Determinants of Level of Commercialization among Horticultural Crops (Okra and Maize) Farmers in Southeast Nigeria

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ABSTRACT

The study examined the determinants of level of commercialization among horticultural crops (okra and maize) farmers in Southeast Nigeria. It specifically estimated the profitability of the two enterprises; and established the determinants of level of commercialization of the enterprises. Multistage and random sampling techniques were used to select 300 farmers, however 240 (120 maize and 120 okra) farmers with properly completed copies of the questionnaire were used in data collation. Primary data were collected by means of structured questionnaire, which were administered to the farmers by personal interview. The collected data were analyzed using budgetary method and Ordinary Least Squares (OLS) regression analysis. The result of enterprise budgeting indicated net return on investment values of 0.55 for maize and 0.73 for okra farmers. This implied that the two enterprises were profitable, however the okro enterprise was more profitable than the maize enterprise having returned 73kobo against the 55 kobo returned by the maize enterprise per Naira (100kobo) investment. The significant determinants of level of commercialization among the maize farmers were marital status, education, years of experience and union membership while those for okra farmers were quantity produced, gender, age, marital status and years of experience. Government in collaboration with private initiatives should ensure the provision of soft loans to the farmers to enable them operate at minimal cost and earn more profit.

Keywords: Commercialization; Okro & Maize Enterprises: Determinants: Anambra, Nigeria.

INTRODUCTION

Horticultural crops play very important roles in nutrition and health especially as they contain substances which regulate or stimulate digestion, and act as laxatives or diuretics; pectins and phenoic compounds which play a part in regulating the pH of the intestines (Hussain, 2019). Fruits and vegetables enterprises also contribute to the income of both the rural and urban dwellers. Horticultural crop production creates jobs for the producers. On the average, it provides twice the amount of employment per hectare of production compared to strict cereal crop production (Ali *et al,* 2020). The move from cereal production towards high-value horticulture crops is an important contributor to employment opportunities in developing countries (Karki and Bauer, 2018). In spite of various initiatives aimed at improving the horticultural sub-sector, the sector still remains relatively unexploited.

Maize, one of the horticultural crops is one of the main staple crops in Nigeria and featured among the five food crops (cassava, maize, wheat, rice, and sugar) whose production is to be promoted for the attainment of food self-sufficiency as revealed by the Minister of Agriculture and Water Resources (Sall *et al.*, 2020). In Nigeria, maize production ranks third after sorghum and millet among the cereal crops (Food and Agriculture Organization Statistics (FAOSTAT), 2018). Maize contributes about 80 percent of poultry feeds and this has great implication for protein intake in Nigeria. Thus, maize can be considered very vital to the economic growth of the nation through its contribution to food security and poverty alleviation (Omiti *et al.,* 2009).

Okra (Abelmoschus esculentus) is an essential vegetable crop belonging to genus Abelmosclus and the family malvaceae. It is very popular in the indo-park subcontinent. In India it ranks number one in its consumption but

its original home is Ethiopia and Sudan, the north-eastern African countries (Okoye et al., 2017). It has two main species, Abelmochus exculentus (L) Moench and Abelmoschus caillei (Achev) stevels. It is one of the oldest cultivated crop and presently grown in many countries and is widely distributed from Africa to Asia, Southern Europe and America, (Mefo *et al.,* 2017). Okra popularly known as lady finger, is a vegetable crop grown from the seed. It is an annual plant that is very resistant to heat and drought and can tolerate poor soils (Mefo et al., 2017). It grows best in sandy-loamy soil, though it can also tolerate a poor soil with heavy clay and intermediate moisture. Generally okra is native to hot climates but does well in northern summers, given the right soil conditions and extra effort to keep it warm (Okoye *et al.,* 2017). Okra marketing is highly lucrative because of the popularity of its pods for various uses. According to Farinde *et al.* (2019), okra is suitable for medical industrial applications and as a plasma replacement or blood volume expander.

Manyong *et al.* (2016) explained horticultural crop commercialization to mean the scaling up of agricultural production from subsistence level to become market based. According to them, commercialization is characterized by expansion in sales of output which raises cash earnings of small-scale horticultural crop enterprises. To bring about commercialization, the unit of output can be increased, value addition can be raised, or both carried out, and there can be production for domestic and foreign markets. The commercialization of horticultural crops which were mainly grown for home consumption has also emerged. However, subsistence production has remained dominant despite the invested efforts (Minot and Sawyer, 2013). Based on this backdrop the study assessed the determinants of levels of commercialization among horticultural crops (maize and okra) farmers in Southeast Nigeria. The specific objectives were to estimate the profitability of okro and maize enterprises and ascertain the determinants of level of commercialization attained by the farmers.

METHODOLOGY

The study area is Southeast geopolitical zone of Nigeria. The zone consists of five States (Abia, Anambra, Ebonyi, Enugu and Imo). The zone is bounded in the East by Awka Ibom and Cross River States; in the North by Benue and Kogi States; in the West by Edo and Delta States; and in the South by Rivers and Bayelsa States. The area is inhabited by the Igbo race and Igbo is the native language, though English is widely spoken and used as official language in governance. They are predominantly Christians and agriculture is the predominant occupation mostly in the rural areas. The study population comprised all the horticultural crop farmers of maize and okra in the States. Multistage and random sampling methods were used to select 3 States, 15 LGAs, 150 maize farmers and 150 okra farmers for the study. Stage I: Three States (Anambra, Ebonyi and Enugu) were randomly selected from the five States in Southeast geopolitical zone. Stage II: Five LGAs were randomly selected from each of the selected States, thus making a total of 15 LGAs. Stage III: This involved random selection of 20 horticultural crop farmers (10 maize and 10 okro farmers) from each of the selected 15 LGAs to arrive at 300 farmers.

Primary data were obtained using structured questionnaire administered to the respondents by personal interview. A total of 300 copies of the structured questionnaire were administered but 240 (120 maize and 120 okro) were found well completed and useful for data collation. Data were collected on socio-economic characteristics of the respondents such as age, gender, marital status, household size, educational level, marketing experience among others. Additional data were collected on costs and returns of the okra and maize enterprises.

Three functional forms (linear, semi-log and double-log) of the OLS regression model were fitted with the data and ran using MINITAB statistical package. The equation of best fit was selected based on the magnitude of the coefficient of multiple determination (R^2), t-statistic and F-statistic values and number of significant variables. The implicit form of the model is given as:

Y= f(QTP, GEN, AGE, MAR, EDU, OPE, HHS, UNM; e)

Where:

COI = Commercialization index

QTP = Quantity produced (kg)

GEN = Gender (dummy: male = 1; female = 0)

AGE = Age (years)

MAR = Marital status (dummy: married = 1; otherwise = 0)

EDU = Educational level (years)

OPE = Farming experience (years)

HHS = Household size (number of people living together in the same house)

UNM = Union membership (dummy: member = 1; otherwise = 0)

e = error term.

The explicit forms of the regression model are given as:

Linear: $COM = \beta_0 + \beta_1 QTP + \beta_2 GEN + \beta_3 AGE + \beta_4 MAR + \beta_5 EDU + \beta_6 OPE + \beta_7 HHS + \beta_7 UNM + e_i$

Semi-log: $\beta_0 + \beta_1 \ln QTP + \beta_2 \ln GEN + \beta_3 \ln AGE + \beta_4 \ln MAR + \beta_5 \ln EDU + \beta_6 \ln OPE + \beta_7 \ln HHS + \beta_7 \ln UNM + e_i$

Double-log: $\beta_0 + \beta_1 \ln QTP + \beta_2 \ln GEN + \beta_3 \ln AGE + \beta_4 \ln MAR + \beta_5 \ln EDU + \beta_6 \ln OPE + \beta_7 \ln HHS + \beta_7 \ln UNM + e_i$

The budgetary technique used to determine the profitability of okra and maize enterprises is expressed as:

$$NMI = \sum_{i=1}^{n} P_{yi} Y_i - \left(\sum_{k=0}^{n} P_{xij} X_{ij} + \sum_{i-1}^{r} F_{ij} \right)$$

Where:

NMI/Profit = Net marketing income /Profit

$\sum$ = Sum

PyjYj = Unit price x quantity of jth respondent's sales = total revenue (TR) for jth respondent.

PxijYij = Prices x quantities of jth respondent's variable inputs = total variable cost (TVC) for jth respondent.

Fij = Depreciation values of equipment, annual rent for store, interest on loan, e.t.c. for jth respondent = Total fixed cost (TFC) for jth respondent.

TC = Total cast (TVC + TFC).

RESULTS AND DISCUSSION

Profitability of the enterprises (maize and okra) in Southeast Nigeria

Profitability of maize marketing: The enterprise budgeting analysis was deployed to determine the profitability of okro marketing in Southeast, Nigeria. The result of the analysis (Table 1) revealed that the business generated

₦354,706.42 as total revenue (TR) from the sale of 18 bags (900kg) of fresh maize. The variable cost (VC) which is the amount spent in marketing activities was found as ₦209,407.40 representing 91.5% of the total cost (TC) incurred in marketing of fresh maize. On the other hand, the fixed cost (FC) spent which represent only 6.5% of the TC of marketing the fresh maize was ₦19,429.21; hence the total cost was ₦228,836.42. The enterprise generated a gross margin of ₦145,299.21 naira and net return/profit of ₦125,800. It is interesting to note that the net return on investment (NROI) and return on investment (ROI) ratio were 0.6 and 1.6 respectively. This implied that fresh maize marketing in the area returned 55kobo for every 100kobo spent. This is in agreement with the finding of Abdullaha et al. (2019) who reported the profitability of commercialization of enterprises.

Profitability of okra marketing: Table 2 shows the result of analysis of okro marketing in the study area. The result revealed that the business generated ₦476,665.24 revenue from the sale of 41 bags/50kg of fresh okra. The total variable cost (TVC) which is the amount spent in marketing activities was found as ₦261,205.79 representing 94.7% of the total cost incurred in marketing of fresh okra. This TVC may vary even on the same quantity of okra produced by different farmers considering variability in economic factors. On the other hand, the total fixed cost spent which represent only 5.2% of the total cost of marketing was ₦14,459.45. It is important to note that every cost becomes variable in a long run. Therefore, the total cost spent in the marketing of fresh okra was ₦275,665.24. The enterprise generated gross margin of ₦215,459.45 and net return of ₦201,000. Further result of the analysis recorded NROI of 0.73, which implied that the okra enterprise returned 73kobo for every 100kobo spent by marketers during the marketing period. This finding concurs with Oyewo et al. (2020) who found that okra marketing is a profitable venture.

Determinants of the level of commercialization among maize farmers

The ordinary least square regression approach was used to assess the determinants of level of commercialization of the maize farmers. The result is presented in Table 3. It revealed the coefficient of multiple determinant (R^2) value of 0.82, an indication that variations in the socioeconomic characteristics of maize farmers in the study area explained 82% of variations in level of commercialization of the maize farmers, hence the remaining 18% was due to error. The F-statistic value of 6.51 was significant, implying that all the independent variables exerted statistically significant influence on the dependent variable (level of commercialization), hence goodness of fit of the model.

The coefficient of marital status was positive and significant at 1% level of probability. This implies that a unit increase in the number of married maize farmers will increase their level of commercialization by 13.8%. This is because the married famers are likely to engage more family labour which is cost effective, and consequently produce more for commercial purposes.

Educational level exerted negative and significant effect on level of commercialization at 1% level. This result is contrary to a priori expectation that increase in years of formal education will increase level of commercialization of the farmers. The implication of this result is that maize farmers seems to migrate to other profession other than farming when they acquire more education, with properly little subsistence farming for personal and family consumption. This finding contradicts Tafesse et al. (2020) which posited a positive relationship between educational level and agricultural commercialization in Offa District, Ethiopia.

The coefficient of operating experience was positive and significant at a 5% level of probability. This is in line with a priori expectation, and implies that a unit increase in the number of years maize farmers spend in farming operation will increase their level of commercialization by 3.2%. As the farmers gain more expertise or knowledge in maize farming, their experience about commercialization and the need to make more money from the enterprise grows. To have practiced the enterprise for a long time shows that the farmers have adopted the enterprise as their means of livelihood. The result is in agreement with that of Abdullaha et al. (2019) which reported a positive relationship between farming experience and level of commercialization.

Union membership was negative and significant at 5% level of probability. This is in line with a priori expectation and implies that a unit increase in the number of maize farmers belonging to trade union will reduce their level of commercialization by 53.4%. Membership of trade union seems to posse much restriction on farmers or comes with several regulations which suggest the reason many of them are not members (Table 4.1). Agwu et al. (2013) noted that membership of associations and groups possess the potentials of increased access to information important to production and marketing decisions.

Determinants of the level of commercialization among okra farmers

The result of ordinary least square regression analysis to ascertain the determinants of okro farmers' level of commercialization is shown in Table 4. It revealed that the coefficient of multiple determinant (R^2) value of 0.82 is an indication that variations in the socioeconomic characteristics of maize farmers in the study area explained 82% of variations in level of commercialization while the remaining 18% was due to error. The F-statistic value of 69.05 was significant, implying that all the independent variables jointly exerted significant influence on the dependent variable (level of commercialization), hence goodness of fit of the model.

The coefficient of quantity of okra produced for sale was positive and significant at 1% level of probability, implying that higher the quantity of okro produced by the farmers, higher the level of commercialization. The gender variable had a negative and significant relationship with level of commercialization at 1% level of probability. This is in line with a priori expectation, and implies that female farmers are more likely to plant more okro and engage in commercialization than their male counterparts. This finding agrees with Hill & Vigneri (2014) who pointed out that women do not have access to farm productive resources which could attribute to more reason of their involvement in marketing that participation in production and processing.

Age of the farmer had a positive and significant relationship with level of commercialization at 1% level of probability. This is according to a priori expectation, and implies that the higher the farmers age, the higher the experience and resources accumulated, and the more likely for him to increase area of land cultivated, produce more and consequently increase the level of commercialization. Bellemare (2012) submit that the relationship between market participation and age is positive, and increased production comes from older farmers who are willing to offer more for sale (Sebatta et al., 2014).

The coefficient of marital status was positive and significant at 1% level of probability. This implies that a unit increase in the number of married maize farmers in the study area will increase their level of commercialization by 6.5%. This is because the married famers are likely to engage more family labour which is cost effective, and consequently produce more for commercial purposes.

The coefficient of operating experience was positive and significant at 1% level of probability. This is in line with a priori expectation, and implies that a unit increase in the number of years maize farmers spend in farming operation will increase their level of commercialization by 0.32%. As the farmers gain more expertise or knowledge in okro farming, their experience about commercialization and the need to make more money from the enterprise grows. The result is in agreement with that of Abdullaha et al. (2019) which reported a positive relationship between farming experience and level of commercialization.

CONCLUSION

Commercialization of horticultural crops (maize and okro) in Southeast Nigeria proved profitable enterprises, however okra marketing was more profitable than maize marketing. Socio-economic variables, especially marital status and operational experience, exerted significant influence on level of commercialization attained by both the maize and okro farmers. Policy measures aimed at encouraging married couples with many years of operational experience will increase the productivity and output of the farmers and improve the level of commercialization attained by them.

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Table 1: Monthly profitability of maize marketing in Southeast, Nigeria

Variable	Amount (N)	Percentage
Total Revenue	354,706.42	
Variable cost (VC):		
Purchase	200,186.57	
Loading cost	903.85	
Offloading cost	403.37	
Association dues	768.33	
Transportation cost	2,436.67	
Miscellaneous	4,708.42	
TVC	209,407.4	91.5
Fixed cost (FC)		
Rent	1,679.88	
Wheelbarrow	2,604.58	
Interest on loan	4,816.67	
Taxes/LGA charge	5,101.43	
Packaging material	3,050.82	
Storage cost	2,175.83	
TFC	19,429.21	8.4
Total cost	228,836.42	
Gross margin(TR-TVC)	145,299.21	
Net returns(TR-TC)	125,800	
Net return on investment(NR/TC)	0.55	
Return on investment (TR/TC)	1.55	

Source: Field Survey Data, 2021.

Table 2: Monthly profitability of Okra marketing in Southeast, Nigeria

Parameter	Amount (₦)	Percentage
Total Revenue	476,665.24	
Variable cost (VC):		
Purchases	252,408.66	
Loading cost	1,371.77	
Offloading cost	698.44	
Association dues	416.15	
Transportation cost	1,533.85	
Miscellaneous	4,776.92	
TVC	261,205.79	94.7

Fixed cost: (FC)		
Rent	800.96	
Wheelbarrow	1,263.34	
Interest on loan	5,013.85	
Taxes/LGA charge	1,263.85	
Packaging material	3,449.76	
Storage cost	2,667.69	
TFC	14,459.45	5.2
Total cost	275,665.24	
Gross margin(TR-TVC)	215,459.79	
Net returns/Profit	201,000	
Net return on investment(NR/TC)	0.73	
Return on investment (TR/TC)	1.73	

Source: Field Survey Data, 2021.

Table 3: Determinants of the Level of commercialization among maize farmers

	Anambra		Ebonyi		Enugu		Pooled	
Determinants	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Quantity produced	-0.005	-0.61	-0.002	-0.23	-0.006	-0.92	-0.004	-1.08
Gender	0.018	0.09	0.125	0.62	0.117	0.66	0.089	0.88
Age	-0.004	-0.24	-0.008	-0.49	-0.001	-0.08	-0.004	-0.52
Marital status	0.138	1.85*	0.156	2.10**	0.117	1.71*	0.138	3.61***
Years of education	-0.070	-1.52	-0.055	-1.17	-0.074	-1.70*	-0.066	-2.73**
Operation experience	0.031	1.35	0.028	1.14	0.036	1.57	0.032	2.53**
Household size	0.022	0.37	0.037	0.63	0.035	0.63	0.031	1.02
Union membership	-0.528	-1.18	-0.479	-1.04	-0.604	-1.4	-0.534	-2.25**
Constant	1.160	2.59	0.831	1.84	1.068	2.55	1.013	4.34
R2	0.334		0.334		0.317		0.3194	
Adjusted R2	0.157		0.168		0.141		0.2703	
F-statistics	1.88		2.01		1.8		6.51	
Obs.	39		41		40		120	

Source: Field Survey, 2021. (*, **, ***) Significant @ 10%, 5%, and 1% respectively.

Table 4: Determinants of the Level of commercialization among okra farmers

	Anambra		Ebonyi		Enugu		Pooled	
Determinants	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	t-ratio	Coeff.
Quantity produced	0.006	4.18	0.006	4.75***	0.005	3.16**	0.005	6.95***
Gender	-0.632	-7.62***	-0.569	-7.40***	-0.534	-5.57***	-0.573	-12.11***
Age	0.200	4.38***	-0.019	-4.71***	-0.418	-3.34***	0.119	7.34***
Marital status	0.110	3.01***	0.311	3.87***	0.255	3.82***	0.345	6.56***
Years of education	-0.008	-0.82	-0.007	-0.82	0.001	0.08	-0.004	-0.71

Operation experience	0.270	2.48**	0.470	2.66**	0.405	3.86***	0.315	5.75***
Household size	0.004	0.22	-0.003	-0.17	-0.026	-1.28	-0.012	-1.09
Union membership	-0.022	-0.24	0.038	0.43	0.073	0.69	0.033	0.62
Constant	0.860	4.85	0.765	4.51	0.496	2.42	0.696	6.84
R2	0.832		0.874		0.800			0.8203
Adjusted R2	0.795		0.844		0.751			0.8084
F-statistics	22.28***		29.34***		16.45***			69.04***
Obs.	45		43		42			130

Source: Field Survey, 2021. (*, **, ***) Significant @ 10%, 5%, and 1% respectively.