassava farmers taking part in the market ($0.05 < p < 0.10$). The conclusion of the study is that access to market information and farm size play significant positive roles in cassava farmers' market participation. Thus, there is the need for government interventions in lowering the transaction costs incurred by cassava farmers. These interventions should focus on ensuring that the farmers can easily access market information, cultivate more farmlands and incur low cost of transportation.

Keywords: Transaction costs, Market participation, Cassava farmers, Osun State, Logit regression

1. INTRODUCTION

Agriculture constitutes one of the main economic activities in Nigeria, contributing about 30% to national income. Majority of Nigeria's population practises small-scale agriculture, with cassava as one of the predominant food crops (Owoseni, Okunlola & Akinwalere,

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2021). As a matter of fact, data obtained from Food and Agriculture Organisation (FAO, 2022) showed that world cassava production was about 303 million tonnes in 2020, with about 64% of this (i.e., about 194 million tonnes) coming out of Africa. Of the total that came out of Africa during that same time, Nigeria accounted for about 60 million tonnes. Since agriculture remains a major sector in Nigeria, commercialising the sector will necessitate improvement in smallholder farmers' market participation ability. The challenges of this category of farmers in the country are multidimensional and as such, numerous interventions would be required to tackle the challenges. These interventions include facilitating efficient rural service delivery through institutional reforms, markets development, physical infrastructure and supportive policies of government, among others. As the agricultural sector in developing countries transforms towards commercialisation, there is the need for systems that are responsive to the needs of smallholder farmers and intermediaries. These systems would take the form of market accessibility, market information, market intelligence and effective farmer organisation. Despite the fact that marketing chains are evolving, smallholder farmers lack the ability of meeting the requirements for high-end markets in most developing countries. This is why the agricultural marketing systems in these countries are dominated by the traditional markets.

The need to devote attention to farmers' market participation derives from the likelihood of their incomes and, consequently, their livelihoods to improve when they can easily access the markets for their products. It has been argued that enhancing agriculture-based economic growth and increasing rural incomes would not be possible without an appreciable improvement in poor rural farmers' market access. Establishing efficient as well as well-functioning markets and trade systems must form the basis for the intensification of agricultural production systems and increased commercialisation. This will ensure that transaction costs are kept low, risks are minimised and information is extended to all actors, regardless of whether they live in urban or rural areas. Transaction costs are expenses that are associated with the buying or selling of a good or service. They represent the labour that is needed to bring a good or service to the market. From the financial point of view, these costs consist of brokers' commissions and spreads, which are the differences between the price the dealer paid for a security and the buyer's price (Downey, 2021). Williamson (1979) sees these costs as been part of the most significant factors when it comes to business operation and management.

Transaction costs comprise two main components, namely, those that are observable and those that are unobservable (de Silva, Ratnadiwakara & Soysa, 2008; Staal, Delgado, & Nicholson, 1997). Observable components are made up of marketing costs which include transport, handling, packaging, storage, spoilage, etc., that are visible when a transaction is conducted. On the other hand, unobservable components are made up of the costs of information search, bargaining, and enforcement of contracts, etc. According to Chowdhury (2003), transaction costs can also be categorised based on whether they are dependent on the volume of trade or dependent on the frequency of trade. The first category, which comprises costs that are incurred in each trade unit, are referred to as proportion transaction costs (PTC). The second category, which consists of costs that are incurred in each trading and hence, does not vary with the volume of trade are called fixed transaction cost (FTC). In practical terms, the two categories may be observed for a particular trade.

Pingali, Khawaja and Meijer (2005) posit that high transaction costs discourage small farmers from participating in the market, thereby robbing them of the benefits derivable from commercialising the agricultural sector. Hence, interventions targeted at the reduction of transaction costs would bring about increased participation of farmers in competitive markets. This would raise their level of productivity and hence meet the broader poverty alleviation

objective. The need for such interventions in a country like Nigeria where smallholder farmers experience difficulty in participating in the market cannot be over-emphasised. This difficulty is as a result of the existence of a set of constraints and barriers which discourage their market participation. Such constrains and barriers make access to markets and productive assets difficult as they are often reflected in hidden costs (Makhura, Kirsten, & Delgado, 2001). It is for this reason that this study was conducted with a view to providing insight into how transaction cost factors can be tackled to ensure that cassava farmers in Osun State, Nigeria participate more in the market.

2. Literature Review

Only a handful of empirical studies have attempted to shed light on the nexus between transaction costs and farmers' market participation decisions in Nigeria. For example, Okoye, Onyenweaku, and Ukoha (2010) examined how cassava farmers' decision to participate in cassava markets is influenced by transaction costs. The authors used primary data on 360 smallholder farmers in South-Eastern Nigeria as well as the Ordered Probit model. Their results showed significant positive effects of access to communication facilities, age, road conditions to the nearest town, yield, membership of cooperatives or social organisations, farming experience and marketing experience on the decision to be autarkic instead of buyer and seller. The study also found significant negative effects of education, distance from the farm to the market, distance to the nearest town, and crop transportation on the decision to remain autarkic instead of seller and buyer.

Using primary data on 320 small holder farmers in South Eastern Nigeria and the Ordered Probit model, Ohajianya and Ugochukwu (2011) investigated how the decision to participate in sweet potato markets is influenced by transaction costs. The results revealed that variables which contributed positively to the decision to be autarkic other than buyer and to be seller other than autarkic include marketing experience, membership of cooperatives/social organisations, farm size, extension contact, and farming experience. Others are age, road conditions to the nearest town, household size, output, access to communication facilities, access to credit, and sex. Findings also showed that variables which contributed negatively to the decision to remain autarkic other than a seller and to be buyer other than autarkic are level of education, distance from the farm to the market, distance to the nearest town, and cost of transportation.

Osebeyo and Aye (2014) used a survey data from 165 farm households in Makurdi Local Government Area (LGA), Benue State, Nigeria and a logit model to assess the link between transaction costs and smallholder tomato farmers' marketing decision. The study found a positive and significant link between the probability of the farmers' participation in the market and each of access to market information and education. On the other hand, results showed a negative and significant relationship between the farmers' participation in the market and each of transport cost, dependency ratio and market distance.

Mani et al. (2019) analysed the factors that determine market participation decisions as well as the intensity of participation using data on 600 smallholder maize farmers in Kaduna State, Nigeria State in 2017. The results of their probit model revealed that individual farmer characteristics as well as private and public assets are related to the probability and intensity of market participation of the farmers.

Okoye, Mbanasor and Okoye (2020) investigated factors that determine the market behaviour of farmers using data on 360 smallholder sweetpotato farmers in South Eastern, Nigeria in 2017. The results of their Heckman Selectivity model showed that female farmers participated more in the market while their male counterparts participated more at farmgate sells. Further findings revealed that area of sweetpotato cultivated, road condition, transportation cost, and market orientation contributed positively to the decision to sell in the market for female farmers, while age exerted a negative effect. For the male farmers, the

authors found that level of education, area of sweetpotato cultivated, household size, market orientation and transportation cost had positive coefficients, while those of distance from farm to the market and age were negative.

One notable point that can be inferred from the empirical review above is that not much effort has been paid to how transaction costs affect market participation decisions among Nigerian farmers in general and those in Osun State in particular. It is worthy of note to point out that a sizable number of farmers in Osun State, Nigeria are involved in the cultivation of cassava. Hence, any attempt to provide insight into the nexus between transaction costs and market participation among cassava farmers in the State will have important impacts on the lives of the people.

3Materials and Methods

The section focuses on the methodology employed in achieving the objective of the study. It comprises the model specification, research design, population, sample size and sampling techniques, research instrument, validity, reliability as well as the methods of data analysis.

3.1 Model Specification

The following econometric model which expresses market participation as an attendant consequence of transaction costs is specified for this study:

$$MKP = f(TCS) \tag{1}$$

where MKP denotes market participation, while TCS denotes transaction costs. In line with extant studies, transaction costs are measured using the following variables:

$$TSC = g(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}) \tag{2}$$

where X_1 is access to market information, X_2 is non-farm work, X_3 is road condition, X_4 is credit availability, X_5 is access to telecommunication facilities, X_6 is personal transport, X_7 is farm size, X_8 is farming experience, X_9 is price of a basket of cassava, X_{10} is market distance, X_{11} is cost of transportation, X_{12} is dependency ratio, and X_{13} is age.

Substituting equation (2) into equation (1) yields the following:

$$MKP = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}) \tag{3}$$

The model to be estimated for the purpose of achieving the main objective for the study is obtained by expressing equation (3) in an explicit form and adding an error term as follows:

$$MKP = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \alpha_9 X_9 + \alpha_{10} X_{10} + \alpha_{11} X_{11} + \alpha_{12} X_{12} + \alpha_{13} X_{13} + \mu \tag{4}$$

where μ is the error term.

3.2 Research Design

This study is based on the use of the descriptive survey design that is targeted at describing the relevant aspects of the phenomena under consideration. The choice of this research design is informed by its appropriateness in providing an accurate and valid representation of how transaction cost variables affect market participation among cassava farmers in Osun State, Nigeria.

3.3 Population of the Study

There are 705 registered cassava farmers across the thirty local government areas (LGAs) in Osun State, Nigeria. As a result of the difficulty in covering all the LGAs in the State, the scope of the study was limited to three LGAS. The three LGAS, which were selected on the basis of their proximity and accessibility, are Ede South, Ede North and Osogbo. The distribution of cassava farmers in the selected LGAs as at April 2022 is presented in Table 1.

Table 1: Total Population of Cassava Farmers in Ede South, Ede North and Osogbo LGAs

S/N	Local Government Area	Number of Cassava Farmers
1	Ede South	46
2	Ede North	27
3	Osogbo	60
	TOTAL	**133**

Source: Cassava Growers' Association of Nigeria (CGAN), Osun State Chapter (2022)

3.4 Sample Size and Sampling Techniques

In arriving at the sample size from the population, the study adopted the formula developed by Yamane (1967) in the spirit of similar studies. The formula is given as follows:

$$n = \frac{N}{1 + N(e)^2}$$

where n denotes the sample size, N is the population size and is equal to 129, while e is margin of error or level of precision. In line with extant studies, the value of e is taken as 0.05 by this study. Hence, the sample size is calculated as follows:

$$n = \frac{133}{1 + 133(0.05)^2}$$

Therefore, $n \approx 100$.

Two stage sampling technique was employed in drawing a sample of 100 from the population of 133. The first stage involved the use of purposive sampling in selecting three LGAs out of the thirty in the State based on their proximity and accessibility. The selected LGAs are Ede South, Ede North and Osogbo. The second stage involved the use of proportional sampling technique based on the Krejcie and Morgan formula in selecting samples proportionately from the three LGAs to arrive at one hundred (100) cassava farmers. The selection is shown below:

$$\text{Stratum Distribution} = \frac{n \times N_n}{population}$$

where n is sample (100), N_n is number of cassava farmers in each of the selected LGAs (strata), while $population$ is the total number of cassava farmers in the selected LGAs.

Hence, the number of samples drawn from Ede South LGA is given as follows:

$$\text{Ede South LGA} = \frac{100 \times 46}{133} \approx 35$$

The number of samples drawn from Ede North LGA is given as follows:

$$\text{Ede North LGA} = \frac{100 \times 27}{133} \approx 20$$

The number of samples drawn from Osogbo LGA is given as follows:

$$\text{Osogbo LGA} = \frac{100 \times 60}{133} \approx 45$$

3.5 Research Instrument

The research instrument used by this study for the purpose of collecting data is a well-structured questionnaire tagged "Analysis of Transaction Costs and Market Participation among Cassava Farmers in Osun State, Nigeria (ATCMPCFOSN)." The questionnaire is divided into three sections, A – C, with sub-scales as follows:

Section A: This section elicits information on socio-economic characteristics of respondents. It consists of four close-ended questions which cover gender, age, level of education and local government of respondents.

Section B: This section consists of seven close-ended and six open-ended questions which focus on the measurements of transaction costs variables.

Section C: This section consists of four close-ended and one open-ended questions which focus on market participation among cassava farmers. The first three are ranked using the Yes or No format (Yes = 1 and No = 0), while the fourth question is ranked as on-market = 1 and off-market = 0. The five questions are aimed at eliciting information on whether each farmer participates in the market or not.

3.6 Validity of the Instrument

Face validity was used to validate the research instrument, i.e., to ensure that the questions stated in the research instrument measure what they were intended to measure. The instrument was subjected to scrutiny by experts in the field who verified the items in the questionnaire for content, construct and face validity.

3.7 Reliability of the Instrument

Cronbach's alpha test is commonly used in ascertaining the reliability of a data collection instrument which will yield a correlation coefficient between 0 and 1. The higher the coefficient, the more reliable the instrument is. According to Gugiu and Gigiu (2017), a standard minimum value of $\alpha = 0.7$ is recommended. In adopting this test, a pilot survey was conducted where thirty copies of the questionnaire were administered to cassava farmers in Egbedore LGA, who were not part of the study population. The results of the test, which are presented in Table 2, showed that there is internal consistency of the instrument with overall Cronbach Alpha of 0.88 and the following psychometric properties for each of the sub-scales were obtained (transaction cost variables: $\alpha = 0.92$; market participation: $\alpha = 0.88$)

Table 2: Summary of Pilot Survey

Variables	Copies Administered	No of Items	Cronbach's Alpha
Transaction Cost Variables	30	14	.921
Market Participation	30	5	.880
OVERALL(All Variables)		**19**	**.884**

3.8 Method of Data Analysis

The study used descriptive as well as inferential statistics in analysing the data collected. Specifically, it used frequencies, percentages and mean under descriptive statistics while logit regression analysis was estimated under inferential statistics. The logit regression analysis was carried out using the Statistical Package for Services Solution (SPSS), version 23. The analysis allowed for measuring the effect of each of the transaction cost variables on market participation. The null hypothesis (H_0) underlying the analysis is that transaction costs do not influence the participation of cassava farmers in the market.

4. Results and Discussion

This section presents the results obtained from the statistical and econometric analysis of the data obtained from the respondents and their discussion. All the copies of the questionnaire administered were retrieved, giving a response rate of 100%. The study proceeded by analysing the socio-demographic characteristics of the selected cassava farmers, after which it assessed the effects of the transaction cost variables on the farmers' participation in the market.

4.1 Socio-Demographic Characteristics of Respondents

The socio-demographic data of the selected cassava farmers such as gender, age, level of education and farm size were analysed using pie chart, frequency counts and bar chart.

A. Gender

The pie chart in Figure 1, which captures the distribution of the gender of respondents, shows that 90% of the farmers are male while the remaining 10% are female. This result portrays the true picture of the involvement of men and women in agricultural activities in Nigeria where farmers are predominantly men.

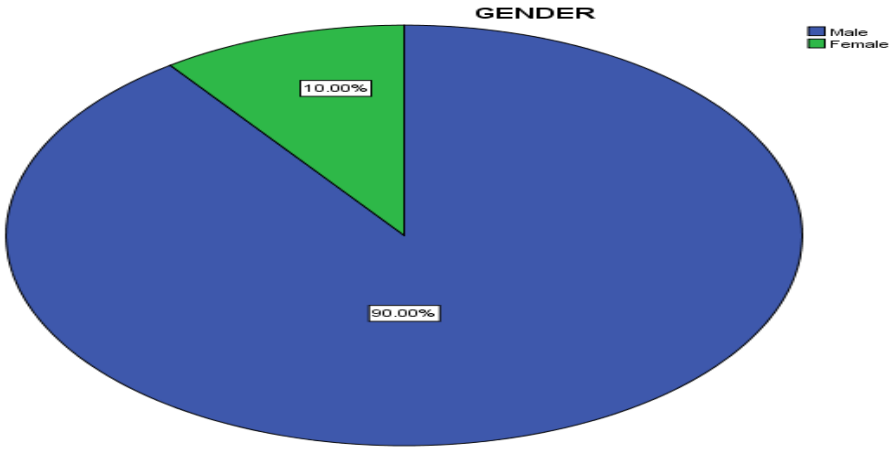

Figure 1: Gender of Respondents

B.Age

Table 3 shows that 4.0% and 16% of the respondents fall within the age ranges of 0–20 and 21-40 years, respectively. The table also reveals that 64% falls within the age range of 41-60 years, while the remaining 16% is made up people above 60 years of age. These findings underscore the sad reality that farming is not popular among the youth in Nigeria.

Table 3: Ages of Respondents

Age Range	Frequency	Percentage (%)
0 – 20	4	4.0
21 – 40	16	15.0
41 – 60	64	64.0
Above 60	16	17.0
Total	**100**	**100.0%**

Source: Authors' Field Work (2022)

C. Educational Level of Respondents

The distribution of the respondents based on their level of education is presented in Figure 2. The figure shows that 9.0% have no formal education, 30.0% have only primary education, 28.0% were educated up to the secondary level, while majority (33.0%) of the respondents have tertiary education. These findings highlight a shift from what used to be the belief among most of the educated people in Nigeria that farming was the exclusive preserve of the uneducated people.

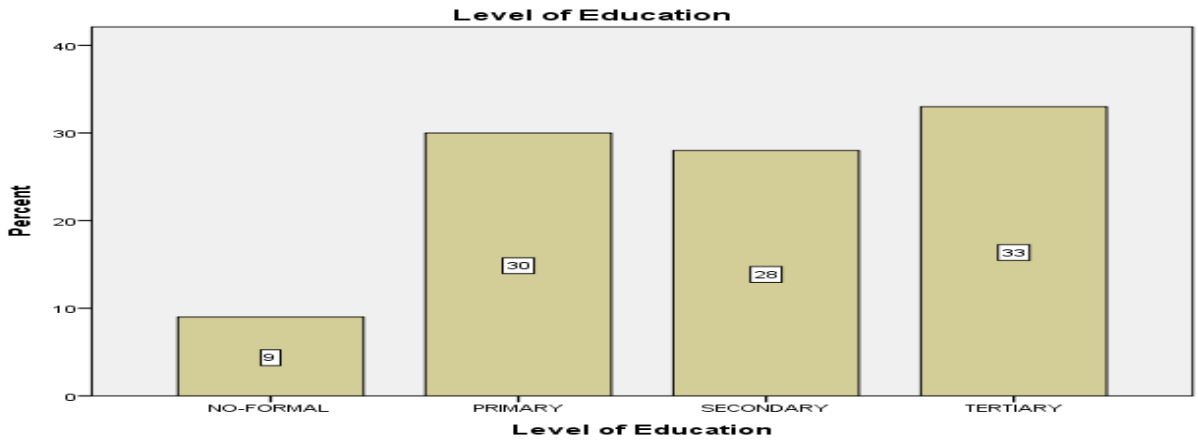

Figure 2: Level of Education of Respondents

D. Farm Size

Table 4 presents the distribution of the respondents on the basis of the size of their farmlands. The table shows that 93.0% of the farmers have farmlands that are less than 6 hectares, while the remaining 3.0% cultivate on a farm size of 6 hectares and above for cassava production. These results underscore the fact that most of the farmers in Nigeria are smallholders and that farming activities in the country are not yet on a large scale.

Table 4: Respondents' Farm size

Farm size (Hectares)	Frequency	Percentage (%)
Less than 2	24	24.0
Greater than 2 but less than 4	67	67.0
Greater than 4 but less than 6	6	6.0
6 and above	3	3.0
Total	**100**	**100.0%**

4.2 Logit Regression Results

The results of the logit regression analysis carried out to assess the effects of the transaction costs variables on the participation of the cassava farmers in the market are reported in Table 5. The table shows that market information, road condition, access to telecommunication facilities, use of personal means of transportation, farm size, farm experience, cassava price and age have positive effects on the likelihood of farmers to participate in the market. These results are in line with a priori expectations because the more those variables increase, the more incentivised farmers are in participating in the market. For example, farmers are more likely to participate in the market when market information and telecommunication facilities are easily accessible than when they are not. Access to market information coupled with availability of telecommunication facilities will enable farmers to analyse the situations prevailing in the market especially where the level of demand for their produce and prices are concerned. This will almost certainly save the farmers from the agony of returning home without selling their produce or being forced to sell at prices that are not desirable, which has consequences for profitability. Also, cassava farmers are likely to participate more in the market the higher the price of cassava so as to be enable to benefit from the high price of their produce. In addition, the better the condition of the road farmers ply in transporting their

produce to the marker, the more they are likely to participate in the market. This is because the good condition of the road will lower the cost incurred by the farmers in marketing their produce, and thus the higher their profit. In addition, the larger the size of their farms, ceteris paribus, the more cassava they are likely to produce, and the more they are likely to participate in the market.

On the other hand, non-farm work, availability of credit facilities, market distance, cost of transportation and dependency ratio have negative effects on farmers' market participation. The findings on market distance, transport cost and dependency ratio are consistent with a priori expectations because of their negative relationship with farmers' profitability. For example, the more the distance farmers have to cover to get their produce to the market, the more farmers will have to pay in terms of transport cost and hence, the less likely they are to participate in the market in order to maximise their profit. Also, the higher the number of household members farmers have to cater for (high dependency ratio), the lesser the likelihood of their market participation. This is because greater part of their produce is likely to be consumed by their dependants while little or nothing will be left for the market (Osebeyo & Aye, 2014). The finding on availability of credit facilities is inconsistent with a priori expectation because it is expected to induce farmers to participate more in the market. However, this result may not be surprising in the context of a country like Nigeria where credit facilities are usually not available for investment purposes or when they are available, they come with high rates of interest.

In terms of statistical significance, however, only access to market information and farm size have effects that are significant among the variables that are positively related to the farmers' market participation ($p < 0.05$). The result on access to market information is in line with the finding of Osebeyo and Aye (2014), while the one on farm size is consistent with the result of Ohajianya and Ugochukwu (2011). On the other hand, only transport cost and dependency ratio have effects that are significant although weakly ($0.05 < p < 0.10$) among variables that are negatively related to the farmers' market participation. The finding on cost of transportation is in line with that of Osebeyo and Aye (2014).

Table 5: Logit Regression on Transaction Costs Variables

Variable	Coefficient	Standard Error	z-statistic	p-value
Constant	3.502**	1.976	1.818	0.057
Market information	2.608***	0.858	3.037	0.006
Non-farm work	-0.296	0.863	-0.262	0.796
Road condition	0.134	0.639	0.287	0.765
Credit	-0.680	0.703	-0.967	0.340
Telecommunication	0.481	0.871	0.553	0.636
Personal transport	0.249	0.284	0.876	0.367
Farm Size	0.353**	0.156	2.265	0.033
Farm experience	0.772	0.741	1.042	0.319
Cassava price	0.132	0.206	0.643	0.645
Market distance	-0.269	0.165	-1.623	0.104
Transport cost	-0.865*	0.505	-1.711	0.098
Dependency Ratio	-0.806*	0.432	-1.865	0.074
Age	0.071	0.233	0.305	0.754
Log likelihood	42.614**			0.042

Source: Authors' Compilation Using SPSS (2022)

5 Conclusion

This study has investigated the effects of transaction costs on market participation among cassava farmers in Osun State, Nigeria. This was with a view to providing insight into how transaction cost factors can be managed to ensure that cassava farmers in Osun State participate more in the market for the purpose of promoting cassava production in particular and agricultural growth in general as a means to poverty alleviation among rural households. Access to market information, non-farm work, road condition, credit availability, access to telecommunication facilities, personal transport, farm size, farming experience, price of a basket of cassava, market distance, transport cost, dependency ratio, as well as age were used as proxies for transaction costs. The study made use of primary data by administering copies of a well-structured questionnaire to 100 cassava farmers drawn from three local governments in the State. Data obtained were analysed descriptively using frequencies, tables, simple percentages as well as pie and bar charts. Data collected were also analysed by inferential statistical procedure using Logit regression model.

Results of the descriptive analysis showed that nine out of every ten cassava farmers in the three selected LGAs are male, and that eight are above 40 years of age. The findings also revealed that majority of the farmers were educated up to the tertiary level and they are smallholder farmers based on the size of their farmlands. Results of the logit regression showed that access to market information and farm size have significant positive effects on cassava farmers' participation in the market. The study also found that transport cost and dependency ratio have weakly significant negative effects on the probability of cassava farmers to participate in the market. The study therefore concludes that transaction costs play significant roles in the participation of cassava farmers in the market.

Based on these findings, the following measures are recommended for managing transaction cost factors to ensure that cassava farmers in Osun State, Nigeria participate more in the market:

(i) More women should be encouraged to participate in cassava farming in order to boost productivity.
(ii) Cassava farming in particular and agriculture in general should be made more attractive to young people.
(iii) More farmlands should be made available for cassava farming.
(iv) An enabling environment should be created for farmers to have easy access to market information. One way of doing this is to encourage them to participate more in farmers' associations.
(v) Steps should be taken to reduce costs associated with transporting farm produce to the market drastically through the provision of good road networks, among others.
(vi) Cassava farmers should be encouraged to maintain manageable family size in order to reduce their dependants to the barest minimum and increase their market participation.

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Author Contributions

Conceptualization, Eyitayo Oyewunmi Ogbaro and Gloria Itunuoluwa Ladapo; Methodology, Eyitayo Oyewunmi Ogbaro and Ganiyu Biodun Bakare; Software, Eyitayo Oyewunmi Ogbaro and Gloria Itunuoluwa Ladapo; Validation, Eyitayo Oyewunmi Ogbaro, Ganiyu Biodun Bakare and Gloria Itunuoluwa Ladapo; Formal Analysis, Eyitayo Oyewunmi Ogbaro; Investigation, Eyitayo Oyewunmi Ogbaro; Resources, Eyitayo Oyewunmi Ogbaro and Gloria Itunuoluwa Ladapo; Data Curation, Eyitayo Oyewunmi Ogbaro, Ganiyu Biodun

Bakare and Gloria Itunuoluwa Ladapo; Writing – Original Draft Preparation, Eyitayo Oyewunmi Ogbaro, Ganiyu Biodun Bakare and Gloria Itunuoluwa Ladapo; Supervision, Eyitayo Oyewunmi Ogbaro.

Conflicts of Interest

The authors declare no conflict of interest.

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