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RURAL EMPLOYMENT GENERATION AND POVERTY ALLEVIATION THROUGH SMALL SCALE CASSAVA PROCESSING VENTURES IN NIGER STATE, NIGERIA

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Abstract

The study was conducted on rural employment generation and poverty alleviation through small scale cassava processing ventures in Niger State, Nigeria. Primary data were collected using a structured questionnaire and the analtical techniques involved the use of ordinary least square, Foster, Greer and Thorbecke (FGT) poverty index and binary logit regression models. The study revealed that four cassava products namely garri, cassava flour (lafun), fufu and starch were the major products from cassava processing in the area and that it provided full employment for 81% of the cassava processors in the area. The study showed that cassava processing was profitable in the area. The logit regression result revealed that age and amount spent on feeding by the processors were statistically significant at 5% and 10% probability level, respectively but negatively related to the poverty status of the processors. This implies that the probability of the cassava processor living above poverty line decreased with age and amount spent on feeding while the probability of the processors living above poverty line increased with increased in assets ($p \leq 0.05$), quantity of cassava processed ($p \leq 0.01$) and years of experience ($p \leq 0.01$). The mean income/day/processor was ₦275 which implied that cassava processing alleviated poverty in the area. The results of partial elasticity revealed that quantity of cassava processed, years of experience, value of assets and amount spent on feeding were elastic. In conclusion, cassava processing was a source of employment for majority of the processors and also had ability of alleviating poverty among the rural folks in the study area.

Key words: *elasticity, poverty, Nigeria, rural employment*

INTRODUCTION

Poverty is the lack of, or inability to achieve, a socially acceptable standard of living and/or, the possession of insufficient resources to meet basic needs required for sustenance and well being [12]. It is a plaque that has eaten deep into different people across nations of the world. Although it is a universal phenomenon that affects socio-economic and political well being of its victims across board, available statistics shows that poverty in poor country is absolute and more pronounced in the rural areas[13]. Agricultural sector which absorbs about 70%of the labour force in Nigeria is a very important sector in the economy with high potentials for employment generation, food security and poverty reduction (Federal Ministry of Agriculture and Rural Development, 2011). However, one of the problems faced in Nigeria and Niger State in particular, is how to improve on the production capacity, the productivity as well as ability to change the forms of our staple crops (such as cassava) into various alternative consumables and industrial by-products to minimize waste, increase availability of foodstuffs, employment generation capacity and earnings and eventual reduction in hunger, malnutrition and poverty among the small scale farmers.

To this end, the Presidential Initiative on Cassava (PIC) was launched in 2002 to create awareness among farmers on the opportunities in cassava market world-wide and also targeted at producing tonnes of processed cassava products such as garri, pellet, chips, starch and flour. It sets in motion the process of achieving economic growth through cassava production and processing. Between 2002 and 2010, International Institute of

Tropical Agriculture (IITA) implemented the Integrated Cassava Project (ICP) to support the PIC and in the process, introduced and promoted more than 40 cassava varieties to Nigerian farmers and facilitated the establishment of hundreds of processing centres [7]. Despite these efforts by the Federal Government, most of the cassava processors are yet to tap the full potentials embedded in cassava processing that could attract the attention of private entrepreneurs in the sector. It is against this backdrop that the study is aimed at identifying the proportion of processors that are fully employed in cassava processing and determine the effect of cassava processing on poverty status in the study area.

Conceptual framework

Poverty can be generally understood as the lack of, or inability to achieve, a socially acceptable standard of living, or the possession of insufficient resources to meet basic needs [12]. A commonly used approach to assess poverty is the construction of a poverty line and computation of different measures which take into account the way in which household expenditures fall short of the poverty line [4]. Hence, poverty lines are established to divide the poor from the non-poor. Poverty can be assessed by constructing a poverty index which makes use of a range of quantitative and qualitative indicators. Credible information can be obtained quickly and inexpensively with a tool of this type that uses indicators to describe different dimensions of poverty [4]. However, the most common three poverty measures of the FGT class [6] are the headcount, the poverty gap, and the squared poverty gap. Poverty Headcount is the share of the population which is poor, i.e. the proportion of the population for whom consumption or income y is less than the poverty line z. Suppose we have a population of size n in which q people are poor. Then the headcount index is defined as:

$$H = \frac{q}{N} \quad (1)$$

Poverty Gap (depth of poverty) is the mean distance separating the population from the poverty line, with the non-poor being given a distance of zero. It is a measure of the poverty deficit of the entire population, where the notion of poverty deficit captures the resources that would be needed to lift all the poor out of poverty through perfectly targeted cash transfers. It is defined as follows:

$$P\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - yi}{z}\right] \quad (2)$$

where yi is the income of individual i, and the sum is taken only on those individuals who are poor. It can be written as being equal to the product of the income gap ratio and the headcount index of poverty, where the income gap ratio is itself defined as:

PG = I * H,

where, $I = \frac{z - y_q}{z}$ and $y_q = \frac{1}{q}\sum_{i=q}^{q} y_i$ is the average income of the poor. (3)

It must be emphasized that the income gap ratio I in itself is not a good measure of poverty.

Assume that some households or individuals who are poor but close to the poverty line are improving their standards of living over time, and thereby become non-poor. The Income gap ratio will increase because the mean distance separating the poor from the poverty line will increase (this happens because some of those who were less poor have emerged from poverty so that those still in poverty are on average further away from the poverty line), suggesting a deterioration in welfare, while nobody is worst off and some people are actually better off. Although the income gap ratio I will increase, the poverty gap itself PG will decrease, because the headcount index of poverty will decrease, suggesting an improvement towards poverty reduction. The problem with the income gap ratio is that it is defined only on the population that is poor, while the poverty gap is defined over the population as a whole. As mentioned above, the poverty gap is a useful statistics to assess how much resources would be needed to eradicate poverty through cash transfers perfectly targeted to the poor. Squared Poverty Gap is often described as a measure

of the severity of poverty. While the poverty gap takes into account the distance separating the poor from the poverty line, the squared poverty gap takes the square of that distance into account. When using the squared poverty gap, the poverty gap is weighted by itself, so as to give more weight to the very poor. Said differently, the squared poverty gap takes into account the inequality among the poor. It is obtained as follows:

$$P2 = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - yi}{z}\right]^2 \quad (4)$$

The headcount, the poverty gap, and the squared poverty gap are the first three measures of the Foster-Greer-Thorbecke class of poverty measures. The general formula for this class of poverty measures depends on a parameter α which takes a value of zero for the headcount, one for the poverty gap, and two for the squared poverty gap in the following expression:

$$P\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - yi}{z}\right]^2 \quad (5)$$

It is important to use the poverty gap or the squared poverty gap in addition to the headcount for evaluation purposes, since these measure different aspects of income poverty. Indeed, the basing of evaluation on the headcount ratio would consider as more effective policies which lift the richest of the poor (i.e those close to the line) out of poverty. On the basis of the poverty gap PG and the squared poverty gap P2, on the other hand, puts the emphasis on helping those who are further away from the line, the poorest of the poor.

MATERIALS AND METHODS

The study was carried out in Niger State, Nigeria. It is located in the North-central zone of the country and lies between latitude of 8˚ 22'N and 11˚ 30'N and longitude 3˚ 30'E and 7˚ 20' E. It is bordered to the north by Sokoto State, west by Kebbi State, South by Kogi and South-West by Kwara State, Kaduna and the Federal Capital Territory border the State to both North-East and South-East, respectively. The State has a common boundary with the Republic of Benin along New Bussa, Agwara and Wushishi Local Government Area of the State. This has given rise to common inter-border trade between the two countries. It has a population of about 3, 950, 249 people [9]. The projected population of the State for 2014 is 5,235,294 people at 3.4% growth rate according to (United Nations Funds for Population Activities [15]. It covers a total land area of 83,266,779 square kilometres which represent 8% of the total land area of Nigeria. About 85% of the land is arable. It experiences distinct dry and wet seasons with annual rainfall varying from 1,100mm-1,600mm per annum and average monthly temperature ranging from 23˚C to 37˚C. Generally, the climate, soil and hydrology of the State permit the cultivation of most of Nigeria's staple crops and still allows sufficient opportunities for grazing, fresh water fishing and forestry development. About 85% of the State's population are farmers, while the remaining 15% are engaged in other vocations such as white collar jobs, manufacturing, business, production of crafts and arts.

Data collection and sampling Procedure. Primary data were collected with the aid of structured questionnaire. A multi-stage sampling technique was used to select the processors in the study area. The first stage involved the random selection of two out of the twenty-five Local Government Areas (LGAs) of the State. The second stage involved random selection of two villages from each LGA while in the third stage twenty five households were randomly selected from each village/towns making a total of hundred cassava processors in the study area.

Data Analytical Techniques and Model Specification.

Budgetary analysis was used to determine the profitability of the cassava processing ventures in the study area. The net margin is the net earnings which a processor earns after paying all marketing costs. Net earnings of the processors was computed using the

following formulas:

Gross Margin (GM) = GI – TVC (6)

Where,

GM = Gross Margin,

GI = Gross Income,

TVC = Total Variable Cost.

Therefore,

Net Profit (NP) = GM – TFC (7)

Where:

NP = Net Profit,

TFC = Total Fixed Cost

The profitability index measures the profitability of a proposed business or project. It attempts to identify the relationship between costs and benefits of the business and it is represented by:

PI = Profitability Index = NI/TR (8)

Where,

NI = Net Income

TR = Total Revenue

Rate of return on investment is the ratio of the gain and loss from an investment to the initial investment amount. It is given by the formula in equation (9)

$$\text{RRI (Rate of Return on Investment)} = \frac{NI}{TC} \times 100 \quad (9)$$

Where,

NI = Net Income

TC = Total Cost

To analyse the determinants of profitability of the processors, multiple regression model was used. This is specified implicitly as:

$Y_i = f(X_1, X_2, X_3, X_4, X_5, X_6, U_i)$ (10)

Where,

Y_i = Net income (₦).

X_1 = Quantity of cassava processed (kg)

X_2 = Labour (Man-days)

X_3 = Age of respondent (years).

X_4 = Experience (years).

X_5 = Depreciation (₦).

X_6 = Cost of firewood (₦)

X_7 = Packaging cost (₦)

X_8 = Availability of market (1 if yes, 0 otherwise)

X_9 = Transportation Cost (₦)

X_{10} = Storage cost (₦)

U_i = Error term.

Four functional forms namely, linear, Cobb-Douglas, semi-log and exponential forms were used and the best fit was selected based on the number of significant variables, coefficient of determination and F-ratio.

Poverty indices of the households were determined using [6] analysis model as used by [11]. The FGT model postulated that there are three different ways by which poverty can be measured which are headcount, poverty gap and squared poverty gap. The basic formula for the model is:

$$P\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - yi}{z}\right]^{2} \quad (11)$$

Where,

z = the poverty line

q = the number of processors below poverty line.

n = the total number of individual in the sampled population.

yi = the income of the ith processors/household

α = poverty aversion parameter and takes on the values 0, 1 and 2, representing incidence depth or severity of poverty.

P = Poverty gap

When α = 0, then P will be reduced to headcount ratio which measures the incidence of poverty; when α = 1, it shows the intensity of poverty that is, how far the processors are below the poverty line and α = 2 gives the severity of poverty.

The poverty line was set at the international poverty line of US$ 1per day following the work of [1] which translated to ₦5,040 per month at the prevailing exchange rate of ₦168 per dollar. Therefore, any rural processor whose income per month fell below ₦5040 was considered poor. Those whose income fell below one third of the poverty line, that is, N1680 were considered "very poor", those whose income fell between 1/3 and 2/3 of the poverty line (₦1680-₦3360) were termed "moderately poor", those whose income were between 2/3 of the poverty line and the poverty line (That is,N3360 - N5040) were considered "poor" while those whose income was greater than the poverty line were considered "non poor".

The logit regression model was used to determine the effect of cassava processing on

poverty status of the processors and it is represented as:

$$InY = \beta_0 + \sum_{i=1}^{n} \beta_i X \quad (12)$$

Where,

Y = Poverty status of the processors (1= non-poor i.e income > ₦5,040 and 0 = poor i.e income < ₦5,040

X_1 = Quantity of cassava processed (₦)

X_2 = Health status of the processors (No. of days absent from processing activities due to ill- health)

X_3 = Age of respondent (years)

X_4 = Experience (years)

X_5 = Household size (No.)

X_6 = Assets ownership (₦)

X_7 = Amount spends on feeding per month (₦).

U_i = Error term

RESULTS AND DISCUSSIONS

Proportion of processors involved in cassava processing. Table 1 shows the distribution of the processors based on the types of cassava products produced. It was revealed that all the processors were fully involved in cassava processing. Specifically, all the processors produced garri (100%), followed by cassava flour (43%) and starch (26%), respectively. Fufu ranked 4th and had only 9%. The implication of this is that cassava processing was a source of rural employment in the study area. Moreover, garri which ranked first was an indication that it was a widely acceptable staple food in the study area and had the highest demand.

Table 1. Distribution of Processors based on the Types of Cassava Products Produced

Products	*Frequency	Percentage	Rank
Garri	100	100	1st
Cassava Flour	43	43	2nd
Starch	26	26	3rd
Fufu	9	9	4th

Source: Field Survey, 2014 *Multiple response were allowed

This is line with the study of [8] on the assessment of the economics of cassava processing in Kwara State, Nigeria who revealed that four cassava products namely garri, cassava flour (lafun), fufu and starch were the major products from cassava processing in the area.

Cost and Returns of the Processors. The cost and return analysis of the processors is as shown in Table 2 and 3. From Table 2, the total estimated cost was 209.57/kg/processor. Cost of tubers accounted for ₦70.91 followed by transportation costs ₦30.56, variable inputs accounted for ₦21.46, labour cost ₦20.49, storage cost ₦18.37 and packaging costs ₦16.81. The estimated total revenue accounted for ₦341.88/kg/ processor and gross margin of ₦163.28/kg/processor. The net income was ₦132.31/kg/processor. The Profitable Index was 0.39 which implied that 39% of the total revenue generated constituted the net income. This showed an appreciable level of profit. The Rate of Returns on Investment (IRR) was 63% which showed that each processor earned 0.63 kobo profit on every Naira spent. This likewise showed that cassava processing in the study area was profitable.

Table 2. Costs and returns on analysis of cassava processing

Item	Amount(₦)/kg/processor
Variable costs	
Packaging cost	16.81
Storage cost	18.37
Labour cost	20.49
Cost of firewood and palm oil	21.46
Cost of cassava tubers	70.91
Transportation cost	30.56
Total Variable Cost	178.60
Fixed cost	
Depreciation	30.97
Total Fixed Cost	30.97
Total Cost	209.57
Revenue	341.88
Gross margin	163.28
Net Income	132.31

Source: Field Survey, 2014

Determinants of Profitability of Cassava Processing: Four functional forms were estimated and based on economic, statistical and econometric criteria, the Cobb Douglas functional form was chosen as the best fit.

Table 3. Gross margin analysis of Cassava processing

Variable	Value (₦)
Total Revenue	341.88
Gross margin	163.28
Net income	132.31
Profitability index	0.40
Rate of return on investments	63%

Source: Field Survey, 2014

Quantity of cassava processed (X_1) was significant at 1% while the years of experience (X_4), transportation cost (X_9) and storage cost (X_{10}) were all significant at 5% levels. Furthermore, availability of market (X_8) and age of the processors (X_3) were significant at 10%. From Table 4, the positive regression coefficient of quantity of cassava processed (X_1), years of experience (X_4), availability of market (X_8) showed that an increase in these variables will lead to an increase in the profitability of the processors whereas an increase in the age, transportation and storage costs will reduce the profitability of the processors in the study area. In essence, the longer a processor stays in the business, the more experienced and efficient he becomes in handling the operations.

Table 4. Regression Analysis of Determinants of Profitability of Cassava Processing

Explanatory variables	Coefficient	T – ratio	Standard error
Quantity of cassava	0.835	13.3327***	0.139
Labour	-0.086	-1.455	0.102
Age	-0.143	-1.919*	0.247
Experience	-0.182	2.389**	0.150
Depreciation	0.048	0.612	0.067
Cost of Firewood	-0.056	-0.707	0.133
Packaging Cost	0.002	0.036	0.092
Availability of Market	0.101	1.750*	0.169
Transportation cost	-0.119	-2.052**	0.140
Storage cost	-0.130	-2.132**	0.071

Source: Field Survey, 2014 *** Significant at 1%, ** Significant at 5%, *Significant at 10%. R2 = 0.731 and F = 23.966***

Also, the more the experience the lesser the risk encountered and this will lead to greater profit.

This conforms to the study of [2] study on economic analysis of cassava processing into garri in Oyo State, Nigeria which revealed that years of experience of garri processors showed a positive relation and was significant at 1% meaning that they have direct effect on profit of the processors.

The F- ratio of 23.966 showed that the overall model was significant at 1% Level while the Coefficient of Determination (R^2) was 0.731. This implied that 73% of the variations observed in profitability level of the processors were explained by the included explanatory variables.

Poverty Status of Processors. The international poverty line of US$1 per day per person was adopted for this study. This translated to ₦5040 per month at the exchange rate of ₦168 per dollar (This was the prevailing rate during the period of the survey). Thus, any rural processor whose income per month falls below ₦5040 was considered poor.

Table 5 revealed that 41% of the processors were poor while 59% of the processors were non-poor. The mean income/day/processor was ₦275.This suggests that cassava processing was an effective measure in alleviating poverty in the study area. This was corroborated in the study conducted by [1] on effect of poverty on risk attitude of rural women investors in Osun State, Nigeria where 58.6% respondents where poor.

Table 5. Distribution Processors by Poverty Levels

Poverty level	Amount(N)	Frequency	Percentage
Very poor	<1680	4	4.0
Moderately poor	1680-3360	17	17.0
Poor	3360-5040	20	20.0
Non poor	>5040	59	59.0
Total		100	100

Source: Field Survey, 2014

Effect of Cassava Processing on Poverty Status of the Processors: From Table 6, the age and amount spent on feeding of the processors were statistically significant at 5% and 10% probability level, respectively but negatively related to the poverty status of the processors. This implies that the probability of the cassava processor living above poverty

line decreased with age and amount spent on feeding while the probability of the processors living above poverty line increased with increased in assets ($p \leq 0.05$), quantity of cassava processed ($p \leq 0.01$) and years of experience ($p \leq 0.01$). This is in line with the study of [10] on cassava marketing and rural poverty among smallholder farmers in Southwest, Nigeria which revealed that age of the farmer is significant at 5% and has a negative sign. Implying that the older the farmer, the lower his probability of being poor. but contrary to the study of [14] on Analysis of poverty and its determinants among cassava farmers in Apa Local Government Area, Benue State, Nigeria which revealed that the co-efficient of age was positive to poverty implying that the older a farmer becomes, the more his poverty level increases. The value of household assets measures the ability of the household to withstand economic shocks and income shortfalls to finance the purchase of household needs. This result is in agreement with the findings of [3] study on in their study on estimating the determinants of poverty depth among the Peri-Urban Farmers in Nigeria which stressed that poverty depth is decreased by total value of asset increases by one unit. This is contrary to the findings of [14].

Table 6. Logit Regression Analysis of the Poverty Status of the Processors

Variables	Coefficients	Z	P > |Z|
Quantity of cassava	0.0037021	3.10***	0.002
Health status	-0.02719704	-1.01	0.313
Age	-0.2013934	-2.42**	0.016
Years of experience	0.9732738	2.91***	0.004
Household size	0.3131291	1.35	0.178
Assets	0.0001115	2.35**	0.019
Amount spent on feeding	-0.0006928	-1.84*	0.065

Source: Field Survey, 2014 *** Significant at 1%, ** Significant at 5%, * Significant at 10%

Table 7 shows the marginal effect and partial elasticity of the significant variables affecting the poverty status of the processors. The Table revealed that a 1% increase in the years of experience, value of assets and quantity of cassava processed resulted in 4, 446 and 0.01 percent increase in the probability of the processors living above poverty line, respectively. In addition, a 1% increase in age and amount spent on feeding reduced the probability of the processors living above poverty line by 0.8 and 0.003%, respectively. The results of partial elasticity revealed that quantity of cassava processed, years of experience, value of assets and amount spent on feeding were elastic, that is, a unit change in any of these variables caused a more than proportionate change in probability of living above poverty line whereas, a unit change in age resulted in less than a proportionate change in probability of living above poverty line.

Table 7. Marginal effect and partial elasticity of the significant variables affecting poverty status of the Processors

Variables	Marginal effect	Partial elasticity
Quantity of Cassava	0.0001481	10.24581
Age	-0.0080585	-2.904093
Experience	0.0389444	2.851692
Assets	4.460060	1.438043
Amount spent on feeding	-0.0000277	1.155534

Source: Field Survey, 2014

CONCLUSIONS

The study was conducted on rural employment generation and poverty alleviation through small scale cassava processing ventures in Niger State, Nigeria. The result of the profit indicators showed that cassava processing was a profitable business venture and could be a source of livelihood for most rural dwellers, particularly women in the study area. Quantity of cassava processed, years of experience, transportation cost and storage cost were the main determinants of cassava processing in the area. In addition, the findings revealed that probability of the cassava processor living above poverty line decreased with age and amount spent on feeding while the probability of the processors living above poverty line increased with increased in assets, quantity of cassava processed and years of experience. The result of the marginal effect and partial elasticity of

the significant variables affecting the poverty status of the processors revealed that a 1% increase in the years of experience, value of assets and quantity of cassava processed resulted in 4, 446 and 0.01 percent increase in the probability of the processors living above poverty line, respectively. In addition, a 1% increase in age and amount spent on feeding reduced the probability of the processors living above poverty line by 0.8 and 0.003%, respectively. The results of partial elasticity revealed that quantity of cassava processed, years of experience, value of assets and amount spent on feeding were elastic, that is, a unit change in any of these variables caused a more than proportionate change in probability of living above poverty line whereas, a unit change in age resulted in less than a proportionate change in probability of living above poverty line. Based on the findings, it is recommended that processors should be provided with market to increase the sale of cassava products thereby enhancing profits made by processors and also, there is need for community based programmes organised by government and non-governmental organizations towards ensuring the continuous production and processing of cassava to its by-products by young and middle age group.

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