Determinant of smallholder plantain farmers participation in market

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ABSTRACT

Increased participation of smallholder farmers in the output market shall go a long way in improvement of livelihood and sustainable agricultural development. However, there is dearth of information about factors influencing market participation of plantain farmers in the study area. Factors influencing participation of Plantain farmers in the output market in two local government areas of Osun state, Nigeria were studied. A multistage stage sampling approach was adopted to select a sample of 97 plantain farmers. Primary data on socioeconomic characteristics yield and constraints to market participation were collected using semi-structured questionnaires. Data collected were analyzed using descriptive statistics and Probit regression and Household Commercialization Index (HCI). Findings showed that majority of the farmers (81.4%) participated in Plantain market. Result of the Probit regression revealed that marital status, household size, access to market information, farmer's age and farm size were the factors influencing participation of the smallholder's plantain farmers in the market. The most important constraints to market participation in the study area were inefficient transport system and bad road (94%).The study therefore brings to the fore that increasing farm size should be accompanied with appropriate capacity building and deeper knowledge of production and market forces at farmer's level.

Key words: Plantain, output market, probit regression, smallholder farmers.

Plantain production is profitable (Adeoye and Oni, 2014; Nwaiwu *et al.,* 2012), contribute to food security (Adeoye *et al.,* 2013) and occupies a strategic position for rapid food production in Nigeria due to its short gestation period and low production cost (Akinyemi *et al.,* 2010). Farming households, therefore intuitively produce enough quantities of crops to meet both consumption requirements and market demand (Adenegan *et al.,* 2013). Participation in output market shall go a long way in achieving sustainable livelihood, economic empowerment and disrupt poverty traps. However, in most developing markets like Nigeria, the small holder farmers are poorly integrated into the markets. This is because market participation is directly associated with the generation of a market surplus, which is influenced by productivity (Rios *et al.,* 2009) whereas, small holder farmers face a lot of production and marketing constraints which limit their productivity. Majority have less land to farm and few assets; lack access to high-quality farm inputs, credit, modern agricultural technology and information (Mgbenka *et al.,* 2015). They are often cut off from markets due to geographic isolation with poor transport and market infrastructure contributing to high transaction cost (Ohen *et al.,* 2013). Their rights to land and other resources are weak; and therefore do not have adequate access to markets in a way that can increase their productivity and lift them out of poverty. A farmers' decision to produce either strictly for sale, or to participate in a market by selling off what remains after consumption therefore depend on many factors other than the price of a commodity (Chilundika, 2011). Market participation is defined as involvement in any market related activity which promotes the sale of produce (Holloway *et al.,* 2005). Farmers' participation in markets enables them realize their comparative advantage in agricultural production (Timmer, 2005). For one thing, markets provide the opportunity for farm production to contribute to poverty reduction through the cash income realized from sales of farm produce. In turn, markets drive production as farmers strive to meet the demands of consumers and end-users (Obi *et al.,* 2012). Markets are prerequisites for enhancing agriculture-based

economic growth and increasing incomes particularly for the rural poor households (Adeoti *et al.,* 2014; Ohen *et al.,* 2013; Barett, 2007). Increased participation of small holder farmers in markets is therefore considered vital for sustainable agricultural development and economic growth. Previous studies on the market participation of agricultural crop producers include those of Adepoju *et al.,* (2015), Adeoti *et al.,* (2014), Ohen *et al.,* 2014; 2013), Adenegan *et al.,* (2013), Egbetokun and Omonona, (2012) and Gani and Adeoti, (2011). They examined the factors determining small holder market participation of various crops. These factors include Age of farmers, Education, Gender, Distance, Output price, Access to market information, Extension contact, Credit access, farm size, Yield, Wealth, Transportation efficiency, Group membership, Contractual agreement, Road condition and Transaction cost. None of these studies examined the drivers of small holder plantain farmers' participation in markets despite the fact that plantain is a high market value crop and its production merits high among small holder farmers. It therefore becomes imperative for this study to examine the factors influencing smallholder plantain farmers' market participation.

MATERIALS AND METHODS

The study was conducted in Osun state, Nigeria. The state lies between Latitude 7°30´N of the Equator and Longitude 4°30´E of the Greenwich meridian on a land area of about 9,251 km². Osun state shares boundaries with Kwara state in the North, Oyo state in the West, Ogun state in the South, Ondo and Ekiti states in the East. The provisional 2006 population census result put the population of Osun state at 3,423,535 (NPC, 2006 Estimate), comprising mainly the Yoruba ethnic group. The people are predominantly peasant farmers cultivating mostly cash crops, food crops, fruits and vegetables as well as livestock. The state has 2 distinct climatic seasons, namely the Dry and Wet season. The natural vegetation comprises moist evergreen and semi-evergreen forest and secondary forest, with mean annual rainfall ranging between 1400 to 2000 mm while mean annual temperature ranges between 25°C to 27°C 2 which supports agricultural production in the area.

A multistage stage sampling approach was adopted to select a sample of 97 plantain farmers from three local governments namely Irewole, Ife South and Olaoluwa Local Government Areas of Osun State. Primary data on socioeconomic characteristics, Farming systems and cultural practices, Yield, Determinants of market participation and constraints were collected using semi-structured questionnaires. Data collected were analyzed using descriptive statistics, Probit regression and Household Commercialization Index (HCI).

Model Specification

Probit Model was employed to identify drivers of small holder plantain farmer's market participation. The binary probit regression model was adopted following Gujaratti, (2006). This is because the response variable (market participation) is not quantitative or an interval scale. Market participation, denoted by Y therefore assumes the value of 1, if the plantain farmer participates in market where $Y \geq Y^*$ given a threshold, $(Y^*) = 75\%$ sales of produce and 0 otherwise if $Y \leq Y^*$ following the method adopted by Ohen *et al.,* (2013).The Probit model specified in this paper to analyse drivers of market participation among plantain producers is specified as:

$$Y^* = \beta_o + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_n x_n + \mu \quad (1)$$

Y*= Household Commercialization Index (1= if Participate and 0 otherwise)

β = Vectors of parameters to be estimated.

X = Set of explanatory variables

μ=Disturbance term

The explanatory variables were:

X_1 = Gender of farmers (dummy variable 1 representing male farmer while 0 otherwise)

X_2 = Marital Status of farmers (dummy variable while 1 represents married and 0 otherwise)

X_3 = Household size (Number of individuals in the household)

X_4 = Experience in farming (Years)

X_5 = Access to Extension (1= Access 0 = No)

X_6 = Access to credit (1= Access 0 = No)

X_7 = Access to Market Information (1= Access 0 = Otherwise)

X_8 = Mode of farming (dummy variable while 1 represents full time and 0 otherwise)

X_9 = Membership of market association (1= Yes, 0 = No)

X_{10} = Farm size (continuous variable and it is captured by number of hectares of cultivated by the farmers.

X_{11} = Years of formal education (continuous variable measured in years)

X_{12} = Age of farmers (continuous variable measured in number of years)

The Household Commercialization Index (HCI) is the ratio of the gross value of all plantain sales per to the gross value of all plantain produced. This is depicted as:

$$HCL = \frac{\text{Gross value of plantain sold}}{\text{Gross value of plantain produced}} \text{ x100}$$

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Plantain Producers

Results revealed that majority of the plantain producers were males (78%), married (76.3%) and between 31-40 years age group (45%) having household size of 1-5 persons (56%)(Table 1). This implies that males in their active working age produce plantain, as a means of livelihood to sustain their families. Most had secondary education (54%) and farming experience of 6-10 years (40%) which conforms to the findings of Nwaiwu *et al*., (2012) that low level of formal education might affect the level of technology adoption. Results further revealed most of the farmers were full time (67%) small holder producers having 1-5 ha of farm size (65%). Similar trends were observed by Adeoye *et al.,* (2013) and Akinyemi *et al.,* (2010) who reported that small holder producers dominate plantain production in Nigeria. This may limit farmers' scope of operation and ability to generate market surplus to facilitate participation in markets. The fact that majority (53%) sourced their planting materials from the open market implies that the farmers have limited access to improved plantain suckers which may affect productivity levels. Results revealed only 55% of the farmers had access to extension service. According to Gani and Adeoti (2011), farmers who have access to extension agents are more likely to participate in markets. Furthermore, less than half (34%) of the farmers had access to credit. Inadequate access to funds and credit limits farmers' ability to invest in market infrastructures which might influence their participation in market negatively. According to Oladejo, (2015) access to credit has significant effect on marketing efficiency. The result of the analysis indicated that 81.4% of the farmers participated in the market while 18.6% did not participate in plantain markets. This is an indication that the majority of the farmers participated in the market despite their challenges.

Table 1: Socioeconomic Characteristics of Plantain Producers

Variable	Frequency	Percentage
Sex of Respondents		
Male	76	78
Female	21	22
Marital Status		
Single	13	13.4
Married	74	76.3
Divorced	4	4.1
Widowed	6	6.2
Age		
21-30	11	11.34
31-40	44	45.36
41-50	21	21.65
51-60	13	13.40
61-70	8	8.25
Level of Education		
No formal	13	13.4
Primary	14	14.43
Secondary	52	53.61
Tertiarty	18	18.56
Household size		
1-5	54	55.67
6-10	41	42.27
11-15	2	2.06
Experience in farming		
1-5	5	5.15
6-10	39	40.21
11-15	35	36.08
16-20	5	5.15
>21	13	13.4
Farm Size		

(hectare)		
<1	27	27.84
1-5	63	64.95
6-10	6	6.19
11-15	1	1.03
Farming system employed		
Sole cropping	38	39.18
Mixed cropping	46	47.42
Shifting cultivation	13	13.4
Source of planting materials		
Open market	51	52.58
Research Institution	12	12.37
Own farm	32	32.99
Friends	5	5.15
Access to Market Information		
Yes	43	44.33
No	54	55.67
Mode of Farming		
Full time	65	67.01
Part time	32	32.99
Access to Extension		
Yes	53	54.64
No	44	45.36
Access to Credit		
Yes	33	34.02
No	67	69.07
Type of Labour		
Hired	33	34.02
Family	9	9.28
Self	13	13.40
All combined	42	43.29
Participation in market		
Participating	79	81.4
Do not participate	18	18.6

Source: Field Survey, 2016

Drivers of Plantain Farmers Market Participation

The result of the probit regression showed that the Chi-square value was 55.83 and was significant at 1% indicating that the model has a good fit to the data. The pseudo R square was 0.6629 indicating that the explanatory variable explained about 66% of the variable determining market participation among small holder's farmers.

The variables that significantly influence farmer's decision to participate in plantain markets were Age, household size, access to market information, farm size and marital status of farmers. The variable age is significant at 1% and positively influenced market participation decision of the farmers. This is an indication that an increase in the age of farmer increases the probability of participating in plantain markets by 0.08%. This reveals that older farmers are willing to participate in the market than younger ones in the study area. According to Martey *et al* (2012) older farmers were found to make better decision and have greater contacts which may enable them to seek for better market for their produce.

Household size was significant at 5% and negatively influenced market participation. This is an indication that an increase in the family size would lead to reduction in market participation. This may be due to the fact that more of the produce may be used in household consumption. Similar trend was observed by Nwigwe *et al* (2009) in which large household size negatively influence farmer's participation in yam output market. According to Omiti *et al* (2009), a large household size is labour inefficient and produces less output thereby leaving smaller and decreasing proportions for sale.

Access to market information was found to be negative and statistically significant at 5%. Farmers in the study area had inadequate price information which affected negatively their participation in the market. Farm size was significant and negatively associated with market participation. This is an indication that a unit increase in the size of the farm would lead to 0.40% reduction in market participation. This infers that productivity and management of land resources is very crucial because of its effect on yield. This indicates that management of available land resources is crucial in improving total productivity level and quantity of produce. Similar trend in the relationship between

farm size and market participation was observed by Egbetokun and Omonona (2012). They found negative and significant relationship between farm size and market participation. According to Randela *et al* (2008), negative relationship between land size and commercialization may indicate that increased market participation is a function of input (land) productivity. Thus productivity of land is crucial in determining the quantity of produce that will be taken to the market. The variable marital status was negative and significant at 5% level. This shows that a unit increase in marital status will lead to probability of 1.65% decrease in market participation. This is contrary to the findings to Egbetokun and Omonona (2012) whose findings revealed a positive and significant impact of marital status on market participation.

Table 2: Drivers of Smallholder Plantain Farmers Participation in Output Market

Variable	Coefficient	Standard Error	Marginal Effect	P>Z
Gender	-3.444	2.167	-0.265	0.097
Age	0.202	0.084	0.0155	0.007***
Household size	-0.348	0.164	-0.027	0.019**
Experience in Farming	0.014	0.338	0.001	0.966
Access to Extension	0.873	0.913	0.067	0.326
Access to credit	0.344	0.775	0.027	0.653
Access to Market Information	-1.913	0.855	-0.147	0.011**
Mode of farming	-0.891	0.654	-0.068	0.157
Members of Farmers Association	0.640	0.831	0.049	0.441
Farm size	-0.401	0.122	-0.0308	0.000***
Level of Education	0.585	0.451	0.0450	0.179
Marital Status	-1.625	0.866	-0.125	0.044**
Constant	3.958	3.543		
Log likelihood	-14.1934			
Pseudo R^2	0.663			
Prob>chi^2	0.0000			
Chi^2	55.83			

Source: Field Survey, 2016 ** significant at 5% *** significant at 1%

Table 3: Constraints to Market Participation

Constraints	Frequency	Percentage (%)
Inadequate access to market information	72	75.0
Educational level	39	41.0
Distance to market	86	89.0
Quantity harvested	69	72.0
Low unit price	43	45.0
Inadequate transportation and bad road	91	94.0
Membership of market association	70	73.0
Poor extension service	48	50.0
Pests and diseases	66	68.0
Inadequate input supply	63	65.0
Land tenure problem/access to land	53	55.0

Source: Field survey, 2016

However, the variables gender, experience in farming, access to extension and credit, mode of farming, members of farming association, and level of education had no effect on farmers decision to participate in the market.

Constraints to Market participation

The most important constraints to market participation in the study area (Table 3) were inefficient transport system and bad road (94%), distance to market (89%) and inadequate access to market information (75%). According to Nwaiwu *et al*., (2012), about 95% of plantain and banana farmers suffer marketing problems such as poor road network and lack of vehicles which might discourage large scale production.

Poor road networks also result in high transportation cost (Adeoye *et al*., 2013) which might reduce the farmers' profits in plantain production. Others include: non membership of market association (73%), quantity harvested (70%), pest and disease problems (68%), inadequate input supply (65%), land tenure problem and access to land (55%), poor extension service (50%), low unit price (45%) and level of education (41%). This implies that the farmers' level of education do not necessarily affect their participation in market, probably because the plantain farmers in the study area had more years of farming experience and may be familiar with the market structures and functions.

CONCLUSION

The study investigated the drivers of smallholder plantain farmers' participation in markets in Osun state, Nigeria. The results indicated that most of the farmers cultivated between 1-5 hectares of farm land in a mixed cropping system and had limited access to credit. Findings from the study indicated that, the significant drivers of smallholder plantain farmers' participation in markets were; marital status, household size, access to market information, farmer's age and farm size. The most important constraints to market participation were inefficient transport system and bad road (94%), distance to market (89%) and inadequate access to market information (75%). The least constraints were poor extension service, low unit price and level of education. Based on the results, the study recommends that:

Increasing farm size should be accompanied with appropriate capacity building and deeper knowledge of production and market forces at farmer's level.

Stakeholder consultative processes should be strengthened to stimulate increased market information flow and access.

REFERENCES

Adepoju, A.O., Owoeye, I.T. and Adeoye, I.B. 2015. Determinants of Market participation among Pineapple farmers in Aiyedaade Local Government Area, Osun State, Nigeria. *International Journal of Fruit Science,* 15(4):392-404.

Adenegan, K.O., Olorunsomo, S. O. and Nwauwa, L.O.E. 2013. *Global Journal of Management and Business Research Finance.* 13(6): 57-66.

Adeoye, I.B. and Oni, O.A. 2014. Competitiveness and Effects of Policies on Plantain Production Systems in Southwestern Nigeria. *Agris-on-line Papers in Economics and Informatics.* 4(4)3-13.

Adeoye, I.B., Oni, O.A., Yusuf, S.A. and Adenegan, K.O. 2013. Plantain Value Chain Mapping in South Western Nigeria. *Journal of Economics and Sustainable Development*. 4(16): 135-145.

Adeoti, A.I., Oluwatayo, I.B. and Soliu, R.O. 2014. Determinants of Market Participation among Maize Producers in Oyo State, Nigeria. *British Journal of Economics, Management & Trade,* 4(7): 1115-1127.

Akinyemi, S. O. S, Aiyelaagbe, I. O. O, Akyeampong, E. 2010. Plantain (Musa spp.) Cultivation in Nigeria: a Review of Its Production, Marketing and Research in theLast Two Decades. Proc.IC on Banana & Plantain in Africa Eds.: T. Dubois et al., *Acta Horticulturae*, 879: 211 - 218.

Barrett C. 2007. Small holder market participation: Concepts and evidence from Eastern and Southern Africa. *Food Policy*. 33(4):299–317.

Chilundika, N. 2011. Market Participation of Bean smallholder farmers in Zambia: A gender Based Approach. A Research Report presented to the Department of Agricultural Economics and Extension Education of the University of Zambia in partial fulfillment of the requirements for the Degree of Bachelor of Agricultural Sciences.

Egberongbe, O.A. and Omonona, B.T. 2012. Determinants of Farmers' Participation in Food Market in Ogun State. *Global Journal of Science Frontier Research, Agriculture and Veterinary Science.* 12,(9): 25 -30.

Gani, B.S and Adeoti A.I.2011. Analysis of Market Participation and Rural Poverty amongFarmers in Northern part of Taraba State, Nigeria. *Kamla-Raj, Journal of Economics*, 2(1)23-36.

Holloway, G.J., Barrett, C.B. and Ehui S. 2005. The Double Hurdle Model in the Presence of Fixed Costs. *Journal of International Agricultural Trade and Development*. 1:17-28.

Martey, E., Al-Hassan, R.M and Kuwornu, J.K.M. 2012. Commercialization of smallholder agriculture in Ghana: A Tobit regression analysis. *African Journal of Agricultural Research*, 7(14): 2131-2141.

Mgbenka, R.N., Mbah, E.N. and Ezeano, C.I. 2015. A Review of Small holder Farming in Nigeria: Need for Transformation. *Agricultural Engineering Research Journal* 5(2): 19-26.

National Population Census (NPC) 2006. National Bureau of Statistics official Gazette. (FGP71/52007/2 500(OL.24) Abuja URL. http//www.nigerianstat.gov.ng.

Nwaiwu, I.U., Eze, C.C., Amaechi, E.C.C. and Osuagwu, C.O. 2012. Problems and Prospects of Large Scale Plantain Banana (Musa Spp) Production in Abia State, Nigeria. *International Journal of Basic and Applied Sciences*, 1(4):322-327.

Nwigwe, C., Okoruwa, V., Nkamleu, B., Omobowale, O. and Oyekale A. 2009.Socioeconomic Factors affecting Intensity of Market Participation among Smallholder Yam-Based System Farmers in Oyo North Area of Nigeria. International *Journal of Economic Perspectives,* 3(2): 131-140.

Obi, A., Schalkwyk, H.D. and Tilburg A. 2012. Market Access, Poverty Alleviation and Socio- economic Sustainability in South Africa. Unlocking Markets to Small Holders: Lessons from South Africa. Mansholt Publication Series, Vol 10. Wageningen Academic Publishers. ISBN 978-90-8686-134-7.

Ohen, S.B., Umeze, G.E. and Cobham, M.E. 2014. Determinants of Market Participation by Cucumber Farmers in Odukpani Local Government Area, Cross River State, Nigeria.*Journal of Economics and Sustainable Development*. 5(2):188-196.

Ohen, S.B., Etuk, E.A. and Onoja, J.A. 2013. Analysis of Market Participation by Rice Farmers in Southern Nigeria. *Journal of Economics and Sustainable Development*. 4(7):6-11.

Oladejo, J.A. 2015. Effects of Credit Accessibility on Performance of Tomato Market in Osun State, Nigeria. *European Journal of Business and Management*. 6(7):57-64.

Omiti, J., Otieno, D. Nyanamba, T. and Mc Cullough, E. 2009. Factors influencing the Intensity of Market Participation by Small holder Farmers: A Case Study of Rural and Peri-Urban Areas of Kenya. *African Journal of Agricultural and Research Economics*, 3(1)57-82.

Randela, R. Alemu, Z.G. and Groenewald, J.A. 2008. Factors Enhancing Market Participation by Small-scale Cotton Farmers. *Agrekon* 47(4):451-469.

Rios, A.R., Shively, G.E. and Masters, W.A. 2009. Farm Productivity and Household Market Participation: Evidence from LSMS Data. Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009.

Timmer, P. 2005. Agriculture and pro-poor growth: An Asian perspective. Center for Global Development, Working Paper No. 63, July 2005.