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Assessment of Labour Choice Decisions among Smallholder Cassava Farmers in Ikom LGA, Cross River State, Nigeria

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Abstract
The study examined the assessment of labour choice decisions among smallholder cassava farmers in Ikom LGA of Cross River State, Nigeria. Data was collected from 60 farmers using a multistage sampling method. Data collected were analyzed using descriptive and inferential statistics such as means, percentages, tables, frequency, Multinomial logit regression, and Ordinary Least Square (OLS) multiple regression. Results of the study showed that 66% of farmers were married, with females dominating agricultural activities in the study area. Farmers' average farm size was 0.8ha, 70% have a household size of 6-10 people, and 70% have farming experience ranging from 1 to 20 years. Family labour was the most common type of labour activity. Results of multinomial logit regression revealed that farming experience, educational level and income status were positive and significantly related to the probability of choosing hired labour while the household size and prevailing labour cost in the study area impacted positively the choice of hired labour. Also, the coefficient for farm size was positive and significantly related to the choice of both family and hired labour. Multiple regression analysis showed that factors such as hired labour, family labour, farming experience, farm size, and farmer household size were significant predictors of cassava output in the study area. It was therefore recommended that policies encouraging land access be pursued and that a campaign promoting the profitability of cassava production in the study area be advocated for and intensified. Other incentives such as farm inputs, subsidies, access to loans, and training should be made available to cassava farmers to improve production and profitability.

Keywords: Labour choice, Smallholder, Cassava, Farmers, Nigeria

Introduction

Agricultural production in Nigeria despite being the backbone of the economy still relies heavily on the small-scale, resource-constrained farmers who live in the rural areas of the country. Their reliance on hoes and cutlasses, which has kept them at the subsistence level of production, is evidence that, in addition to the many difficulties they face, such as inadequate infrastructures, and poor access to technology has continued to constrain their ability to produce. As a result, agricultural production in the country has been very labour-intensive, with farmers depending on the labour of their own households. Agricultural production in Nigeria (unlike the developed world) continues to be labour intensive with more than 90% of the population being small-scale farmers, cultivating less than two hectares and utilizing unpaid labour as a major source of farm labour supply (Arikpo *et al*., 2009). Gocowski and Oduwole (2003) confirmed labour as a major constraint to peasant agricultural production in Nigeria, especially during planting, weeding and harvesting. Agriculture serves as a vehicle for diversifying the economy and enabling economic development. Household roles in crop production is not static but tend to be dynamic in response to pressure from the changing social, cultural and economic milieu(Agwu and Chukwu, 2006). It is sufficient to say that labour used in crop production depends on household characteristics, resources, type of labour used and gender of labour waged/exchanged (Durno and Stuart, 2005).

Labour supply from the family level has been dwindling considerably over the past years due to a number of factors, some of which are related. Amsalu *et al*. (2013) opined that a shortage of farm labour at peak seasons may be a reason for households to hire farm labour. In addition, vulnerable households such as women headed or orphaned households are usually unduly disadvantaged in family labour availability and productivity (Babatunde *et al*., 2008). Farmers who are naturally more inclined to avoid payment of wages to hired hands would have a clearer basis for decisions on

farm labour structure. Cassava is one of the major crops grown by smallholder farmers in the southern and eastern parts of Nigeria. Literature suggests that men are involved in cassava production and processing even though their level of involvement cannot be compared to their female counterparts. In view of this assertion, Odebode and Adetunji (2015) affirmed that there are different roles adult and young males and females play in cassava production activities. Hence, this study was undertaken to assess The Labour Choice Decisions among Smallholder Cassava Farmers in Ikom LGA of Cross River State, Nigeria**.** The specific objectives of the study were to (i) describe the socio-economic characteristics of Cassava farmers in the study area (ii) determine the labour choice decision prevalent among cassava farmers in the study area(iii) estimate the production function of cassava in the study area.

Methodology

The study area

The study was carried out in Ikom Local Government Area in Cross River State, Nigeria between longitudes 8.00ºand 8.10ºE, and latitudes 5.00º and 6.30ºN. Ikom LGA is bounded in the northeast by Boki LGA, in the east by Etung LGA, in the northwest by Ogoja LGA and in the south by Obubra LGA, all in Cross River State. The local government area is administratively located in the central senatorial zone. The study area has a land mass of about 1,961km^2. Topographically, the land is generally undulating with monotonous depressions that contain water even during the dry season (Njoku *et al*., 2017) . The people of the state are majorly engaged in farming, trading, fishing and hunting. The major crops grown include yam, cassava, cocoyam, rice, maize, vegetables, bush mango, oil palm, and cocoa.

Sampling Procedure and Data Collection

The study made use of primary data that were collected through a multistage random sampling technique in 2019. Cross River State has three (3) Agricultural zones namely; Ogoja, Ikom and Calabar zone**s.** First, Ikom Agricultural Zone was selected from the existing three (3) zones for the study. Ikom agricultural zone is a tropical rainfall area and is known for its abundant food supply in arable and cash crop production. Cocoa product dealers are very prominent in this area. The next stage was the selection of 3 communities from Ikom Agricultural Zone. Alesi, Alok and Balep communities were the ones chosen; a total of 60 farmers were selected in the ratio of 20 farmers per community.

Method of Data Analysis

Simple descriptive statistics (mean, frequency, percentages) were used to analyze the demographic characteristics of respondents. Multinomial logit regression was used to estimate the influence of socioeconomic factors on cassava farmer's labour choice decisions. Lastly, Ordinary Least Square (OLS) multiple regression was used to measure the influence of socioeconomic variables on the output of cassava in the study area.

The study's empirical models are presented below:

Three labour choice decisions were available for farmers namely hired labour, family labour, and both hired and family labour. The dependent variable was assigned one if the farmer chose family labour, two if the farmer chose hired labour and three if the farmer chose both family labour and hired labour.

Model specification

According to Enete (2003), in multinomial logit model, a set of coefficients $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ are estimated as;

$$\Pr(Z=1) = \frac{\ell x\beta^{(1)}}{\ell x\beta^{(1)}+\ell x\beta^{(2)}+\ell x\beta^{(3)}} \quad (1)$$

$$\Pr(Z=2) = \frac{\ell x\beta^{(2)}}{\ell x\beta^{(1)}+\ell x\beta^{(2)}+\ell x\beta^{(3)}} \quad (2)$$

$$\Pr(Z=3) = \frac{\ell x\beta^{(3)}}{\ell x\beta^{(1)}+\ell x\beta^{(2)}+\ell x\beta^{(3)}} \quad (3)$$

Since there exist more than one solution to $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ that leads to the same probabilities for Z=1, Z=2, Z=3, the model is unidentified. In order to identify the model, one of $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ is arbitrarily equated to 0. Assuming =0, then the remaining $\beta^{(1)}, \beta^{(3)}$coefficientwill measure the change relative to Z=2(hired labour in this case).In other words, we will be comparing the choice of hired labour with other labour choice decisions of the farmers. Setting $^{(2)} = 0$, the above equation becomes:

$$\Pr(Z=1) = \frac{\ell x\beta^{(1)}}{\ell x\beta^{(1)}+1+\ell x\beta^{(3)}} \quad (4)$$

$$\Pr(Z=2) = \frac{\ell x\beta^{(2)}}{\ell x\beta^{(1)}+1+\ell x\beta^{(3)}} \quad (5)$$

$$\Pr(Z=3) = \frac{\ell x\beta^{(3)}}{\ell x\beta^{(1)}+1+\ell x\beta^{(3)}} \quad (6)$$

The relative probability of Z=1to the base category is given

$$\frac{\Pr(Z=1)}{\Pr(Z=3)} = \ell^{x\beta^{(1)}} \quad (7)$$

Assuming we call equation (7) the relative likelihood and assume that X and $\beta^{(1)}$ are vectors equal to $X_1, X_2..X_k$ and $\beta^{(1)}, \beta^{(1)}\ldots\beta^{(1)}$respectively, the ratio of relative likelihood for one unit change in X_i relative to the base category is then:

$$\frac{\Pr(Z=1)}{\Pr(Z=3)} = \ell^{x\beta^{(1)}} \quad (7)$$

Hence, the exponential value of a coefficient is the relative likelihood ratio for a unit change in the corresponding variable (StatCorp, 1999 cited in Enete, 2003).

Multiple Regression Model

In order to determine the effect of labour choice decision and socioeconomic variables on cassava output, the multiple linear regressions which involved the Ordinary Least Square (OLS) estimation was employed. Of the four functional forms (Linear, Double log, Semi-log and Exponential) that were estimated, the linear model was chosen as the lead equation based on econometric, economic and statistical significance such as: sign of

coefficients, theoretical justification, R^2 and statistical significance of coefficient.

The implicit form of the model for cassava output in the study area is implicitly stated as follows:

$$Y = (X_1, X_2, X_3, X_4, ..., X_9) + u \quad \ldots\ldots\ldots\ldots (9)$$

Where Y = output of cassava (kg) X_1=Family labour (man days) X_2=Hired labour (man days) X_3=Both family and hired labour (man days) X_4=Age of farmers (years) X_5=Farming experience (years) X_6=Educational level (years) X_7=Household size number) X_8=Farm size (hectare) X_9=Gender of farmer(Male=1, otherwise=0) u=Error termThe model can be stated explicitly as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + ... b_9X_9 + u \quad \ldots\ldots\ldots (10)$$

Where $b_1 ... b_{11}$ are coefficients to be examined and $X_1 ... X_9$ are the explanatory variables defined in equation (9)

Results and Discussion

Demographic characteristics of the Farmers

The frequency distribution of respondents by gender, age, marital status, household size, education, type of labor used, farming experience, source of capital, and farm size is shown in Table 1. In terms of sex, 65% of respondents were females and 45% were males. This means that both men and women are actively involved in cassava production in the Ikom Local Government Area. This could be attributed to increased advocacy for women's participation in agriculture. According to the findings, the majority of farmers in the study area (51.3%) were between the ages of 41 and 60, 30% were between the ages of 21 and 40, and 18.3% were over the age of 61. Age is said to be a primary latent characteristic in cassava production. The results also show that the majority of farmers (66%) were married, 11.7% were single, and 23.3% were divorced or widowed, indicating that married people dominated agricultural activities in the study area and were more likely to make rational decisions. The results also show that (25%) of the majority of farmers have a household size of 5 or less, followed by (70%) of farmers with a household size of 6 to 10 people, and (5%) have a household size of 11 or more people. This indicated the prevalence of abundant labour for cassava production in the study area. About 33.3% of farmers had tertiary education, 28.3% had secondary education, 31.7% had primary education, and 6.7% had no formal education. Educated farmers are expected to be more receptive to improved farming techniques (Okoye *et al*., 2004); additionally, a high literacy rate has the potential to positively impact cassava output. In terms of experience, approximately 30% of respondents had 1 to 10 years of farming experience, 40% had 11 to 20 years of farming experience, 15% had 21-30 years of farming experience, and 15% had more than 31 years of farming experience. This is likely to impact positively on cassava production as experienced have been found to enhance the use of improved technology (Bassey and Okon, 2008). Experienced people are believed to have learned through several years of trials and errors in the agricultural sector. 60% of the respondents are members of cooperative societies, while 40% are not members of any cooperative society. According to the findings, the majority of farmers (71.7%) financed their cassava production with personal savings, 25% borrowed from friends and relatives, and 3.3% borrowed from thrift/cooperatives. This may have a negative impact on cassava production, modern input acquisition, and labour hiring for efficiency. Finally, the results showed that (21.7%) used hired labour, 46.7% used family labour, and 30% used both family and hired labour. This, therefore, shows the availability of both family and hired labour for farm work in the study area and is likely going to increase the cost of cassava production in the study area. The result shows that 16.7% of the respondents have a monthly income less than #20,000, 68.3% have a monthly income that ranges from #20,001-#60,000 and 15% of the respondents make 60,001 and above as their monthly income.

Socioeconomic Determinants of Labour Choice Decisions

Table 2 displays the findings of a multinomial logit regression analysis conducted to examine the factors affecting farmers' choice of labour use in the study area. The Pseudo R^2 value of 58.16% indicates that the selected factors have a relatively high explanatory power. The Probability > Chi2 value of 0.0000 suggests that the model has a strong ability to explain the labour choice. The primary labour choice among farmers was family labour, likely because the majority of farmers relied on their family members for various farm work. Hired labour was only sought after all available family labour had been exhausted. In comparison to family labour, the analysis revealed a positive and significant relationship between the probability of cassava farmers choosing hired labour and their farming experience, with a significance level of 10%. This implies that experienced farmers are more likely to use hired labour as a complement to family labour. Additionally, household size was found to influence the choice of both family and hired labour at a significance level of 5%. Previous research by Bamine, Fabiyi, and Manyong (2002) has shown that a larger household size is associated with a larger labour force, enabling more timely execution of farming activities. Similarly, studies by Nandi Gunn and Yukushi (2011) and Bassey and Okon (2008) have also found a positive impact of large household size on cassava production. Educational attainment positively and significantly affected the choice of hired labour at the 10 % level of probability. The majority of highly educated farmers prefer to hire labour for their farm work because they tend to have less time for farm work and other lucrative employment outside of agriculture. According to Nzeulor (2002), having more education is linked to less involvement in farm work. The choice of family labour and hired labour was significantly impacted by the farm size coefficient at the 5 and 1% levels, respectively. This is consistent with a prior expectation, as farmers with large farm sizes would also hire outside labour, engage family labour, or

both to meet their large farm size requirements. The result further revealed that in comparison to family labour, the probability that cassava farmers choose hired labour was positive and significantly related to the income status of farmers at the 1 percent level. This implied that farmers within the high income group would opt for hired labour. This is the case because majority of high income earners dominate the political, business, civil service, and other social organization and at the end have little or no time for their farm work. In most cases, the numbers of hours they invest in farm work are often so insignificant. Ufiem (2000) reported that low income farmers participated more in farming activities than their high income counterpart. The coefficient for farmer's age was positive and impacted positively on the choice of hired labour. Its coefficient was 0.5835 with t-stat of 3.141, implying that in addition to family labour, aged farmers prefers more hired labour to carry out their farming activities. There as on is because, cassava production requires more energy in all operations, as such aged farmers may not have such energy to undertake those difficult operations and as a result prefer to hire labour to achieve such task. Oyilimba (2002), reported that the use of hired labour was more common among household headed by old people because such households were likely to have larger farms.

Average Costs and Returns in Cassava Production in the Study Area

The average cost and return of cassava farmers in the study area is presented in Table 3. From the Table, average total revenue from cassava output is **N**288, 200 with a total cost of N135, 400. Variable cost accounted for 85 percent of total cost of production while fixed costs constituted 15 percent. Of this, labour costs made up 77.8% and 59.2%of the total variable cost and the total cost of production, respectively. Farmers also made a gross margin (GM) and net profit of N152, 800 and N110, 300, respectively. Thus, it is obvious that cassava production was profitable in the study area. In the respondents also had an average of 0.8 per hectare of land.

Determinants of Output for Labour Choice in Cassava Production

Table 4 presents the results of the determinants of labour type utilized in cassava production in the study area. The semi-log model was selected as the preferred equation due to its high R2 value and significant explanatory variables. The findings indicate that both hired and family labour have a positive and significant impact on the output of cassava production, with significance levels of 1% and 5% respectively. This suggests that increasing the utilization of these labour types would lead to an increase in cassava output. These results align with the aprior expectations since cassava production is known to be labour-intensive. Farmers often rely on hired labour as a supplement to family labour, as cassava farming involves tedious and rigorous tasks. According to Achoja, Idoge, Ukwuaba, and Esowhode (2012) and Bassey and Okon (2008), cassava production is labour-intensive. The age of the farmer was found to have a significant negative impact on cassava output at a significance level of 1%. This suggests that as farmers grow older, their ability to handle the labour-intensive nature of cassava production declines, leading to a reduction in productivity. This finding aligns with expectations, as aged farmers may struggle to maintain the same level of efficiency. Interestingly, this result contradicts the findings of Ogundari and Ojo (2006). On the other hand, farming experience was found to have a significant and positive effect on cassava output at a significance level of 5%. This indicates that as farmers gain more experience, their cassava output is likely to increase. Highly experienced farmers have accumulated valuable knowledge and insights through years of trial and error. Their expertise enables them to optimize their farming practices, resulting in higher productivity. This finding backs up Bassey and Okon (2008) and Gbigbi, Bassey, and Okon (2010). Household size had a positive impact on cassava output. According to the coefficient, increasing household size increases output by 3.142%. This outcome is favourable because a large household size implies an abundance of labor for cassava production. At the 5% level, the coefficient for farm size was positive and significantly related to cassava output. This finding is consistent with those of Achoja *et al*. (2012), and Ogundari and Ojo (2006).

Conclusion

The study examined the factors that determine the choice of labor among cassava farmers in Cross River State, Nigeria. The results showed that farming experience, educational level, income status, and age had a positive and significant impact on the likelihood of choosing hired labor. Additionally, household size and prevailing labor costs in the study area were also positively associated with the utilization of hired labor. The study further revealed that farmers with larger farm sizes tended to employ more labor, both from their families and hired workers, compared to those with smaller farm sizes. Moreover, the study demonstrated the profitability of cassava farming in the region, with a substantial gross margin and net income. The multiple regression analysis confirmed that hired labor, family labor, farming experience, farm size, and household size were influential factors affecting cassava output. As a result, the study recommends pursuing policies that facilitate access to land, intensifying campaigns highlighting the profitability of cassava production, and actively encouraging young individuals to participate in cassava farming through various incentives such as providing agricultural inputs, subsidies, access to loans, and training opportunities.

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Table 1: Socio Economic Characteristics of the Respondents

Variables	Frequency	Percentage
Sex		
Female	35	65
Male	25	45
Age (Yrs)		
≥ 20	00	00
21-40	18	30
41-60	31	51.7
≤61	11	18.3
Marital Status		
Single	7	11.7
Married	39	66
Widowed	14	23.3
Sources of Finance		
Personal	43	71.7
Friends/relatives	15	25
Thrift/Cooperative	2	3.3
Household Size		
≤5	15	25
6-10	42	70
≥11	3	5
Educational Qualification		
No Formal Edu.	4	6.7
Primary Edu.	19	31.7
Secondary Edu.	17	28.3
Tertiary Edu	20	33.3
Farming Experience		
≥10	30	50
11-20	6	10
21-30	9	15
≤31	15	25
Membership of Coop. Society		
Yes	36	60
No	24	40
Labour Source		
Family labour	28	46.7
Hired labour	13	21.7
Both	18	30

Field survey, 2019

Table 2: Multinomial Logit Regression Result of Factors Influencing Choice of Labour Use among Cassava Farmers in the Study Area

Variable	Both Family and Hired Labour	Hired labour
Constant	18.674*	31.285***
	(9.465)	(9.0002)
Farming experience	0.2576	0.9425*
	(0.2137)	(0.4779)
Household size	0.7154**	-0.0294
	(0.2942)	(-0.3454)
Educational level	-0.2187	0.4762***
	(0.1959)	(0.1387)
Farm size	3.8941**	6.8763***
	(1.7376)	(1.8425)
Income of farmer	0.2863	2.2841*
	(0.2461)	(1.1460)
Age of farmer	-0.1963	0.6835**
	(0.1781)	(0.2521)
Labour cost	1.6732**	-0.1825
	(0.6528)	(-0.1609)
Gender	-0.5173	0.0824
	(-4.0351)	(0.1065)
LR Chi^2=68.32, No.of observation=60	Prob Chi^2 = 0.0000PseudoR^2=0.5816	LRChi^2 = 68.32,

Source: Field Survey, 2019.

Note: N/B, ***denotes P≤0.01, **P≤0.05 and*denote P≤0.1. The base activity/outcome index is family labour (Comparison category). Figures in brackets are standard errors

Table 3: Costs and Returns Analysis for Cassava Farmers in the Study Area

Items	Units	Value(₦)
Sales/Revenue items		
Cassava tubers	Bags	254,500
cuttings/stems	Bundles	33,600
Total Revenue		288,200
Cost items		
(i)Variable cost		
(a)Labour cost	Man-days	105,400
(b)Cost of cuttings	Bundles	15,000
(c)Transportation	Naira	12,200
(d)Cost of empty bags	Naira	2,800
Total variable cost		135,400
(ii)Fixed Cost		
(a)Land		35,000
(b)Depreciation		7,500
Total Fixed Cost		42,500
Total Cost(TVC+TFC)		177,900
Gross Margin(TR-TVC)		152,800
Net Income(GM-TFC)		110,300

Source: Computed from field survey data, 2019 .Note: ₦360 is equivalent to 1$

Table4.Estimate of the Determinants of Cassava Output for Labour Type Utilization

Variable	Linear	Semi log(A)	Double-log	Exponential
Intercept	963.430**	1587.62	9.117	2.109
	(303.729)	(1315.34)	(2.2187)***	(1.889)
Family labour	0.968	1.792**	0.027	-0.008
	(1.536)	(0.873)	(0.072)	(-0.044)
Hired labour	0.007	0.741*	-0.079	3.549*
	(0.029)	(0.383)	(-0.325)	(1.787)
Borrowed labour	1.837**	-0.9731	1.103	-0.1537
	(0.781)	(0.719)	(1.214)	(0.662)
Age of farmer	-6.435	437.256*	-0.556**	-2.914
	(-3.215)	(218.846)	(-0.258)	(-2.991)
Farming experience	-1.973	0.970**	0.731***	121.281**
	(3.606)	(0.458)	(0.235)	(50.261)
Educational level	7.661	11.418	0.0704	-0.682
	(-24.398)	(12.277)	(0.053)	(-0.666)
Household size	9.514**	109.752***	1.165	4.227***
	(3.587)	(33.772)	(1.238)	(1.402)
Farm size	98.71*	124.011**	0.035	121.52**
	(51.79)	(51.844)	(0.031)	(59.539)
Gender	0.0259	0.0046	-0.089	-0.984*
	(0.024)	(0.005)	(-0.323)	(0.492)
R^2	0.583	0.719	0.514	0.623
F-ratio	2.464	3.271	1.251	0.908

Source: Field Survey, 2019.

N/B, figures in brackets are standard errors.Significant at1%,**significant at 5%,and*significant at10%.(A) is the lead equation.***