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Gender Roles in the 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 gender roles in productivity and profitability of cassava 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 made up of 186 males and 114 females from twenty (20) communities. Data collected were analyzed using net farm income analysis, Z-test and econometric regression analysis. The Results showed that males were more available especially during the period of land preparation as it is regarded as a tedious energy consuming activity. Respondents between the ages of 31-40 made up 51 percent for males and 57 percent for females. Males on the average were more literate than females as about 4 percent had no formal education as compared to 24 percent of females. Female had more years of experience as 62 percent had between 5-15 years of experience compared to males 46 percent of males. Farm size was relatively small and fragmented ranging between 1-3 hectares. 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, hired labour, farm size, farming experience and age were statistically significant to the output of cassava in the study area. The key recommendation drawn is that government development activities should be targeted at the female folk in order to increase their lot as they dominated in production and processing.

Key words: Cassava · Gender · Productivity · Profitability

INTRODUCTION

Cassava (*Manihot esculenta*) is an important staple crop in Nigeria. It can be grown on a wide range of soils, withstand extreme stress [1] and can yield satisfactorily even on poor acid soils where most other crops fail [2]. In the world, cassava ranks fourth in importance after rice, wheat and maize [3]. [4] reported that cassava is the single major staple crop which provides a good proportion of the calories needed in tropical Africa. This is attributed to cassava being among the most stable of the world's major food crops [5]. Cassava can be processed into various forms for consumption [6]. Such forms include popular *garri* and *fufu.* According to [7] cassava is useful in bridging seasonal food gaps in preventing or alleviating famine and cushioning shortfalls of per capita food production where environmental and per capital resource conditions are deteriorating. Cassava thus plays an important and fundamental role in ensuring and stabilizing food security in Africa.

Nigeria is the largest producer of cassava in the world [8] producing about 34 million metric tonnes annually [9]. Although the output of cassava has been increasing over the years [10], various studies carried out indicate that the increase may be attributed more to expansion of land under cultivation rather than to increase in resource productivity or to efficiency in resource utilization. Definitely, raising the productivity per hectare appears to be the most ultimate goal and key factor to effectively address the challenges for achieving increased cassava output in Nigeria as the opportunity for expansion of cultivated land is limited. In many cases however, the role of women is ignored. [11] opined that inequality of gender have resulted in female farmers having less access to

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agricultural resources and services. Similarly, [12] argued that gender discrimination is the main barrier to women participation in agricultural programmes in Nigeria. Interestingly, FAO records that women produce between 60 to 80 percent of the food in most sub-saharan African countries and are responsible for half of the world's food production [13].

In view of this, the paper was designed to disaggregate gender roles in productivity and profitability of cassava in Ika South and Ika North East Local Government Areas of Delta State of Nigeria in order that development activities are channeled appropriately. The specific objectives were to:

- examine the roles played by men and women in productivity and profitability
- estimate the productivity of cassava in the study area by varieties and by communities
- determine the profit level of cassava and
- determine the factors that affect production of cassava.

Research Hypotheses: The research hypotheses tested in this study were:

H_{o1} : $Y_{IS} = Y_{INE}$, no significant difference in the output of cassava in the two Local Government Areas

H_{o2} : $\beta_{5IS} = \beta_{5INE}$, no significant difference in the farm sizes in the two Local Governments Areas.

H_{o3} : TR=TC no significant difference in Cost and Benefit in the study areas

H_{o4}: $Y = \beta_1 = \beta_2 \ldots \beta_5 = 0$, production factors do not significantly affect output of cassava

MATERIALS AND METHODS

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 then 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: Similar to earlier studies by [14][15], the profit functions used to ascertain the profitability of cassava production and processing in the study area were

$$\text{Cost-Benefit Ratio (CBR)} = \frac{\text{Total Cost (TC)}}{\text{Total Revenue (TR)}}$$

$$\text{Profit } (\Pi) = \text{Total Revenue (TR)} - \text{Total Cost (TC)}$$

$$\text{GM} = \text{Total Revenue (TR)} - \text{Total Variable cost (TVC)}$$

$$\text{Net Farm Income (NFI)} = \text{Gross Margin (GM)} - \text{Total Fixed cost (TFC)}$$

$$\text{Net Returns to Investment/ ₦ (NRI)} = \frac{\text{Net Farm Income}}{\text{Total Cost}} \text{ X } 100$$

The regression model used to determine the effect of productive resource on the output of cassava. Linear, semi log and Double log functional forms were tried and are specified implicitly as:

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

Where
Y = Output of cassava in tonnes
X_1 = Number of cassava cutting (bundle/ha)
X_2 = Fertilizer (kg ha^{-1})
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

RESULT AND DISCUSSION

Socioeconomic Characteristic of Respondents: Results presented in Table 1 show that males were more available especially during the period of land preparation as it is regarded as a tedious energy consuming activity. This corroborates the findings of [16]. Respondents between the ages of 31-40 made up 51 percent for males and 57 percent for females. This shows that cassava farming is predominantly practiced by adults in their active age. About 63 percent of male cassava farmers were married while 86 percent of females were married. This had its advantage as there were extra hands available in form of family labour. Males on the average were more literate than females as about 4 percent had no formal education as compared to 24 percent of females.

The literacy level of the female folks implies that it may be more difficult for this group to adopt and practice innovations in farming. Female had more years of experience as 62 percent had between 5-15 years of experience compared to 46 percent of males. This shows that collectively, majority of the farmers had experience above 5 years which they readily employed to their advantage. Farm size was relatively small, fragmented and between 1-3 hectares in multiple locations. This implies that majority of cassava farmers in the area operate on small to medium scale. This is similar to the reports of [17] that farm sizes in Nigeria are small and in most cases fragmented. The sources of land were mainly through inheritance for males as this accounted for 61 percent while majority (64 percent) of females source their land from rent thus faced insecurity of tenure which could have impact on productivity.

Gender Involvement in Cassava Production and Processing: The result of gender involvement in cassava production and processing is presented in Table 2.

Table 1: Socioeconomic characteristics of respondents

	Male		Female	
Characteristics	Frequency	Percentage	Frequency	Percentage
Age (Years)				
< 20	-	-	-	-
21-30	26	13.9	22	19.3
41-50	96	51.7	66	57.9
>50	64	34.4	26	22.8
Marital status				
Single	58	31.2	2	1.8
Married	118	63.4	98	86.0
Widowed	10	5.4	14	12.2
Educational Level				
No formal education	8	4.3	28	24.6
Primary	85	45.7	35	30.7
Secondary	57	30.6	45	39.5
Tertiary	36	19.4	6	5.2
Farming Experience (Yrs)				
<5	34	18.3	32	28.1
5-10	54	29.0	30	26.3
11-15	33	17.7	41	35.9
16-20	24	12.9	10	8.8
>20	41	22.1	1	0.9
Farm size				
<1	3	1.6	9	7.9
1-1.9	40	21.5	56	49.1
2-2.9	80	43.0	34	29.8
3-3.9	26	13.9	10	8.8
≥4	37	20.0	5	4.4
Source of farm land				
Inherited	114	61.3	6	5.3
Rent	5	2.6	73	64
Purchased	20	10.8	28	24.6
Family	47	25.3	7	6.1
Total	186	100	114	100

Source: Field survey, 2012.

Table 2: Gender involvement in Cassava production and processing

Activities	Percent Male	Percent Female	Dominant Gender
Land acquisition	72.2	27.8	Male
Bush clearing	81.6	18.4	Male
Land burning	76.8	23.2	Male
Ridge/mound making	61.6	38.4	Male
Procurement of cassava stem	23.2	76.8	Female
Planting of cassava stems	22.6	77.4	Female
Weeding	80.6	19.4	Male
Harvesting of cassava tubers	22.2	77.8	Female
Transportation	34.6	65.4	Female
Sales of cassava tubers	22.0	78.0	Female
Peeling of cassava tuber	18.8	81.2	Female
Grating of cassava	27.2	72.8	Female
Ownership of grating machine	62.4	37.6	Male
Processing	11.4	88.6	Female
Sales of cassava product	18.2	81.8	Female

Source: Field survey, 2012

Table 3: 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

The result show that more males are involved in tedious activities like land acquisition, ridge making, bush burning and weeding of farm land while more females are involved in activities like planting of cassava cutting, procurement, harvesting, transportation and sales of cassava. Generally, female dominated most of the activities in cassava production and processing which implies that development activities designed for improving cassava production should be targeted at the female folk for effective result. This is in line with [18].

Analysis of Gross Margin of Cassava Production: Results presented in Table 3 showed that the main source of sustenance of these farmers was from the sale of cassava tubers. A total variable cost was ₦19,585 per hectare was obtained 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 gives an indication of the short run profitability in cassava. This result corroborates earlier reports by [19] and [20].

Productivity of Cassava in the Study Areas: On average, the output of cassava in Ika South was about 7.2 tonnes per hectare while Ika North East produced about 6.8 tonnes per hectare. It is argued here that besides management practices, this difference may also be attributed to the difference in fertility of soils in both locations.

Test of Hypotheses: The results as presented in Table 3 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 4 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 5 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 preferred functional form as adopted by [21] are the number of statistically significant coefficient, relative F-value of the model and relative magnitude of adjusted R.

Table 4: 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 5: 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, 2011

Table 6: Regression results for factors that affect the output of Cassava

	b Coefficient		
Variables	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 percent, Source: Field survey, 2012.

The linear function was chosen as the best function because it best fit the data. The results presented in Table 6 shows that about 73 percent of the variation in cassava output was accounted for by the variables. The number of cassava cutting, hired labour, farm size, farming experience and age were statistically significant at 5 percent level.

CONCLUSION AND RECOMMENDATION

The results of the study showed that males were more available especially during the period of land preparation as it is regarded as a tedious energy consuming activity. Males on the average were more literate than females. Female had more years of farming and processing experience compared to males. 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, hired labour, farm size, farming experience and age were statistically significant.

Based on the findings of this study, the recommendations made are: 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, cassava processing industries should be established in the

area to manage the massive supply of cassava tubers during the period of glut and development activities should be targeted at the female folk in order to increase their lot as they dominated in production and processing.

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