Market-Oriented or Not: A Gender Situation Analyses of Small Holder Sweet potato Farmers in South-East Nigeria

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Abstract

Farmers can only be market oriented if his/her production plan follows market signals and produce commodities that is more marketable. In other to achieve it, this study provided empirical evidence on the gender analyses of market orientation in South-East, Nigeria. A stratified sampling design was used to select 360 sample respondents in 2017. Market Orientation Index (MOI) and Heckit selectivity model were used to estimate the level of market orientation and determinants of market orientation respectively. The results show a mean market orientation score (0.17 and 0.59) for the male and female sweet potato farmers respectively, indicating low level of market orientation especially for the male farmers. The coefficients for age, educational level, capital, area cultivated with sweet potato, farming experience, marketing experience, native of community, and road conditions were positive and household size negative and significantly related to market orientation for female farmers. Coefficients for age, household size, level of education, transportation cost, native of community, and marketing experience were positive and distance from farm to the market was negative and significantly related with market orientation for the male farmers. The coefficients for gender were negative and significant at 5% and 1% for probability of being market oriented and level of market orientation respectively, indicating that the female farmers were more likely to be market oriented compared to their male counterparts. The study therefore calls for policies on promoting farmers access to land (particularly the female farmers), availability and the use of quality planting seed and establishment of formal sweet potato market.

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International Journal of Agricultural Management and Development, 10(1), 87-100, March 2020.

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INTRODUCTION

Market-oriented production begins with an understanding of the market, demand, and involvement in the selection of suitable crop and procedures that can supply the demand and generate profits over time. In diverse areas, especially in agricultural sector, market-orientation can be seen as an extent of use of knowledge by a producer about the market (Gebremedhin & Jaleta, 2010). According to Kohli and Jaworski (1990) market orientated farming is refers as a basis to make decisions on the three basic economic questions of what to produce, how to produce and how to market. It is also the degree of allocation of resources (land, labor and capital) to the production of agricultural products that are meant for exchange or sale by Hinderink and Sterkenburg(1987) and Immink and Aarcon (1993). Berhanu and Moti (2012) noted market-orientation as the relative importance of more marketable crops in the crop mix of the household. Underlying market-orientation as the profit motive of households as posited by Pingali and Rosegrant (1995) and Pingali, (2001) with the realization of profit depending on market revenues following the study of Gebremedhin and Jaleta (2010).

Farmers can only be market-oriented if his/her production plan follows market signals and produce commodities that is more marketable (Gebremedhin and Jaleta, 2010). Under a semi commercial system, where both market and home consumption play a central role in production decision, all crops produced by a household may not be marketable at same proportion. Thus, households could have different levels of market-orientation depending on their resource allocation (land, labour and capital) to a more marketable commodity. In market-oriented farming, the farm is being run as a business of buying inputs, to produce agricultural products, marketing these products and also selling them for cash. The main goal is increased profits. To be successful in market-oriented farming, farmers require knowledge of farm management particularly to the crop involved.

Gebremedhin and Hoeskstra (2008) study on market-orientation of smallholder in selected grain in Ethiopia shown that about 65–77 percent of households produce these market-oriented commodities on about 27–44 percent of the total cultivated area, only 47–60 percent of the produce of these market-oriented commodities is sold. A large body of literature have analyzed determinants of market-orientation. The study by Berhanu and Moti, (2012) shown that large household size leads to reduction in level of household market-orientation due to its effect on increasing household domestic consumption needs, according to a priori expectations. Hence, control for labour supply and larger households had a lower market-orientation as posited by Gebremedhin and Jaleta (2010). Educated households (are expected to have better skills, and better access to and ability to process information) was positively associated with market-orientation. Reduction in marketing costs, and increased profitability (yield) influenced the level of market-orientation among farmers positively. Sadoulet and de Janvry, (1995) noted that with imperfect land markets, households with larger farm holdings may likely, be more market-oriented with higher outputs as shown by von Braun and Immik, (1994). Hence, household endowments of land, labour and farm equipment had a direct relationship with market-orientation. Further studies by Alene et al., (2008);Barrett, (2007); De Janvry et al., (1991); Gabre-Madhin, (2001); Key et al., (2000);Pender and Alemu, (2007) and Sadoulet and D Janvry, (1995) showed that nearness to markets, roads, and ownership of transport reduced marketing costs, thereby encouraging market-orientation.

The degree of farmer's level of knowledge in farming and marketing are the major determinant of its success following Selnes et al. (1996). Although, sweet potato is a crop with high versatility with respect to growing conditions and low susceptibility to natural

disasters such as hurricanes (Singh et al. 2008). It is also amenable to the typical small-scale farming systems that characterize in Nigeria. In most parts of Nigeria, sweet potato production is mainly grown and marketed by women with few number of men cultivating sweet potato on their own plots for its profitability (David and Madu, 2014 and Olagunju et al., 2013). The effect of market-oriented production across gender depends on how production plan is organized at the household level; with specifics on provision of labour, decision making (marketing decision) and income control.

METHODOLOGY

The study was carried out in South-East Geo-Political Zone of Nigeria. A stratified sampling design was used for the study. The design adopted five stage multi method that involves random and systematic procedures with 360 respondents selected. Three out of the five states in the South-East Geo-Political zone were randomly selected for the study. For the second stage two agricultural zones per state were randomly selected. In the third stage, two Local Government Areas (LGAs) were randomly selected from each zone. In the fourth stage, three communities were selected randomly from each LGA and in the last stage, 10 (5 males and 5 females) sweet potato producers were systematically sampled. A cross sectional data were collected by the use of structured questionnaires in 2017.

Market-Orientation Index (MOI) was used to estimate the level of market-orientation following Berhanu and Moti (2012). This was done for both male and female smallholder sweet potato farmers. The determinants of market-orientation were also estimated using Heckit selectivity model (Heckman, 1979) following a Double Hurdle procedure. Household's market-orientation index (MOI$_i$) was estimated from the land allocation pattern of the household weighted by the marketability index Thus;

$$MOI_i = \frac{\sum \alpha_i L_i}{L^T} \qquad (1)$$

where,

MOI$_i$= market-orientation index of farmer,
L$_i$=size of land allocated to sweetpotato
L^T=total crop land operated by the ith farmer
α_i= proportion of sweetpotato sold (marketability index, α_i) as

$$\alpha i^. = \frac{\sum_{i=1}^{N} Si}{\sum_{i=1}^{N} Qi} \quad Q_{i \geq} S_i \text{ and } 0 \leq \alpha_i \leq 1 \qquad (2)$$

where,

S$_i$= the proportion of sweetpotato sold
Q$_i$ = total amount produced

MOI takes a value between 0 and 1, inclusive. Crops mainly produced for markets usually have MOI value closer to 1. Value of 0.5 and above are market-oriented while value of 0.49 and below were not for this study. The higher proportion of land a farmer allocates to the more marketable sweetpotato, the more the farmer is market-oriented.

The determinants of market-orientation were estimated using Heckit selectivity model (Heckman, 1979) following a Double Hurdle procedure. In the first stage, probit link function was used to estimate if producers are market-oriented or not and in the second stage, the level of market-orientation was estimated simultaneously by Heckit Estimation. This model has advantage over the Tobit model by eliminating sample selection bias as observed by Gebremedhin et al. (2009); Makhura et al. (2001); Siziba et al. (2011) and Ouma et al. (2010). The inverse mills ratio (lambda) for the level of market-orientation if significant, imply that a sample selection bias would have resulted if the level of market-orientation was estimated without taking into account the decision to be market-oriented. These were estimated for male and female producers each.
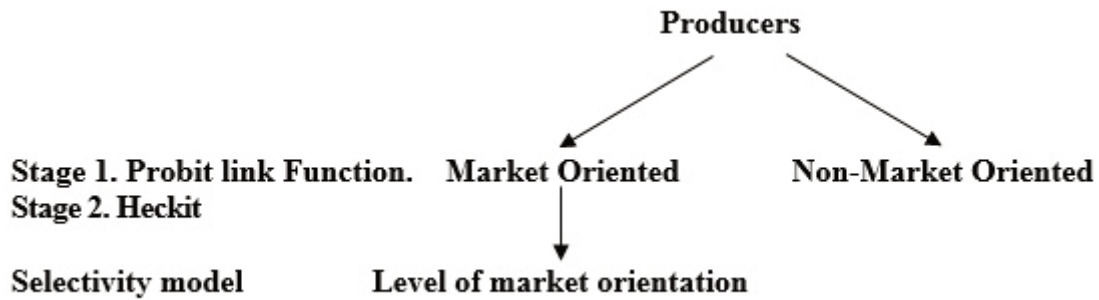
Producers

Stage 1. Probit link Function.   Market Oriented   Non-Market Oriented
Stage 2. Heckit

Selectivity model   Level of market orientation

Figure 1. Illustration of the two-tiered market orientation model

The model which follows a double hurdle formis specified and analysed simultaneously thus;

$$MO^{(1=Market\text{-}oriented,\ 0=Not\ market\text{-}oriented)} = a_0 + a_i X_i + u_i \quad (3)$$

and

$$L^{(LMO)} = a_0 + a_i X_i + u_i \quad (4)$$

where;

MO = Market-orientation (dummy variable; 1= Market-oriented, 0=Not market-oriented)

MOI= Level of market-orientation $(\sum \alpha_i L_i / L_i^T)$

a_0 = Constant for market-orientation and level of market-orientation equation

a_i= Vector of parameters estimated for market-orientation and level of market-orientation

X_i = Variables for estimation

u_i= Error term

In specific terms, the Heckit model in the second stage of estimation is stated as;

$$MOI = a_0 + \sum_{i=1}^{13} aiXi + u_i \quad (5)$$

where,

X_1= Age (years)

X_2= Eeducational background (years) '

X_3= Number of times of extension contacts

X_4= Capital invested (Naira)

X_5= Household size

X_6= Distance to the nearest market (km)

X_7= Area of sweet potato cultivated (hectare)

X_8= Native of community (dummy variable; yes =1, No=0)

X_9= Farming experience (years)

X_{10}=Marketing experience (years)

X_{11}= Sweetpotato yield (kg/hectare)

X_{12}= Transportation cost (Naira/bag)

X_{13}= Road condition (good = 1, bad =0)

a = Estimated coefficients

ui= Error term

The significant differences in market-orientation between male and female sweetpotato farmers each was analysed by the use of Z test.

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad (6)$$

where:

x_1 = Mean level of market-orientation for the male farmers

x_2 = Mean level of market-orientation for female farmers

σ_1^2 = Standard error of market-orientation for male farmers

σ_2^2 = Standard error of market-orientation for female farmers

number of male farmers

number of female farmers

RESULTS AND DISCUSSION

The results in Figure 2 show distribution of respondents according to market-orientation. The results show that out of 360 respondents (180 males and 180 females) sampled

for this study, 228 respondents were market-oriented consisting of 95 males and133 females while 132 farmers were not market-oriented.

The results in Table 1 show the level of market-orientation among sweetpotato farmers in South Eastern, Nigeria.

The resultsshow a mean market-orientation score of 0.17 and 0.59 for the male and female sweetpotato farmers respectively indicating that the female farmers were more market-oriented than their male counterparts. This is against a prior expectation probably because the proportion of sweetpotato marketed by the women (95 percent) was more compared to their male (72.83 percent) counterparts with more land allocated to sweetpotato production (0.46ha for fe-

males and 0.37ha for males).The higher proportion of land a household allocated to the more marketable crops, the more the household is market-oriented following the findings of Berhanu and Moti, (2012). The results show that the male and female farmers allocate an average of 0.37ha and 0.46ha of land respectively to sweetpotato production. This may be as a result of area cultivated with sweetpotato compared with large total area held for agricultural activities (24.03 percent for males and 63.01percent for females). This could be attributed to increase land size for the female which increases the potential to produce higher marketable surplus for the market hence increase in market-orientation among farmers with large land holdings.
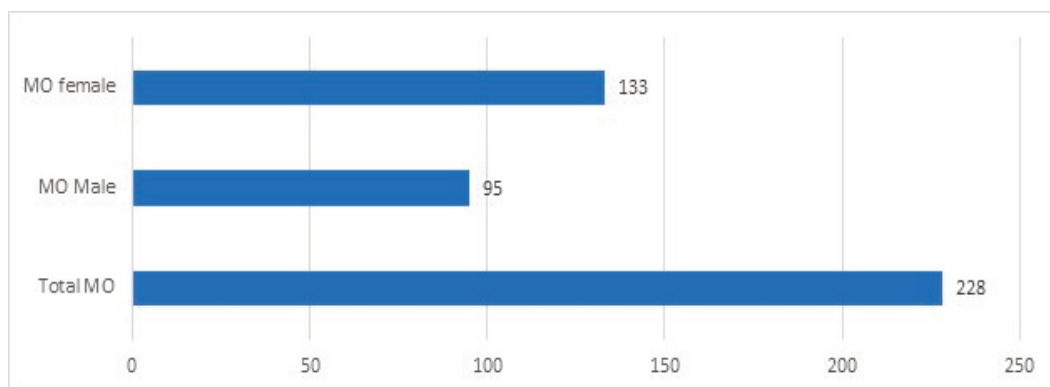

Figure 2. Distribution of respondents according market orientation

The determinants for market-orientation were estimated for male and female sweetpotato producers in South-East, Nigeria is shown in Tables 2 and 3. The empirical results of the determinants of market-orientation by female producers in south eastern Nigeria is shown in Table 2. The χ^2 was highly significant at 1.0 percent level of probability. The inverse mills ratio (lambda) for the level of market-orientation was significant, implying that a sample selection bias would have resulted if the level of market-orientation was estimated without taking into account the decision to be market-oriented. Heckman

selection model allows us to use information from respondents whom are not market-oriented to improve the estimates of the parameters in the regression model. The Heckman selection model provides consistent, asymptotically efficient estimates for all parameters in the model. Heckman estimated ρ (rho) as 0.88, the correlation of the residuals in the two equations and sigma (σ=11.14), the standard error of the residuals of the market-orientation equation. In this case we can reject the null that rho=0, so indeed we should be using a sample selection model on this data.

The coefficients for age were positive and

Table 1

Level Market Orientation among Sweetpotato Farmers in South East, Nigeria

Variable Description	Mean	SD	Min.	Max.
Male				
Quantity harvested (kg)	1794.08	3094.68	400.00	5000.00
Quantity sold (kg)	1306.68	721.38	250.00	2000.00
Total area cultivated (ha)	1.54	0.59	0.01	2.00
Area cultivated sweetpotato (ha)	0.37	0.12	0.025	2.00
Proportion of sweetpotato sold (%)	72.83			
MOI	**0.17**	**0.08**	**0.00**	**0.72**
Female				
Quantity harvested (kg)	1516.37	1167.59	0.00	5000.00
Quantity sold (kg)	1440.56	689.86	0.00	2000.00
Total area cultivated (hectare)	0.73	0.46	0.01	1.57
Area cultivated sweetpotato (ha)	0.46	0.12	0.02	1.00
Proportion of sweetpotato sold (%)	95.00			
MOI	**0.59**	**0.19**	**0.15**	**0.97**
Pooled				
Quantity harvested (kg)	1633.35	1127.14	0.00	5000.00
Quantity sold (kg)	1371.55	1714.51	0.00	2000.00
Total area cultivated (ha)	1.12	0.51	0.01	2.00
Area cultivated sweetpotato (ha)	0.41	0.12	0.02	2.00
Proportion of sweetpotato sold (%)	83.97			
MOI	**0.31**	**0.18**	**0.00**	**0.97**

MOI= Market-Orientation Index

significantly related to the probability of being market-oriented and level of market-orientation at 1 percent level of probability for the female farmers. This suggest that an increase in age by 1 percent will lead to an increase in 0.04 percent, 0.0007 percent and 0.049 percent in probability of being market-oriented, level of market-orientation and for all female farmers respectively. This shows that older farmers have stronger social network and must have established credibility within the network, following the study of Makhura et al. (2001). This implies that older heads were more informed about the marketing system. The coefficients for educational level was positive and significant for female farmers at 10 and 5 percent level for probability of being market orientated and level of

market-orientation respectively. This indicate that a one percent increase in educational level will lead to 0.09 percent, 0.005 percent and 0.098 percent increase probability of being market-oriented, level of market-orientation and for all the female producers respectively. This is expected and in accordance with a prior expectation. This may be because majority of the farmers in the study area have minimum education requirements to make them market-oriented; the result is in line with the findings of Heierli and Gass (2001). Possible explanation is that investing in agricultural crop requires skills and information that individuals whom are educated may possess or acquire more easily than others following Rios et al. (2008).

Table 2

Determinants of Market Orientation for Female Farmers in South East Nigeria: Heckit Results

Variables	Parameters	Stage 1 MO or not	Stage 2 Level of MO	Total
Age (years)	X_1	0.0485(3.99***)	0.0007(3.54***)	0.0492(7.53***)
Educational level (years)	X_2	0.0937(2.53*)	0.0047(3.59**)	0.0984(6.12***)
Number of extension contacts	X_3	0.0415(0.94)	-0.0006(-0.53)	0.0409(0.41)
Capital (Naira)	X_4	0.00002(2.93**)	1.04×10^{-7}(0.49)	1.04×10^{-7}(3.42***)
Household size	X_5	-0.0831(-0.52)	-0.0095(-3.99***)	-0.0926(4.51***)
Distance from the farm to market (km)	X_6	-0.0076(-0.14)	-0.0015(-1.31)	-9.1×10^{-3}(-1.45)
Area of sweetpotato planted (ha)	X_7	4.1191(3.22**)	-0.0252(-0.70)	4.0939(2.52**)
Native of community(dummy)	X_8	-0.0471(-0.08)	0.0594(2.73**)	0.1065(2.65**)
Farming experience (years)	X_9	0.1701(3.40**)	-0.0023(-1.59)	0.1678(1.81)
Marketing experience(years)	X_{10}	0.1834(2.85**)	0.0010(0.63)	0.1844(3.48***)
Quantity of sweetpotato harvested (kg)	X_{11}	-0.0001(-0.50)	1.39×10^{-6}(0.43)	1.38×10^{-6}(-0.07)
Transportation cost (Naira/kg)	X_{12}	-0.8690(-1.64)	-0.0014(0.10)	0.8677(-1.54)
Road condition (dummy)	X_{13}	-0.3991(-1.06)	0.0356(2.78**)	-0.3635(1.72*)
Constant	B_0	-1.3151(-1.00)	0.2473(4.38***)	-1.0678(3.38***)
ρ(rho)		0.8772		
ʎ (mills' ratio)		9.7751(0.0046***)		
χ^2 (chi- square)		34.27***		
σ (sigma)		11.1435		
No of observations		180	113	

*p<0.1, **p<0.05 and ***p<0.01

Figures in parenthesis are t-value, MO= Market-Orientation

The coefficient for capital invested was positive and significant at 5 percent level of probability. This implies that any increase in capital invested will lead to a corresponding increase in probability of being market-oriented and for all the farmers respectively. The cash requirement associated with procurement of inputs as at when due is expected to induce market-orientation in sweet potato production. The coefficients for household size were negative and highly significant for the level of market-orientation for female respondents at 1 percent level of probability. This suggest that a 1 percent increase in household size will lead to 0.0095 percent and 0.0926 percent decrease in level of market-orientation and for all farmers respectively. This is against a priori expectations probably because higher number of children dependents implies higher need for cash to cover household expenditures such as school fees and other expenses, inducing households to invest less in market-oriented commodities. A negative sign on the other hand means that a larger household is labor-inefficient and produces less output but consumes a higher proportion, leaving smaller and decreasing proportions for sale following Omiti et al., (2009). Household size detracts from household market-orientation due to its effect on increasing household domestic consumption needs (Gebremedhin & Jaleta, 2010).

The coefficients of area planted with sweet potato were positive and highly significant at 1 percent for probability of being market-oriented and for all farmers each. This implies that a one percent increase in the area of sweet potato planted will increase the probability of being market-oriented and for all farmers by 4.12 percent and 4.09 percent respectively. Given the imperfections in the land market and land scarcity that prevails in the area, households with higher land ownership offer higher proportion of their sweet potato produce for sale. In the presence of factor market imperfections, ownership of the resource increases efficiency (Gebremedhin & Hoekstra, 2007). The coefficients for native of community were positive and significant at 5 percent for level of market-orientation. This implies that a 1.0 percent increase in native of community will lead to a 0.0594 percent and 0.1065 percent increase in level of market-orientation and for all farmers respectively. Ethnicity reduces barriers to communication and cooperation (Rios et al., 2008). The native of community of the respondent are important in the decision to sell sweet potato, implying that they may be able to negotiate better, following Vakis et al., (2003).

The coefficient for years of farming experience was positive and significant at 5 percent level for probability of being market-oriented. This implies that a 1.0 percent increase in farming experience will lead to a 0.1701 percent and 0.1678 percent increase in probability of being market-oriented and for all participants respectively indicating that greater experience (reflecting the ability to negotiate) increase farmers' orientation levels, following Okoye et al. (2016). The coefficient for marketing experience was positive and significant at 5 percent level for probability of being market-oriented. This indicate that any 1 percent increase in the years of marketing experience will lead to 0.1834 percent and 0.1844 percent for probability of being market orientated and all the farmers respectively. The coefficient for road conditions to the nearest market is good was posi-

tive and significant at 5 percent level for level of market-orientation. This implies that any 1.0 percent increase in road conditions to the nearest market is good will lead to a 0.0356 percent in level of market-orientation.

The results in Table 3 show the determinants of market-orientation among male marketers in south eastern, Nigeria. The χ^2 was highly significant at 1.0 percent level of probability. Heckman estimated ρ (rho) as 0.54, the correlation of the residuals in the two equations and sigma (σ=13.579), the standard error of the residuals of the market-orientation equation. In this case we can reject the null that rho = 0, so indeed we should be using a sample selection model on this data. The coefficients for age were significant and positively related with probability of being market-oriented and the level of orientation at 10 percent and 5 percent respectively for the male respondents. The results show that an increase in age by 1 percent will lead to a 0.028 percent, 0.033 percent and 0.061 percent in probability of being market-oriented, level of market-orientation and for all male farmers respectively. This is against the expected probably because of credibility associated with age garnered over the years. Farmers in the study area were already in their middle ages with very few farmers in their teens and thirties.

The coefficients for education were also significant at 1 percent level each and directly related to the probability of being market-oriented and level of market-orientation for the male farmers. This implies that a 1 percent increase in educational level will lead to 0.107 percent, 0.214 percent and 0.322 percent increase in being market-oriented, level of market-orientation and for all the male farmers respectively. Household head's formal education is posited to increase a household's understanding of market dynamics and therefore improve decisions about the amount of output sold, inter alia (Makhura et al., 2001).Education level influenced farmers access to assets acquisition (Benmehaia and Brabez, 2017) hence em-

Table 3
Determinants of Market Orientation for Male Farmers in South East Nigeria: Heckit Result

Variable	parameters	Stage1MO or not	Stage2Level of MO	Total
Age of the farmers (years)	X_1	0.0281(2.08*)	0.0332(3.04**)	0.0613(5.12***)
Educational level (years)	X_2	0.1079(3.58***)	0.2149(4.80***)	0.3228(8.38***)
Number of extension contacts	X_3	0.0258(0.58)	0.2976(1.60)	0.9234(2.18*)
Capital (Naira)	X_4	1.67×10^{-7}(0.03)	-9.63×10^{-7}(-0.11)	-7.96×10^{-7}(-0.08)
Household size	X_5	0.3706(3.79***)	0.3388(2.09*)	0.7094(5.88***)
Distance from the farm to market (km)	X_6	-0.0511(-1.94*)	-0.0795(-3.45**)	-0.1306(-5.39***)
Area of sweetpotato planted (ha)	X_7	0.0986(0.83)	-0.3964(-1.35)	-0.2978(-0.52)
Native of community	X_8	0.9205(3.02**)	-0.6854(-1.11)	0.2351(1.91*)
Farming experience (years)	X_9	-0.0048(-0.21)	-0.0394(-0.98)	-0.0442(-1.19)
Marketing experience(years)	X_{10}	0.0078(0.28)	0.0735(1.89*)	0.0813(2.17*)
Yield (kg)	X_{11}	0.00006(1.17)	-0.00009(-1.02)	-3.0×10^{-5}(0.15)
Transportation cost (Naira)	X_{12}	0.08936(4.56***)	-0.7775(-0.95)	-0.6881(-3.61***)
Road condition	X_{13}	0.1739(0.07)	0.8668(1.06)	1.0398(1.13)
Constant	b_0	6.8918(1.09)	-0.4179(-0.21)	6.4743(0.88)
Ρ(rho)			0.5490	
ʎ(mills' ratio)		7.4550(0.0086***)		
χ^2 (chi- square)		43.64***		
σ (sigma)		13.5791		
No of observations		180	95	

*$p<0.1$, **$p<0.05$ and ***$p<0.01$

Figures in parenthesis are t-value, MO= Market-orientation

powering them towards market-oriented farming. The coefficients for household size were significant at 1 percent and 10 percent levels and directly related to the probability of being market-oriented and level of market-orientation respectively. This indicate that a 1 percent increase in household size will lead to 0.370 percent, 0.338 percent and 0.709 percent increase of being market-oriented, level of market-orientation and for all the farmers respectively. The household size explains the family labor supply for production and household consumption levels (Alene et al., 2008). A positive sign implies that a larger household provides cheaper labour and produces more output in absolute terms such that the proportion sold remains higher than the proportion consumed following Omiti et al. (2009).

The coefficients for distance from the farm to the market were significant and indirectly related to the probability of being market-oriented and level of market-orientation at 10 and 5 percent level respectively. The results suggest that a 1 percent increase in distance from the farm to the market will lead to 0.051 percent, 0.079 percent and 0.130 percent decrease in being market-oriented, level of orientation and for all male farmers respectively. For farmers in very remote rural areas, geographic isolation through distance creates a wedge between farm gate and market prices. This leads to a shift from production of profitable but highly perishable commodities such as fruits and vegetables to relatively storable low-value cereals following the findings of Stifel and Minten, (2008). Input use is also af-

fected in these rural areas by the substitution of commercial high-value varieties with easily available and affordable though poor-yielding varieties. The coefficient for native of community was significant and directly related to probability of being market-oriented at 5 percent level of probability. This implies that farmers who are native of their communities are more likely to be market-oriented and for all male farmers by 0.920 percent and 0.235 percent respectively compared to their counterparts who are migrant farmers. Farmers who are native of their communities may be able to access more lands than their counterparts who are migrant farmers, indicating probability of more sweetpotato output and market-orientation.

The coefficient of marketing experience was significant at 10 percent level. This indicates that a 1 percent increase in marketing experience will lead to a 0.073 percent and 0.081 percent increase in the probability of being market-oriented and level of market-orientation respectively. Experience has been known to lead to perfection in activities. This resultantly manifests in increased knowledge of techniques or otherwise involved in any enterprise. This result is consistent with Agwu (2009) and (Agwu &Ibeabuchi, 2011).

Table 4
Determinants of Market Orientation among Sweet potato Farmers in South East Nigeria: Heckit Results (Pooled)

Variables	parameters	MO or not	Level of MO	Total
Age of the farmers (years)	X_1	-0.0145(-1.04)	-0.0053(-1.03)	-9.2×10^{-3}(-2.07*)
Educational level (years)	X_2	0.0633(2.36*)	0.0187(1.98*)	0.082(4.34***)
Number of extension contacts	X_3	-0.0208(-0.82)	0.0136(1.72*)	-7.2×10^{-3}(0.90)
Capital (Naira)	X_4	0.00001(2.88**)	-1.51×10^{-6}(-1.05)	8.49×10^{-6}(1.83*)
Household size	X_5	0.0283(0.30)	0.0618(2.17*)	0.0901(2.47**)
Distance from the farm to market (km)	X_6	-0.0465(-2.87**)	0.0021(0.23)	-0.0744(-2.64**)
Area of Sweetpotato planted (ha)	X_7	2.8922(4.32***)	-0.00002(-0.00)	2.8922(4.32***)
Native of community	X_8	1.0609(1.95*)	0.3402(2.25*)	1.4092(4.2***)
Farming experience (years)	X_9	0.0562(2.00*)	-0.0015(-1.04)	0.0547(0.96)
Marketing experience(years)	X_{10}	0.1253(3.35**)	0.0010(0.09)	0.1263(3.44**)
Yield (kg)	X_{11}	0.00007(-1.24)	0.00001(0.80)	-6×10^{-5}(-0.44)
Transportation cost (Naira)	X_{12}	-0.6627(-2.23*)	0.0237(0.22)	-0.639(-2.01*)
Road condition	X_{13}	-0.2961(-1.02)	0.0788(0.87)	-0.2173(-0.15)
Gender	X_{15}	-0.9603(-3.42**)	-0.4663(-4.37***)	-1.4266(-7.79***)
Constant	b_0	1.0643(0.94)	0.4908(1.20)	1.551(2.14*)
ꝓ(rho)		0.5540		
ʎ(mills' ratio)		5.7741(0.0262***)		
χ^2 (chi- square)		58.76***		
σ (sigma)		10.4226		
No of observations		360	228	

*$p<0.1$, **$p<0.05$ and ***$p<0.01$
Figures in parenthesis are t-value, MO= Market-orientation

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The coefficient for transportation cost was highly significant at 1 percent level of probability and positive for probability of being market-oriented and negative for all the participants. This implies that a 1 percent increase in transportation cost for the male respondents will increase the probability of being market-oriented by 0.089 percent and decrease in 0.688 percent for all the participants. Thus, the variable transport costs per unit of distance increases with the potential marketable load size thereby influencing the probability of being market-oriented.

The pooled results in Table 4 show that the coefficients for gender were negative and significant at 5 percent and 1 percent for probability of being market-oriented and level of market-orientation respectively.

This implies that the females tend to increase their probability of being market-oriented, level of market-orientation and for all the farmers by 0.960 percent, 0.466 percent and 1.426 percent respectively compared to their male counterparts. Female headed households are more likely to be market-oriented in sweet potato production than the male-headed households, and this is in line with the findings of Arega et al., (2007) who studied livestock markets in Kenya and Makhura et al., (2001) in maize markets in South Africa. Having a female headed household increases a household's probability of selling its sweet potato by a greater amount than due to other factors. This implies that women are more inclined to sell their sweet potato than men, the result in contrast to the expected outcome, but possibly because women are better at bargaining than men. Female farmers also tend to experience lower transaction costs since they tend to have more credibility following the findings of Okoye et al., (2016).

The results in Table 5 show the test of significant differences between market-orientation and market participation among male and female sweet potato farmers. The Z test statistics is adequate for testing of means between two large population samples such as in this scenario (mean difference between level of market-orientation among male and female farmers).

The results show that the mean market-orientation for male and female sweetpotato producers were 0.17(SD=0.08) and 0.59(SD=0.19) respectively with a Z test value of 5.82 >0.05. According to the Z-test result, the null hypothesis that there were no significant differences between market-orientation for male and female sweetpotato farmers in the study area is rejected.

CONCLUSION

Sweet potato production in South-East Nigeria is characterized by small holder farmers with low level of market-orientation. The female farmers were found to be more market-oriented than their male counterparts indicating the female farmers were more committed to sweet potato farming and marketing. Important factors influencing proba-

Table 5

Test of Significant Differences in Market Orientation between Male and Female Sweet potato Farmers in the Study Area

Variables	Mean	SD	Z-test
Market Orientation			
Male	0.17	0.08	5.8210**
Female	0.59	0.19	

**p<0.05*

bility of being market-oriented and level of market-orientation among the female farmers include; age, educational level, capital, area cultivated with sweet potato, farming experience, marketing experience, native of community, road conditions, and household size. Coefficients for age, household size, education, transportation cost, and native of community, marketing experience, and distance from farm to the market were important factors influencing market-orientation among the male farmers. The gender differentials were addressed by directing attention towards factors influencing market-orientation and level of market-orientation. In order to sustain sweet potato marketing among sweet potato farmers in Nigeria, there is need for farmers (root producers) to follow market signals (market-oriented production). These will step-up growth and development of entire sweet potato seed system. Such approach should extend to policy formulation on promoting access to land among farmers especially for the female farmers. There is need for free and affordable education especially targeted at females to enable them access and process information on production and marketing strategies for increased participation. Provision of rural infrastructure, especially good road networks will reduce the transaction costs of marketing, thereby increasing market-orientation among the sweet potato farmers in the study area.

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