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Economic Analysis of Cassava Production in Obubra Local Government Area of Cross River State, Nigeria

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Abstract: The study is conducted to examine the economics of Cassava production in Obubra Local government Area. Multistage random sampling technique was used to select a sample size of 156 respondents for the study. Data analysis was carried out using descriptive statistics such as frequency counts and percentages. The result show that females made up 63.7%, with 72% of the farmers married, having family size of 4-9 (75%) people, using mostly hired labor. Majority (86.2%) of the respondents have formal education, with 6 years and above farming experience, 75% of them acquired their capital through personal savings and operating on farm holdings of less than 2 ha. Costs and returns were analyzed using gross margin and profitability ratio. Gross margin result indicate that farmer obtain a net return of ₦123, 160.45 per ha with a benefit-cost ratio of 1.96. Gender, capital, farm size, labor and non-farm incomes are significant at 1% level of significance while education, farming experience and cassava cuttings are significant at 5% significance level. Whereas, age and family size are insignificant at all levels tested. Findings showed that the farmers were inefficient in their resource use. This suggests that for the farmers to increase cassava output in the area, they should employ more of the productive resources such as improved varieties and labor to boost their productivity. The study concludes that cassava farming is profitable and so new innovation should be passed to the farmers to adopt.

Key words: Adoption, Cassava production, costs and returns, economics, resource use efficiency, socio-economic variables

INTRODUCTION

Every nation attempts to address the prevalent issue of food security. In Nigeria, agriculture provides food for the teeming population and contributes about 33% to the Gross Domestic Product (GDP) of the nation (Bureau of African Affairs, 2010). The sector employs about one-third of the total labor force and provide a livelihood for the bulk of the rural populace (FMARD, 2006). Total area devoted to agricultural cultivation is about 30.7 million hectares with farmers cultivating less than 2 ha averagely, operating with simple tools. The performance of small holding farms in Nigeria is observed to be unsatisfactory. The agricultural sector of Nigeria has failed to keep pace with the demand of households and industries for farm produce as food or raw materials (Nwaiwu *et al*., 2010).

Olukosi (1999) suggested that access to adequate food by all members of the household and the entire nation at large at all times, for the maintenance of a healthy and active life is one of the major ways of fighting food insecurity in many parts of the world. Despite the involvement of many rural farmers in the agricultural production, several odds however still work against their efforts to produce abundant food for the nation and live a better life. One of the odds is attributed to the fluctuation in market prices as a result of the demand factors (Mohammed and Achem, 2010), thereby, resulting to food insecurity.

Simonyan *et al*. (2010) stated that Nigerians are poor and hungry despite efforts made by various governments in improving agricultural productivity and efficiency of the rural farmers who are the major stakeholders of agricultural production. This effort is geared towards programs that will result to effective production. One of such programs is the Root and Tuber Expansion Program, aimed at increasing root and tuber crops production. Specifically, in the area of Cassava, a Presidential Initiative on Cassava Production and Export was unfolded by Nigerian government in 2002. The initiative was aimed at using Cassava production as the engine of economic growth for the nation. Based on this, in 2005, the Federal Government of Nigeria promulgated a law, making it mandatory for bakers to use composite flour of 10% Cassava and 90% wheat for bread production. The initiative seeks to generate about US$5 billion as export revenue in 2007. Since then, the demand for Cassava

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products globally has increased, making the cultivation to increase but not enough to curb demand, thereby, putting a lot of pressure on production of Cassava. According to Food and Agriculture Organization of the United Nations database (FAOSTAT, 2009), Nigeria is the largest producer of the crop with 45,721,000, 43,410,000 and 44,582,000 million tonnes in 2006, 2007 and 2008 respectively. About 90% of this is however, consumed as food (Awoyinka, 2009). Nigeria is yet to fully harness the socio-economic potentials of Cassava that would translate to higher ranking of Cassava next to petroleum as major contributor to the Gross Domestic Product (GDP). For this to be achieve Cassava farmers production efficiency and profit margins needs to be established.

In Nigeria, as in most developing countries, Cassava is one of the most important carbohydrate sources. The large population of Nigeria depended on Cassava daily as their main dish such as *gari* and *fufu*, the leaves are consumed as vegetable, and it serves as raw material to industries as well as been a means of alleviating poverty. In spite of the various uses Cassava is known for, as an agent of self sufficiency in food production, the gain derived from its production by rural farmers is still not sufficient to keep the resource poor farmers above the poverty line. Efforts aimed at increasing Cassava output to meet the demand for the output cannot be properly directed unless the costs and returns of Cassava production are determined.

If this is done, farmers will be guided on inputs to focus on, thereby, increasing profit which will in turn result to higher standard of living. Establishing Cassava farmers' economics is salient for policy implication to address factors responsible for minimal production and bring about increased incomes of the farmers. Therefore, the broad objective of this study is to examine the economics of Cassava production in the area of study. The specific objectives are to: describe the socio-economic characteristics of Cassava farmers; analyze the costs and returns in Cassava production; and determine the resource use efficiency of Cassava production in the study area.

MATERIALS AND METHODS

The study was conducted in Obubra Local Government Area of Cross River State, Nigeria between November and December, 2009. The area occupies a land mass of 1,115 km² and a population of 172,444 (NPC, 2006). It consists of tropical rainforest and a small stretched of derived savannah. Crops grown in the area include Cassava, yam, rice, maize, vegetables, plantain, banana, fruits and tree crops.

A multistage random sampling technique was employed to select 156 Cassava farmers from nine communities in the Council Area through the administration of questionnaire and interview. 152 questionnaires were used for the analysis because information provided in 4 of the questionnaires could not be computed. Primary data collected focused on socio-economic characteristics of Cassava farmers, inputs used, Cassava output and their prices. The data were subjected to descriptive statistics such as frequency distribution and percentages. Budgetary techniques analyzes such as gross margin and profitability ratio were used to estimate the costs and returns of Cassava production in the study area. Olukosi and Erhabor (1988) stated that farm budgetary analyzes enable the estimation of the total costs as well as total revenue accrued to the enterprise within a specific production period. The difference between revenue (returns) and Total Variable Cost (TVC) makes up the Gross Margin (GM). It evaluates the gross profitability of a given enterprise. It is useful where the value of the fixed cost is negligible as it is the case with Cassava production which is operated mostly at small scale level (Arene and Mbata, 2008).

Therefore, Gross Margin is given as:

$$GM = TR - TVC$$

where,
GM = Gross Margin
TR = Total Revenue
TVC = Total Variable Cost

The profitability ratio used is Benefit-Cost Ratio (BCR)
= Gross Benefit/Total Cost

Production functions were fitted into the data. Three of the forms tried are linear, semi-log and Cobb-Douglas. The implicit form of the regression model used was:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, U) \quad (1)$$

where,
Y = Output of Cassava (kg)
X_1 = Gender (1 = male, 0 = female)
X_2 = Educational level (years of formal schooling)
X_3 = Capital (Naira, ₦)
X_4 = Farm size (in hectares)
X_5 = Non-Farm income (Naira, ₦)
X_6 = Labor (in man days)
X7 = Age of farmers (in years)
X_8 = Farming experience (in years)
X_9 = Family size (number)
X_{10} = Cassava cuttings (Number of bundles)
U = Error term

Explicitly the functional forms are expressed as follow:

(a) Linear form:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + U \quad (2)$$

(b) Semi-log form:

$$Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7\log X_7 + b_8\log X_8 + b_9\log X_9 + b_{10}\log X_{10}U \quad (3)$$

(c) Double-log form:

$$\log Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7\log X_7 + b_8\log X_8 + b_9\log X_9 + b_{10}\log X_{10}U \quad (4)$$

where,

b_0 = constant, b_1-b_{10} = estimated coefficients, X_1-X_{10} are as defined in Eq. (1). Economic, statistical and econometric criteria were employed to choose the lead equation based on coefficient of determination (R^2), significant levels of the parameters, and signs of the estimated coefficients that conform to the a priori expectations.

RESULTS AND DISCUSSION

The socio-economic information on the respondents in Table 1 showed that 63.8% of Cassava farmers are females. This indicates that Cassava production is not gender exclusive but is mostly carried out by the female folk. The age range of the farmers varied, 83.6% of the respondents fall between 30-59 years of age, implying that, in the study area, Cassava production is done by active and energetic people in the middle ages of production. This conforms to the findings of Okunade *et al*. (2005) that in Surelere Local Government Area of Oyo State, Cassava farmers are mostly between 36 and 56 years of age. Married people constitute 72.4% of the respondents, 75% of the farmers have family size of 4-9 people. Those with farming experience of 6 years and above comprise 87.5%. This implies that Cassava farming is not only an occupation but a way of life of the people in the study area. Majority (96.1%) of the farmers operates on farm holdings of less than 2 ha, they acquire their land predominantly through family land (76.3%). 69.7% of Cassava farmers in the area hire labor. This means that some of the family members may be involved in other activities other than Cassava farming. About 75% acquire capital through personal savings, this explain why the farmers cannot venture into mechanized farming as a result of little savings. The category of farmers who acquire their Cassava cuttings through friends and relations constitutes 85.5% of the respondents. Respondents sources of information are mostly (67.1%) from family and friends while only 21.7% gets information from government agencies. This implies that innovation transfer from research institutions through extension agents is low. Farmers who had one form of formal education or the other formed 86.2% of the sample size, which means, the farmers are educated. It also suggests that adoption of new technologies on Cassava

Table 1: Socio-economic characteristics of Cassava farmers

Variable	Frequency	%
Age:		
below 19	2	1.3
20-29	16	10.5
30-39	513	3.6
40-49	40	26.3
50-59	36	23.7
60 and above	7	4.6
Marital status:		
Married	110	72.4
Single	28	18.4
Divorce	11	7.2
Widow/Widower	3	2.0
Gender:		
Male	55	36.2
Female	97	63.8
Farming experience:		
1-5 years	19	12.5
6-10	37	24.3
11-15	442	9.0
15 and above	52	34.2
Family size:		
1-3	9	5.9
4-6	76	50.0
7-9	38	25.0
9-and above	29	19.1
Education:		
No formal education	21	13.8
Primary	49	32.2
Secondary	70	46.1
Tertiary	12	7.9
Labor:		
Hired	106	69.7
Family	31	20.4
Communal	15	9.8
Farm size:		
below 0.5	13	8.6
0.6-1.0	43	28.3
1.1-1.5	67	44.1
1.6-2.0	22	15.1
2.1 and above	6	3.9
Land acquisition:		
Family	116	76.3
Rented	23	15.1
Purchased	13	8.6
Cassava cuttings acquisition:		
Family and friends	130	85.5
Government agencies	17	11.2
Others	5	3.3
Source of capital:		
Personal savings	114	75.0
Credit/Loans	15	9.9
Friends and family	23	15.1
Source of information:		
Friends and family	102	67.1
Extension agents	33	1.7
Media (TV, Radio, Newspapers)	17	11.2

Computed from field survey, 2009

Table 2: Costs and returns analysis per hectare

A. Variables/Inputs	Amount (Naira, ₦)	%
Cassava cuttings	12,500.00	9.7
Labor	83,370.50	65.2
Transportation	10,680.70	8.4
Other cost	21,320.13	16.7
otal variables cost	127,871.33	100
B. Revenue		
Cassava tubers	190,780.73	76.0
Cassava stems	19,550.00	7.8
Quantity consumed	32,490.45	12.9
Quantity as gift	8,210.60	3.3
Total revenue	251,031.78	100
Gross margin 251,031.78 - 127,871.33 = 123,160.45		
Benefit-Cost Ratio, BCR,251,031.78 / 127,871.33 = 1.96		

Computed from field survey (2009)

Table 3: Cobb-douglas regression result of Cassava production

Variable inputs	Coefficient	T-ratio
Gender (X_1)	0.033	5.467**
Education (X_2)	1.155	2.305*
Capital (X_3)	0.310	77.550**
Farm size (X_4)	0.996	110.667**
Non-Farm Income (X_5)	-4.685	-2.835**
Labor (X_6)	1.844	20.719**
Age (X_7)	1.459	1.089^{NS}
Farming Experience (X_8)	0.721	2.060*
Family Size (X_9)	-1.613	-0.574^{NS}
Cassava Cuttings (X_{10})	1.476	2.024*
R^2	0.946	

Extracted from computer analysis results; **: Significant at 1%; *: Significant at 5% level of significance; ^{NS}: Not significant

farming could be facilitated with the above categories of farmers.

Costs that were considered here include cost incurred from variable inputs like labor, Cassava cuttings, transportation and other costs. The result of Gross margin analysis is presented in Table 2. From the table, labor accounted for about 65.2% of the total production cost, while analysis of other variables shows that the percentages share of Cassava cuttings and other costs are 16.7 and 9.7%, respectively. Labor therefore took the highest percentage of Total Variable Cost (TVC). This agrees with the study conducted by Ebukiba (2010) and Okon and Enete (2009) which labor constitutes the highest production cost in their works. The Costs and returns analysis shows gross margin of ₦123, 160.45 per ha. This when divided by a year gives a monthly income of ₦10,263.37. The Benefit-Cost Ratio shows a figure of 1.96, meaning for every one naira invested in Cassava farming, an additional ₦ 1.96 kobo will be realised.

Out of the three functional forms tried, Cobb-Douglass production function was chosen as the lead equation because it is the most fitted which satisfied the economic, statistical and econometric conditions. The result in Table 3 show that gender (X_1), education (X_2), capital (X_3), farm size (X_4), labor (X_6), age (X_7), farming experience (X_8) and Cassava cuttings (X_{10}) had positive signs. This means that these variables are directly related to Cassava output. A one unit increase in any of these variables will result to an increase in output by a corresponding coefficient of the variable. Non-farm income (X_5) and family size (X_9) had negative coefficients, meaning they are inversely related to Cassava output. Increasing these variables by one unit will lead to a decrease in Cassava output by the coefficient of the estimated variable. This could be that some of the family members engaged in other activities other than Cassava farming. As non-farm income increases, Cassava output decreases, meaning that as the farmer generate more income from other activities; concentration in Cassava production reduces, thereby, reducing output.

Gender (X_1), capital (X_3), farm size (X_4), labor (X_6) and non-farm income (X_5) are significant at 1% level of significance while education (X_2), farming experience (X_8) and Cassava cuttings (X_{10}) are significant at 5% level of significant. Whereas, age (X_7) and family size (X_9) are insignificant at all levels tested. The coefficient of determination (R^2) is 0.946; this implies that 94.6% of the variation in the output of Cassava production in the study area is explained by the explanatory variables in the model. Labor was found to be the most important determinant of Cassava output in the study area. This conforms to the study of Oniah *et al*. (2008).

Olayide and Heady (1982) defined returns to scale as the sum of the elasticities that are associated with a certain production process. Returns to scale measures the proportionate change in output if all the inputs are change simultaneously by one percent. It represents the sum of all the elasticities of production with respect to all the inputs (Yakasai, 2010). Various forms of returns to scale are: increasing (Ep>1), constant (Ep = 1) and decreasing returns to scales (Ep<1). The sum of elasticities of production with respect to explanatory variables in the study area is 1.696. This shows that Cassava farmers are operating in increasing return to scale region (Ep>1), that is, stage one of production process, which Olukosi and Ogungbile (1989) termed 'irrational stage'. This implies that if all the explanatory variables are increased simultaneously by 10%, Cassava output in the area will increase by 16.96%. Therefore, increase in variable input is still possible to obtain a higher output of Cassava. This agrees with Oniah *et al*. (2008) who stated that swamp rice farmers in Obubra Local Government Area are operating in stage one and are inefficient in the use of their resources.

CONCLUSION AND RECOMMENDATION

From the study, it can be concluded that Cassava farming is a profitable venture in the study area. It recorded a gross margin of ₦123,160.45 per ha. The benefit Cost ratio shows that for every one naira invested in the enterprise, a profit of ₦1.96 kobo will be realised.

Returns to scale value of 1.696 was obtained, which is increasing returns to scale region, meaning the farmers are operating in stage one of the production process. Therefore, the farmers are inefficient in the use of their resources in Cassava production in the area. Therefore, more variable resources should be employed in order to achieve maximum output from Cassava production and increase their profit margins. The government agencies in charge of Cassava should try to ensure that varieties that are not desirable are eliminated from the system and replace with desirable ones. Extension service should be improved to facilitate adoption of new technologies that will encourage the production of this crop where it is favourable but not yet considered to be grown. Good road networks should be provided to ease the cost of transportation.

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