Determinants of Okra (Abelmoschus esculentus) Production and Profitability in Ayamelum Local Government Area of Anambra State, Nigeria.

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Abstract

The profitability of okra farmers in Ayamelum Local Government Area of Anambra State of Nigeria was investigated. Multi - stage random sampling technique was used to select 100 farmers from six towns in the study area. The data for the study were collected from both primary and secondary sources. Percentage and net farm income were used to capture the objectives of the study. The result revealed that majority of okra farmers were males, small scaled in operation and had no access to credit. The educational level, household size, and farming experience were the determinant variables to the profitability of the farm. The price parameter for labor, land value, pesticide and output price impacted significantly on the profitability of farmers. Okra is profitable in the study area with Net farm income of ₦265,356. The study recommended on the need to enhance farmers' access to improved production inputs (such as fertilizer and seed), education and credit.

Keyword*; Determinants. Okra, Production, Profitability*

Introduction

Okra is an important vegetable that is grown in the tropics and subtropics for valuable food ingredients, vitamins, protein and carbohydrate for building up and repairing the body tissue as well as prevention of diseases(Semon et al. 2005). The dried seed is used to prepare vegetable curds, or roasted and ground to be used as a coffee additive or substitute; leaves are considered good cattle feed, useful in confectionery and to glace certain papers (Akorda, 2010). Also, it serves as a source of income to its producers, labourers, and marketers (Alimi, 2004).

Okra (*Abelmoschus esculentus* [L.] Moench) is an annual crop belonging to the family Malvaceae and widely cultivated in sub – Saharan Africa by small holder female farmers in mixed cropping systems and grown all year round under both rains fed and irrigation (Ashdraf, 2007).

Studies revealed that most okra farmers in tropical and sub-tropical region where this crop is cultivated are facing serious low yield problems. According to Chukwu, (2013) low yield of about 1.8 tons per hectare especially in dry season cultivation was frequently reported by the farmers. Nevertheless, various factors have been suggested as being responsible for this. Akorda, (2010) suggested poor cultural practices and high costs of labour, unavailability of improved okro varieties and pests and diseases. Other factors commonly suggested include inadequate fertilizer application, drought and late planting (Iheke, 2010). Despite, the constrains limiting the production of the crop, its production has increased tremendously due to the low cost per unit of resource use in the production, short gestation period and quick returns on invested capital compared to other crop enterprises especially during the dry season(Alimi, 2004;). The introduction of the FADAMA farming system in Enugu State aimed at ensuring the availability of vegetables during the dry season. In spite of the aforesaid effort and the potential of okra product, its production has not exceeded small scale operation. In effect, the production cannot meet its demand. There is a need to examine those factors that determine okro production and profitability in the study area with view of enhancing its supply and profitability. This, therefore, forms the basis for the study. Therefore, there is need to (1)assess the farmers' socioeconomic characteristics, (2)effects of the farmers' socioeconomic characteristics on their profitability, (3) estimate the profitability of level of individual resource input used in okra production and (4) estimate the profitability of okra in the study area

Materials and Methods

The study was conducted in Ayamelum Local Government Area of Anambra State. Ayamelum L.G.A is made up of many towns with a land mass of 428 m^2 and population of 22,860 people (NPC, 2006). Ayamelum L.G.A lies approximately between latitude 5˚36′ and 6˚18′ North of equator and longitude 7˚24′ and 8˚27′ East of Greenwich

meridian. It shared common boundaries to the North with Uzo-Uwani Local Government Area in Enugu State and in the South by Anambra East, in the West and South by Ezeagu Local Government Area in Enugu State and Igbola Local Government Area of Benue State respectively. The Local Government Area has favourable warm climate for the growth of both cash and food crops and rearing of animals.

Multistage random sampling was used to select towns, villages, and respondents. Firstly, four towns were randomly selected out of five (6). In the second stage, five villages out of eight villages were randomly selected from each of the towns. This brought to a total of 20 villages. Thirdly, six farmers were randomly selected from each village. This gave a total of one hundred and twenty (120) farmers for detailed study. A structured questionnaire was used to obtain primary data, while Secondary data was obtained through internets, Journals, and other periodicals. Percentage response, multiple regression analysis, profit function and Net Farm Income analyses were used to address the objectives of the study

Model Specification.

The implicit form of the production function analysis for okra production in the study area as stated as follows;

$Y = X_1, X_2, X_3, X_4, X_5, X_5 X_6, X_7$....., $X_{n,+} U$ .....(1)

Where
Y = Output (kg)
X_1 = Age (years), X_2 = Gender (Dummy), X_3=Farming Experience (years), X_4 = Quantity of planting (kg), X_5 =Household size (No), X_6 =Farm size (Ha), X_7= inorganic manure (kg), X_8 =Labour use (m), X_9 = Access to credit(dummy)
u = error term. The model can be stated explicitly as $Y = b_{o+} b_1 X_{1+} b_2 X_1 + b_3 X_{1+} b_4 X_{4+} b_5 X_{5+} b_6 X_6 + b7 X_{7+} U$.....(2)

$b_1 \ldots b_7$ are the coefficients to be examined
and
$X_1 \ldots X_{11}$ are the explanatory variables

defined in equation (1) above.

Four functional forms (linear, double log, semi double log and exponential functions) of production function were tried and explicitly represented as
Linear function:
$Y = b_0 + b_1 x_1 b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + ei$ ..... (3)
Double log function (Cobb Douglas):
$\ln(y) = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + ei$ .....(4)
Semi double log function:
$Y = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + ei$ ..... (5)
Exponential function:
$\ln Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + ei$ .....(6)

The choice of the best functional form was based on the magnitude of the R^2 value, the high number of significance, size and signs of the regression coefficients as they conform to *a priori expectation*.
The profit function model is specified as (Py, Pa, Pb, Pd, Pe, Pf……..Za, Zb)……(7)
Where Π* = Amount of variable profit per hectare(N), Py = price of output per hectare(N), Pa = price per unit of labour (N), Pb = price per unit of inorganic manure, Pc = price per unit of pesticides (N), Pd = price per unit of planting material (N). Za = capital(measured a depreciated value of fixed assets used in okra production) and Zb = land value(N) (wether as purchased or inherited or rented)

. Gross Margin analysis can be expressed as =

G.M. = TR – TVC ……...……(8)

$$\text{i.e. G.M} = \sum_{1-1}^{n} P_1 Q_1 - \sum_{j-i}^{m} r_i x_i \quad \text{.....(9)}$$

The Net farm income was calculated by a gross margin less fixed input. The net farm income can be expressed as thus:

$$\text{NFI} = \sum_{1-1}^{n} P_1 Q_1 - \left[\left(\sum_{j-i}^{m} r_i x_i \right) + k \right] \quad \text{.....(10)}$$

Where: GM = Gross margin (₦), NFI = Net farm income (₦), P1 = Market (unit) price of output (₦), Q = Quantity of output (kg), ri = Unit price of the variable input (kg), xi = quantity of the variable input (kg) , K = Annual fixed cost (depreciation) (₦), i = 1 2 3 …….. n, j = 1 2 3

Results and Discussion

Table 1 indicated that less than 38% of the respondents were below 40 years of age, while 62% were above 40 years of age. Table 1 indicated that most of the respondents were aged and this could be a hindrance to farming as they may not be able to withstand the rigors and stains in agriculture. In addition, 65% of the respondents had a household size less than 6, while 35% had above 6 persons. Large house hold size is desirable and of great importance in most developing countries, since most rural households relied more on members of the households than hired labour to work on their farms in order to curtail the minimally cost of production (Iheke, 2010). Besides, 33.3% of the respondents had no formal education, while 66.7% had formal education. Most of the farmers had formal education, and this could boost their prudence in resource use efficiency and rational decision making for high production and productivity to ensure (Udo,2005).

Table 1 also revealed that 25% of the farmers with farming experience of fewer than 10 years, while 75% had above 10 years. The implication is that the higher the farmers' years of farming experience, the higher the possibility of he / she being able to set realistic goals in their farm business (Tanko, 2004). More so, 62.5% of the sampled farmers had contact with extension agent, while only 37.5% had no contact. Udo (2005) made a similar finding. He remarked that extension is the major medium in developing countries through which innovations could be transferred to farmers in order to improve their efficiencies for high production to result. In addition, the majority (90%) of the respondents cultivated one (1) hectare (ha) or less were and above 5 hectares were cultivated by 10%. The implication is that small farm holders dominated farming in the study area and many sub Saharan Africa and could threaten significantly household food security.

Moreover, 33% of the farmers had access to credit either from formal or informal sectors, while 67% did not have access to credit. Credit has the potential of enhancing efficient resource allocation, permits application of technology, reduces post-harvest wastes and stabilizes farm input prices, farm income and enhance efficient marketing of agricultural products (Chukwu, 2013)

Based on the statistical and econometric criteria, Cobb Douglas production function was chosen as a lead equation as indicated in Table 3. The coefficient of determination (R^2) was 0.889, implying that 88.9% of the variation in the output of the pig farmers were accounted by various inputs included in the model, while the remaining 2I.1% were due to error term. The statistical test of the coefficient of age was negative and significant at 10% probability level. This is in line with Iheke, (2010), who reported that younger household heads have the ability to comprehend new technologies and will therefore readily adopt thus improving the timeliness of operations as well as reducing costs of production. As expected the coefficient of the level of education was positive in line with apriori expectation and significant at 10 % alpha . Education status of the farmers is expected to have an effect on the profitability of okra production. They are capable of making informed decisions that could optimize their output at minimal costs.

The coefficient of the years of farmers' farming experience was positive and significant at 5% risk level. The number of years of farming experience helps farmers to set a goal that could be capable of increasing their farm output at a reduced cost (Tanko, 2004).

Table 3 presents the result of the profit function which is employed to determine the factors that affect the profitability of okra in the study area. The result revealed that the price of labour, land value and pesticides had an indirect

relationship on the profit level of okra production. The negative significant effect on the value of land could be deduced from the fact that in the study area and many another sub Saharan African, land is the communal owner and as such people pay meagerly to have access to it (Ume et al. 2010). Furthermore, the use of family labour in most agricultural activities in preference to the high cost hired labour by poor resource farmers in the study area could be the reason for the signing identity of the variable. While, the signing identity of the coefficient of pesticides could be linked to using of indigenous known technology such as the use of neem and wood ash in controlling pests in preference to pesticides , because of the high cost of the latter (Chukwu, 2013).

The cost and returns in okra production as indicated in Table 4 shows that the total physical cost was ₦ 295,500 with fertilizer(₦24,800) constituted about 54-55% of the total cost of production, while the least was cost of planting materials(₦ 7500) Hoarding and diversion of the resources to another state could be the reasons for the scarcity and high cost of fertilizer (Ume et al., 2010). The labour wage rate varied with the nature of farm operation, as more tedious jobs attract more wages. Therefore, the total cost of labour was ₦357,200, which was about 13.57% of total cost of production. A total revenue of ₦720,000 was realized from 6000 kg of okra that was harvested per hectare. The Gross Margin and Net Farm income of okra production were ₦266,356 and ₦265,356 respectively. This implies that the enterprise is profitable when compared to total costs. The return per investment was ₦1.6 which means that in every ₦1 invested in okra production, ₦1.6k would be realized.

Conclusion and Recommendations.

The conclusion deduced were that majority of okra farmers were males, small scaled in operation and had no access to credit. Furthermore, the educational level, household size, and farming experience were the determinant variables to okra farmers' profitability. The price parameter for labor, land value, pesticide and output price impacted significantly on the profitability of the okra farmers. Finally, okra is profitable in the study area with Net farm income of ₦265,356. The study recommended for;(1)There is a need to increase farmers' access to credit through micro finance and commercial banks. (2) Improved production inputs such as fertilizer and seed of okra should be made available to farmers at subsidized prices (3) There is a need to encourage new entrant, especially young, educated and experienced farmers into okra production to absorb the available labour in order to reduce poverty should be advocated. These could be enhanced through the provision of improved production inputs at subsidized prizes.

(4)There is a need to strengthen the current policies on education such as the universal basic education, adult education and nomadic education for the farmers in order to enhance their production efficiencies and effectiveness. Furthermore, policies aimed at improving farmers' access to education through an aggressive awareness campaign and mass mobilization should be encouraged.

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Table 4.1: Distribution of Respondents According to Socioeconomic Characteristics

Factors	**Frequency (n=120)**	**Percentage**
Gender (dummy)		
Male	40	33.3
Female	80	66.7
Marital Status		
Single	33	22.7
Married	77	64.2
Divorced	10	8.3
Age in Years		
20 – 39	45	38
40 – 68	75	62
House hold size		
1 – 5	7 8	65
6 - 10	42	55
Farm size		
0.01-1.00	108	90
1.01 – 5.00	12	10
Farming Experience		
1 – 9	71	59.4
10 – 18	49	40.6
Educational level		

No Formal Education	40	33.3
Primary Education	77	36.7
Secondary Education	20	26.7
Tertiary education	4	3.3
Extension contact (dummy)		
Had extension contact	45	33.3
No extension contact	75	66.7
Access to Credit		
Access	75	62.5
Non Access	45	37.5

Source; Field Survey; 2015

Table 2: Multiple Regression Result

Variables	Cob Douglas	Exponential	Linear	Sem
Constant	597.589	4.587	0.246	616
	(11.496)***	(16.882)***	(3.393)***	(6.95
Age	-2.181	-0.561	-0.268	-54
	(-4.336)***	(-4.502)***	(-0.971)	(-1.
Gender	-14.143	-4.714	-0.021	-0.
	(-0.887)	(-1.128)	(-0.156)**	(-0.
Experience	6.593	0.049	0.008	25.
	(2.346)**	(0.268)	(3.304)***	(2.08
Level of Education	-0.41	0.133	-0.121	-0.
	(1.291)*	(2.145)**	(-0.821)	(0.(
Household size	1.051	0.020	0.006	-9.
	(3.098)***	(0.502)	(-0.338)	(-3.2
Farm size	10.410	0.212	0.025	3.:
	(0.078)	(3.359)***	(1.063)*	(1.6
Extension contact	0.001	8.239	0.146	20.
	(0.002)	(1.095)	(0.951)	(0.(
Credit	-9.019	-0.005	0.051	13.
	(-3.030)**	(-0.225)	(-0.637)	(0.:
R^2	0.889	0.791	0.779	0.8
F-value	15.891***	5.587***	5.121***	15.0:

Source, Field Survey, 2015

Table 3; Profit Function Analysis for Okra

Parameter	Coefficient	Standard error	t-value	P-value
Intercept	3146.61	2245.01	1.4016	0.2122
Labor cost	-3.8511	0.4461	-8.6328	<0.0001
Manure cost	-2.3150	1.8631	-1.2426	0.2190
Output price	8.2816	0.9172	9.0292	<0.0001
Capital	-0.5218	0.5046	-1.0340	0.2730
Land value	-0.9336	0.0719	-12.9339	<0.0001
Pest control	-3.2152	0.1151	-27.9339	<0.0001
Planting Material	-0.3834	0.3152	-1.2164	0.2199

Source; Field Survey, 2015

Table 4: Cost Returns on Okra Production

Item	Unity	Quantity	Cost/ Unit	Total Return	Percentage
Revenue	Kg	6000	120	720,000	
Variable cost					
Planting material kg	Kg	50	150	7,500	1.65%
Fertilizer input kg	Kg	200	6200	248,000	54.5%
Miscellaneous kg	Kg			40,000	8.80%
Total physical output				**295,500**	
Labour cost					
Clearing	man-day	40 hrs	1500	7,500	1.65%
Land preparation	man-day	96 hrs	2200	26,400	5.81%
Planting	man-day	32 hrs	900	3,600	0.79%
Weeding	man-day	80 hrs	1500	15,000	3.30%
Fertilizer	man-day	48 hrs	1000	6,000	1.32%
Harvesting	man-day	32 hrs	800	3,200	0.70%

BLR = ₦96444

TVC = (TC + BLR) = ₦453,644

GM = (TR – TVC) = ₦266,356

Total fixed cost = Depreciation on (hoe, cutlass, rake and basket) = ₦1,000

Total cost = (TVC + Depreciation) = ₦454,644

Net farm income = (TR – TC) = ₦265356

$$BCR = \left(\frac{NFI}{TC}\right) = 0.74$$

Source; Field Survey, 2015