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Productivity and Profitability of Cassava (Manihot Esculenta) In Ika South and Ika North East Local Government Areas of Delta State, Nigeria

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Abstract: *This paper examined the productivity and profitability in cassava production in Ika South and Ika North East Local Government Areas of Delta State. Primary data were collected from a sample of three hundred (300) cassava farmers from twenty (20) communities. Data collected were analyzed using econometric regression analysis. About 70% of respondents had farm sizes in the range of 1-3 hectares in multiple locations. The productivity of cassava in Ika South (7.2tonnes/hectare) was significantly higher than that of Ika North East (6.8tonnes/hectare). On the average, Total Revenue (TR) per hectare was ₦ 81,468 while Total Cost per hectare was ₦32,214. The cost-benefit ratio was 0.40 thus the enterprise can be said to be viable. Gross margin per hectare was ₦61901, Net farm income was ₦ 49,272 and Net return to investment (NRI) per naira was approximately ₦153. Regression results showed that number of cassava cuttings, hired labour, farm size, farming experience and age were statistically significant to the output of cassava in the study area. It was recommended that improved cassava cuttings be made available in the area and inputs such as fertilizer should be provided for farmers at subsidized rate.*
Keywords*: Cassava, productivity, profitability*

I. Introduction

Cassava belongs to the genus *manihot* of the natural order *Euphorbiaceae*. Its botanical name is *Manihot esculenta* Crantz. Cassava is one of the most important crops in Nigeria as well as in Africa because it serves as a major source of carbohydrate [1], [2]. Cassava can be grown and stored in the field in all seasons because it is relatively less sensitive than most crops to environmental changes [3]. The significance of cassava cannot be undermined as cassava is a crop which serves both as food and feed [4]. As a food crop, it is widely consumed in the forms of *garri, fufu*, or chips while its leaves are used as vegetable. In addition to it being a rich source of carbohydrate, the root tubers contain traces of phosphorus and iron [5]. Famine rarely occurs in the areas where cassava is grown since the crop provides a stable base for food production [6] thus it is commonly referred to as one of the major crops for food security in the tropics [7].

Nigeria is the largest producer of cassava in the world followed by Brazil [8]. Although Nigeria produces about 34 million metric tonnes annually [9] most of the cassava produced in Nigeria is consumed locally. And in spite of the fact that Nigeria is the world largest producer, its output falls below total demand for the crop as food, for industry and export. Much recently, Nigeria has shown interest in biofuel obtainable from cassava. This is evident in the ethanol fuel programme in which sites have been mapped for the cultivation of cassava [10]. Thus the need for intensification of the product is obvious. [11] noted that with increasing demand for cassava following population growth and changes in food preferences of the consuming nations as well as increase in industrial needs, subsistence operators are confronted with the challenges of increasing their output. Given the interest of more nations in buying cassava products from Nigeria, the prospect for enhanced foreign exchange is becoming significantly high. Although it has been argued that increasing the productivity of cassava is crucial for Nigeria to increase output to meet the 'actual versus potential' demand, increased hectarage is also essential. Given that Nigeria producers are mostly small holders, increasing hectarage would imply prospective farmers joining the industry. The financial attractiveness of an enterprise is however paramount to attracting new entrants/investors. This is hinged on the understanding of constraints facing the industry. Consequently, this paper was designed to determine the productivity and profitability of cassava using farmers in south and Ika North East Local Government Areas of Delta State as case studies with a view to establishing the attractiveness of the business. The specific objectives were to:

i. Estimate the productivity of cassava in the study area by varieties and by communities
ii. Determine the profit level of cassava
iii. Determine the factors that affect production of cassava

Further, the crucial factors which pose challenges to cassava production isolated, analysed and solution proffered.

Research Hypotheses

H_{o1} : There is no significant difference in the output of cassava in the two Local Government Areas
H_{o2} : There is no significant difference in the farm sizes in the two Local Governments Areas.
H_{o3} : Cost and Benefit are equal (TR=TC)
H_{o4} : Production factors (farm size, age of farmers, experience, variety of cassava cuttings, fertilizer application) do not significantly affect the output of cassava

II. Material and Method

Sampling Technique and Sample Size

Cluster sampling technique was applied in this study. Communities in the local government were regarded as clusters. To select communities for this study, simple random sampling technique was used and twenty communities were selected from a total of thirty-five communities in the Local Government Areas. Systematic sampling technique was employed to draw sample of cassava farmers since there was no existing sampling frame. A list of cassava farmers was drawn in each communities and the required number drawn by systemic sampling from each community. One hundred and fifty cassava farmers were selected from each Local Government Area bringing the total to three hundred (300) cassava farmers.

Primary data were collected using pre-tested questionnaires and interview schedule. Data collected were on socioeconomic characteristics of the farmer, the cost and returns of cassava production, cropping systems, farm output, and income level. Secondary data were collected from journal, bulletins and other published and unpublished sources.

To achieve the objectives of the study, appropriate analytical techniques were used. Descriptive statistics was used to analyze the socioeconomic characteristics of the respondents. To estimate the productivity of cassava in the study area, output/hectare was compared; cost-benefit analysis and other profit functions were used to estimate returns/profit while econometric regression analysis was used to determine the factors that affect production of cassava.

Model Specification

The profit functions used to ascertain the profitability of cassava production and processing in the study area were Cost-Benefit Ratio, Profit, Gross margin, Net Farm Income and Net Returns to Investment

The regression model used to determine the effect of productive resource on the output of cassava was tried in three functional forms (Linear, semi log and Double log) in order to identify the model that best represent the data.

$Y = f(X_1, X_2, X_3, X_4, \ldots X_9, + \mu)$

Where

Y = Output of cassava in tonnes
X_1 = Number of cassava cutting (bundle/ha)
X_2 = Fertilizer (Kg/ha)
X_3 = Hired Labour (Mandays)
X_4 = Family labour (Mandays)
X_5 =Farm size (ha)
X_6 = Educational Level
X_7 = Family size (number)
X_8 = Farming experience (yrs)
X_9 = Age (years)
μ = Error term

III. Result and Discussion

Socioeconomic Characteristic of Respondents

Results presented in Table 1 showed that males were more involved in land preparation activities as cassava farming is regarded as a tedious energy consuming activity. This corroborates the findings of [12]. Respondents between the ages of 31-40 made up 54%. This shows that cassava farming is predominantly practiced by adults in their active age. Over 72% of cassava farmers were married. This had its advantage as there were extra hands available in form of family labour. Results also show that 78% of farmers were involved in full time farming, 8% combined faring with regular paid jobs and 8% with trading. This implies that majority of respondents take cassava faring as their primary occupation. About 12% of respondents were not educated, 40% had primary school education while 86% had secondary school education. The literacy level here implies that it may be more difficult for this group to adopt and practice innovations in farming. Farming experience ranged from less than 5 years which accounted for about 22%, 5-10 years which accounted for 28% to11-15 years which accounted for 26%. This shows that majority of the farmers had experience above 5 years which

they readily employ to their advantage. About 70% of farmers had farm size of between 1-3 hectares in multiple locations. This implies that majority of cassava farmers in the area operate on small to medium scale. This corroborates the findings of [13] that farm sizes in Nigeria are small and in most cases fragmented. The sources of land were mainly through inheritance, family and rent which accounted for 40%, 34% and 26% respectively. Thus 60% faced insecurity of tenure which could have impact on productivity.

Analysis of Gross Margin of Cassava Production

Results presented in Table 2 showed that the major source of farm income was from the sale of cassava tubers. The total variable cost was ₦19,585/hectare while the total revenue was ₦81,468.
The Net Farm Income (NFI) of ₦ 49,272 and Net Returns on Investment (NRI) of ₦ 152.95 was obtained. This implies that in the short run, cassava production is still profitable. This is similar to the findings of [14] and [15].

Productivity of Cassava in the Study Area

On the average, Ika South produced about 7.2 tonnes per hectare while Ika North East produced about 6.8 tonnes/hectare. This may be due to the difference in fertility of soils in the area as most of the top soils in Ika North East have been exposed to erosion. This is in consonance with [16] who whose reported that variations among regions in Nigeria are mainly due to the differences in management practices or variation in soil and climatic factors.

Test of Hypotheses

The results as presented in Table 2 shows that Benefit exceeds Cost and cassava production is profitable thus the null hypothesis whish states that Cost and Benefit are equal (TR=TC) is rejected and the alternative hypothesis accepted. The results of the Z-test as presented in Table 3 shows that there is significant difference in the output of cassava per hectare between the two Local Government Areas. Therefore the null hypothesis is rejected and alternative hypothesis which states that there is significant difference in the output of cassava in the two Local Government Areas is accepted. The Z-test results in Table 4 shows that there is no significant difference in the farm sizes in the two Local Governments Areas.

Regression Results for Factors that Affect the Output of Cassava

The criteria for selecting the lead equation as adopted by [17] are: More number of factors of statistically significant coefficient, relative F-value of the model and relative magnitude of adjusted R.
The linear function was chosen as the lead equation based on these criteria. The results presented in Table 5 shows that about 73% of the variation in cassava output was accounted for by the variables. The number of cassava cutting (X_1), hired labour (X_3), Farm size (X_5), farming experience (X_8) and age (X_9) were statistically significant at 5% level. This finding is similar to that of [18].

IV. Conclusion and Recommendation

The findings of the study showed that cassava production is profitable in the study area. On the average, Total Revenue (TR) per hectare was ₦ 81,468 while Total Cost per hectare was ₦ 32,214 while the cost-benefit ratio was 0.40 thus the enterprise can be said to be viable. Gross margin per hectare was ₦ 61901, Net farm income was ₦ 49,272 and Net return to investment (NRI) per naira was approximately ₦ 153. Regression results showed that number of cassava cuttings (X_1), hired labour (X_3), farm size (X_5), farming experience (X_5) and age (X_9) were statistically significant.

Based on the findings of this study, the following recommendations are made. Government should create incentives for farmers by ensuring that necessary production inputs are made available especially in the form of fertilizers and improved stem cuttings, farmers should be encouraged to pool resources together in order to purchase necessary farm inputs and cassava processing industries should be established in the area to manage the massive supply of cassava tubers during the period of glut.

References

[1] Nweke F.I, Hahn, S.K and Ugwu, B.O. (2002) Circumstances of Rapid Spread of Cultivation of Improved Cassava Varieties in Nigeria. *Journal of farming system research and extension.*49(3).
[2] Food and Agricultural Organisation (FAO) (2000). *The places of Agriculture in Sustainable Development: the way forward on SARD.* Committee on Agriculture, Sixteenth Session, Item 7 of the provisional Agenda, Rome, 26-30 March, 2000.
[3] International Institute for Tropical Agriculture (IITA) (1999): Cassava Catches on Annual Report, International Institute for Tropical Agriculture Pp: 27-29.
[4] Chukwuji C.O. (2006) Factor Productivity and Technical efficiency in Cassava based Food Crop Production Systems in Delta State, Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics and Extension, Delta State University, Abraka.
[5] Afekoro L.O. (2005) Cassava Production Management in the Tropics. Eregha Nigeria Co. Press Ughelli, Delta State. Pg 11-13.
[6] Nweke F.I., (1988). *Spread and Performance of Cassava Varieties in Nigeria* COSCA. Working paper No. 15 Collaborative Study of Cassava in Africa. IITA Ibadan, Nigeria.

[7] Ubalua, A. O., & Mbanaso, E. N. A. (2013). A Novelgene Transformation Technique for Farmer's Preferred Cassava Cultivar (Nwibibi) from Nigeria. *World Journal of Agricultural Sciences*, *9*(3), 284-289.
[8] Food and Agricultural Organisation (FAO) (2000). *The places of Agriculture in Sustainable Development: the way forward on SARD*. Committee on Agriculture, Sixteenth Session, Item 7 of the provisional Agenda, Rome, 26-30 March, 2000.
[9] Food and Agricultural Organisation (FAO) (2004) Online Statistical Data Database, Rome, Italy. Food and Agricultural Organisation of the United Nations Website. www.fao.org
[10] Adeoti, O. (2010). Water use impact of ethanol at a gasoline substitution ratio of 5% from cassava in Nigeria. *Biomass and Bioenergy*, *34*(7), 985-992.
[11] Nweke F.I, Ugwu, B.O., Dixon A.G., Asadu C.L. and Akuba, O. (1997) *Cassava Production in Nigeria.* A Function of Farmers Access to Market And to Improved Production And Processing Technology. COSCA. Working paper No. 21 Collaborative Study of Cassava in Africa. IITA Ibadan, Nigeria.
[12] Oneemolease O.I. (1997). Impact of ADP on Maize farmers in Bendel State. An Unpublished MSc. Thesis. Faculty of agriculture, University of Benin. Pp 19.
[13] Akatugba-Ogisi, O.D (1994) *Multiple Objectives and small Farmer Production Behaviour in Delta and Edo States of Nigeria*: An application of Goal Programming. Unpublished Ph.D Thesis, Department of Agricultural Economics and Management, University of Reading, UK.
[14] Chukwuji C.O. (2006) Factor Productivity and Technical efficiency in Cassava based Food Crop Production Systems in Delta State, Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics and Extension, Delta State University, Abraka
[15] Muhammad-Lawal, A., Salau, S. A., & Ajayi, S. A. (2012). Economics of Improved and Local Varieties of Cassava among Farmers in Oyo State, Nigeria.*Ethiopian Journal of Environmental Studies and Management*, *5*(2), 189-194.
[16] Onoja, A. O., Ibrahim, M. K., & Achike, A. I. (2009). Econometric analysis of credit and farm resource technical efficiencies determinants in cassava farms in Kogi State, Nigeria: a diagnostic and Stochastic Frontier Approach. In A Conference Paper presented at the 14th Annual Conference of the African Econometric Society based in South Africa, Abuja.
[17] Olayemi J.K. (1998). Elements of Applied Economics. A Publication of Department of Agricultural Economics, Ibadan University Press, Nigeria. Pp 225
[18] Nandi, J. A., Gunn, P., & Yurkushi, E. N. (2011). Economic Analysis of Cassava Production in Obubra Local Government Area of Cross River State, Nigeria. *Asian Journal of Agricultural Sciences*, *3*(3), 205-209.

Appendix

Table 1: Socioeconomic Characteristics of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	186	62
Female	114	38
Age (Years)		
< 20	-	-
21-30	48	16
31-40	162	54
41-50	90	30
Marital status		
Single	60	20
Married	216	72
Widowed	24	8
Educational Level		
No formal education	36	12
Primary	129	40
Secondary	102	34
Tertiary	42	14
Farming Experience (Years)		
<5	66	22
5-10	84	28
11-15	74	26
16-20	30	10
>20	42	12
Farm size		
<1	12	4
1-1.9	96	32
2-2.9	114	38
3-3.9	36	12
≥4	40	14
Source of farm land		
Inherited	120	40
Rent	78	26
Purchased	48	16
Family	54	18

Source: Field survey, 2012

Table 2: Summary of Gross Margin Analysis of Cassava Production/ Hectare

Output of Value	₦
A = Total Revenue	**81486**
B = Variable cost	
Cassava cuttings	2434
Fertilizer	3885
Casual Labour	1006
Transportation	2259
Total Variable Cost	**19584**
C= Fixed Cost	
Permanent Labour	10541
Hoes and Cutlasses (Dep.)	891
Equipment (Dep.)	1198
Total Fixed Cost	**12630**
Total Cost	**32214**
Gross Margin	**61902**
Net Farm Income (A-B-C)	**49272**

Source: Field Survey, 2012

Table 3: Z-Test for Output: Two sample for means

	Output	
	Ika South	**Ika North East**
Mean	7.156666667	6.84533333
Known Variance	0.269	0.412
Observations	150	150
Hypothesized mean difference	0	
Z	4.620592779	
P (Z <= z) one-tail	1.91323E-06	
Z critical one tail	1.644853627	
P (Z <= z) two-tail	3.82645E-06	
Z critical two tail	1.959963985	

Source: Field survey, 2012

Table 4: Z-Test for Farm size: Two sample for means

	Farm size	
	Ika South	**Ika North East**
Mean	1.67666667	1.565333333
Known Variance	1.608	0.419
Observations	150	150
Hypothesized mean difference	0	
Z	0.957731931	
P (Z <= z) one-tail	0.169098975	
Z critical one tail	1.644853627	
P (Z <= z) two-tail	0.33819759	
Z critical two tail	1.959963955	

Source: Field survey, 2012

Table 5: Regression Results for Factors that affect the Output of Cassava

Variables	b Coefficient		
	Linear	**Semi-log**	**Double-log**
b_o = constant	10936463 (8.020)	164068 (16.1572)	12.206 (7.505)
X_1 = Number of cassava cutting (bundle/ha)	.115 (1.805)**	.134 (1.927)	0.074 (1.203)
X_2 = Fertilizer (Kg/ha)	.058 (.961)	.115 (1.616)	.104 (1.818)
X_3 = Hired Labour (Mandays)	.001 (3.019)**	-.041 (-.189)	-.098 (-1.199)
X_4 = Family labour (Mandays)	.042 (.731)	-.0.67 (-1.074)	-.127 (-1.448)
X_5 =Farm size (ha)	.344 (6.246)**	.309 (5.294)	.334 (4.189)
X_6 = Educational Level	.005 (0.97)	-.033 (-.563)	-.067 (-.598)
X_7 = Family size (number)	.037 (.691)	-.058 (-.948)	-.067 (-.598)
X_8 = Farming experience (yrs)	.033 (3.620)**	-.026 (-.435)	.059 (.678)
X_9 = Age (years)	.074 (2.368)**	.033 (.556)	.077 (.249)
R^2	.736	.109	.133
Fcal	49.792	33.058	5.485

Figures in Parenthesis are t-values ** Significant at 5%

Source: Field survey, 2012