Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

FACTORS AFFECTING INDIGENOUS PROCESSING OF CASSAVA INTO FLOUR *(Alibo)* AMONG RURAL WOMEN IN SHENDAM LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA

Abdullahi, I. M. and Danwanka, H. A.
Department of Agricultural Economics and Extension, Faculty of Agriculture and Agricultural Technology, Abubakar Tafawa Balewa University, Bauchi
Corresponding Authors' E-mail: imabdullahi@atbu.edu.ng Tel: +234(0)8036126427

ABSTRACT
This study examined the factors affecting of indigenous processing of cassava into flour *(Alibo)* among rural women in Shendam local government area of Plateau State, Nigeria. The study area was purposively selected and primary data were collected from randomly selected 120 respondents using structured questionnaire. The data were analyzed using descriptive statistics and production function. The results showed that all the respondents (100%) are small scale operators; about 47.50% have formal education, whereas 37.50% have non-formal education. It was further shown that 72.50% of the respondents have 1-10years of experience in indigenous processing of cassava into flour and about 60.83% of them are within the active age range of 21 – 40 years. Quantity of cassava tubers used and water for fermentation were significant at 95.00% level of significance while operating cost was significant at ($p<0.01$). Resource use efficiency results indicated that all resources used were inefficiently utilized. Cassava tubers used, labour and water were over utilized while operating expenses was underutilized. The main problems militating against traditional cassava processing in the study area include, among others are: high costs of transport, labour and processing implements; poor pricing of products and very small quantities of cassava used per processing. To achieve increased efficiency of local cassava processing in the study area, the study recommended the adoption of policies that will enable the processors improve on their education, grant them increased access to credit, improved processing technologies and increased quantity of cassava per processing operation.

Keywords: Cassava, Factors, Indigenous, Processing, Rural.

INTRODUCTION
Cassava (*Manihot esculenta*), also called manioc, tapioca or yucca originated in tropical South America hundreds of years ago. It is likely that cassava was introduced into Africa in the early 1500s by the Portuguese and Spanish from the New World. It is considered as the most productive crop and source of food energy in the tropics (Owa *et al.,* 2007). Cassava consists of about 60 to 70 percent water. Processing it into a dry form reduces the moisture content and converts it into a more durable and stable product with less volume, which makes it more transportable (FIIRO, 2017). Processing is also necessary to eliminate or reduce the level of cyanide in cassava and to improve the palatability of the food products. Processed cassava products are also used as raw materials for a number of small – or medium – scale industries in Africa.

The challenge to increase the efficiency of the agricultural sector as a whole, and food production level in particular, in Nigeria appears to be more urgent now than it has ever been in the history of the country (Kareem *et al.,* 2008). The inability of most sub-Saharan African countries to produce or purchase enough food to satisfy the demands of their growing populations continues to be a serious problem. The main crisis stems not from the absolute size

Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

of the population, but its rapid growth, which has exceeded the rate of agricultural output. The Food and Agriculture Organization (FAO, 2016) reported that total agricultural production in developing Africa grew by 30% between 2000-2011, but the population grew faster, so that production per capita fell by 13% over the same period.

Cassava, the most important staple food in sub-Saharan Africa, can go a long way to improve the worsening food situation if given the needed attention. This is because, despite its neglect in the past by policy-makers and research, it has fed and it continues to feed 200 million people in Africa (Abdullahi *et al.,* 2015).

It is based on its importance as a major source of energy for several million people in Africa and also of its economic importance that this research sought to examine the factors affecting the indigenous cassava processing in Shendam Local Government Area of Plateau State, Nigeria. The specific objectives include to: analyze the socio-economic characteristics of rural women involved in the indigenous cassava processing in the study area; determine the production function and resource use efficiency, and; identify the constraints (if any) associated with indigenous cassava processing into flour *(alibo).*

MATERIALS AND METHODS

The Study Area

Shendam Local Government Area is located between Latitude $9^0$28' and 9°30' East and between Longitude 8°43' and $8^0$55' North covering a land area of over 2,477 square kilometres (Google, 2018). The 2006 National Population Census puts the population of the inhabitants of the study area at 208,017 people consisting of 109,519 males and 98,498 females (NPC, 2006). The local government area is divided into four administrative districts of Shendam, Dorok, Derteng and Dokan Tafa with Gamai, Montol, Jukun, and Ngas as the major languages. The major occupation of the people is farming, trading, craftwork like pottery and weaving, wood carving, black-smiting, hunting and fishing (PADP, 2017).

A total of one hundred and twenty (120) respondents were randomly selected, 30 respondents from each of the four districts which formed the sampling frame for the study.

Analytical Technique

The commonly estimated function forms of production function are linear, quadratic, square root and Cobb-Douglas (power) function (Abdullahi, *et al.,* 2015). A multiple regression model is a casual relationship between two or more independent variables and the dependent variable. The Cobb-Douglas function can be expressed as follows:

$$Y = aX_1^{b1}.\ X_2^{b2}.\ X_3^{b3}.\ X_4^{b4}.\ X_5^{b5} + U \quad \ldots(1)$$

It is usually estimated in the logarithmic form. The logarithmic transformation of the function is stated as follows:

$$\text{Log } Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + \log e \quad \ldots(2)$$

where; a is the constant; b_1- b_5 are the regression coefficients; e is error term.

The explicit model in this study is given as: $Y = f(X_1, X_2, X_3, X_4, X_5 \ldots\ldots e)$ …(3)

where; Y is the output of flour processed; X_1 is quantity of cassava (kg); X_2 is labour (man-days); X_3 is quantity of water used (litres); X_4 is age (years); X_5 is operating expenses (₦); e is the error term.

In order to determine the resource use efficiency or productivity estimate, we proceed as follows assuming that the first order derivative of output or cost function measures the marginal physical product or marginal factor cost as the case may be resulting from using the inputs. The efficiency can be calculated mathematically thus:

Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

E = MPP . Pi/PQ = MVP/Pi ...(4)

where; MPP = marginal physical product; PQ = price per unit of output; Pi = price per unit of input or opportunity cost of the input; MVP = marginal value product. The condition for efficiency is: MVP/Pi = 1 ...(5)

When the ratio is less than or greater than unity (1), then the farmers or processors are not price efficient in resource utilization. A ratio of greater than unity indicates underutilization of the input and increasing the rate of that input, will increase the level of profit of the firm.

The marginal value productivity (MVP) of each resource was measured using the formula: MVP/ Xi = BiQ ...(6)

where; MVP is the marginal value product; Bi is the vector of parameters; Q is the quantity of input, Xi.

RESULTS AND DISCUSSION

Table 1 shows that majority (60.83%) of the respondents were young women of between the ages of 21-40 years of age, 16.67% between 41 – 50 years whereas 5.00% were aged over 50years of age. The mean age of the respondents is 31.8years. This is in conformity with the findings of Adeolu and Akinola (2007) whose studies pointed out that the women processing cassava in Doma local government area of Nasarawa state was young and able bodied. Thus, indigenous processing of cassava into flour in the study area could be said to be mostly done by young and middle aged women.

Results on marital status reveals that 65% of the respondents were married, thus constituting majority of them. The remainders (35%) of the respondents were single i.e. they are either divorced widowed or never married. The reason for this may be as a result of the fact that in the north people tend to marry at an early age especially women in the rural area. The average family size for the rural women involved in the indigenous cassava processing in the study area is 6 persons per household. This is somewhat a small family size which could be attributed to the displacement effect of the Plateau crises which affected its southern part especially Yelwa area, despite its polygamous nature.

The level of education is of utmost importance in the decision making process of cassava processors. It has been observed that the educational level of the respondents greatly assist in understanding the different tasks that are involved in cassava processing. The educational attainment of an individual does not only raise his performance, but also increase his ability to understand and evaluate information on new methods and process being disseminated through extension service (Ani *et al.,* 2013). Also level of education of respondents has been tied to the rate of adoption of innovation (Owa *et al.,* 2007).

The study revealed that 48.33% respondents have experience in the indigenous processing business of 1-5 years. Also 24.17% of them have experienced of 6-10 years while 11 respondents have 11-15 years of experience. The remainder 18.33% had experience in the business for over 16 years. It was further revealed that the mean year of experience was found to be 10 years. This may not be unconnected to the ages of the majority of the rural women involved in the indigenous cassava processing in the study area as most of them (78.33%) were aged between 11 – 40 years.

This is somewhat lower than what Husaini *et al.* (2010) obtained. In their study, they obtained a mean year of experience of 16 years which implied a very experienced set up. Also Owa *et al.* (2007) findings showed that 38.54% of the respondents have 11 – 15 years as experience while 25.00% have 6 –10 years as their years of experience. Therefore, they claimed that their findings showed that cassava processing is profitable in the study area since the respondents kept on processing year in year out.

Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

Table 1: Socioeconomic Characteristics of Respondents

Items	Frequency	Percentage	Mean
Age (Years)			
11 – 20	21	17.50	
31.8			
21 – 30	43	35.83	
31 – 40	30	25.00	
41 – 50	26	16.67	
Marital status			
Married	78	65.00	
Single	42	35.00	
Family size (Years)			
1 – 5	72	60.00	
6 – 10	33	27.50	
11 – 15	12	10	
6			
16 – 20	2	1.67	
21 and above	1	0.83	
Level of education			
Never been to school	18	15	
Qur'anic School	45	27.5	
Primary	33	15.0	
Secondary	18	15.0	
Tertiary	6		
Years of experience			
1 – 5	58	48.33	10
6 – 10	29	24.17	
11 – 15	11	9.17	
16 and above	22	18.33	

Results of the multiple regression analysis shown in Table 2 expressed the effect of the factors that influence indigenous cassava processing. The equation estimated for the study was:
$Y = 2.7181 + 0.1016X_1 + 0.1730X_2 + 0.0634X_3 - 0.0249X_4 + 0.2598X_5$

The factors included in the model were: the cost of the cassava, cost of labour (peeling, soaking, grating, drying, grinding and transportation costs), cost of water for fermentation, age of the respondents and operating expenses. The result of the estimated Cobb-Douglas production function indicates that all the variables included in the regression form influenced the total revenue by 61.7% and it means the overall fitness of the model. This result implies that 61.7% of the variation in the dependent variable (total output) is explained by variations in the explanatory variables included in the model. The remaining 38.3% may be due to error or random disturbance terms.

The coefficients with respect to all independent variables all have positive sign (with the exception of age), indicating that an increase in any of the variables, holding others constant, will lead to an increase in output. The significance of the coefficient is tested by the t-values. The results of the Cobb-Douglas function gave -in comparison with other functional forms i.e. (linear and semi-log of the regressing model) -a better results in terms of the signs of the coefficients and number of significant variables. Also as consequence of this, regression

Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

coefficient are used to refer to elasticity of production with respect to the corresponding explanatory variable.

In light of the above therefore, cost of cassava has a 0.1016 regression coefficient or elasticity of production which is significant at the probability level of 0.05. This implies that a 1 percent increase in cassava, holding other inputs constant, will increase total product by 0.1016 percent. The elasticity of production with respect to labour is 0.1730 and it is not significant, although it has a positive coefficient implying that it affects the total output in a positive way though not significantly. This is in line with the findings of Jirgi *et al.* (2007) who made similar discovery in their research on the economics of small scale cassava processing in Yagba local government area of Kogi State. The coefficient of regression with respect to water has a value of 0.0635 and is significant at 0.05 ($p \leq 0.05$) level of probability implying that a 1 percent increase in water (input), holding all other input constant will give rise to an increase in total output. This implies that there was increasing returns to each of the variable inputs in the study area and it is therefore established that all processors in the area under study are operating in the rational stage of production, that is, stage 2.

Table 2: Estimated Regression Results for the Factors that Influence Processing of Cassava.

Variable (input)	Linear function	Semi-log function	Cobb-Douglas function+
Constant	2361 (3.47)**	-805 (-0.26)	2.7181 (7.72)***
Cassava X_1	0.4823 (0.46)^{NS}	-938 (-0.85)*	0.1016 (0.81)*
Labour X_2	1.011 (0.40)^{NS}	246 (0.11)**	0.1730(0.66)^{NS}
Water X_3	7.500 (0.75)^{NS}	1243.0 (0.75)*	0.0635 (0.34)*
Age X_4	-6.07 (-0.31)^{NS}	-330 (-0.23)^{NS}	-0.0249 (-0.16)^{NS}
Operating cost X_5	2.044 (0.47)^{NS}	2300 (1.70)^{NS}	0.02598 (1.70)**
R^2	64.6%	57.3%	61.7%
Adjusted R^2	60.8%	53.7%	58.5%

*** Significant at $P \leq 0.001$; **Significant at $P \leq 0.01$ *Significant at $P \leq 0.05$
+ Lead equation Figures in parenthesis are t-ratio NS = Not significant
Source: Field Survey Data, 2017

The allocative efficient indices in Table 3 showed the resource utilization efficiency by the cassava processors. The efficiency of resource use in cassava processing implies the ability of the processors to efficiently utilize the available scarce resources (inputs). It is the increase in output as a result of an increase in a unit of input. Thus, the cassava processor who is operating in stage one (< 1) is said to be under-utilizing his resources and is advised to add more input and in the case of a person operating in stage two (> 1), that processor is said to be efficiently utilizing his resources. Those operating in stage three are said to be over-utilizing their resources because they may running at a loss. The result indicates that some resources were over-utilized while others were under-utilized. It can also be deduced from the Table that cassava input has a marginal value product of 3.01 naira and an average acquisition cost of 600 naira which is higher than the MVP, thus implying that an increase in cost of cassava by 1 unit would lead to additional expense of 600 naira while revenue would increase by 3.01 naira. Since additional revenue cannot cover the additional cost emanating from the last unit of cassava tuber utilized, processors are said to be over-utilizing the resources. This finding is in

Journal of Agripreneurship and Sustainable Development (JASD)
Volume 1, Number 1, December, 2018
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

support of Jirgi *et al,* (2007) who suggested the over-utilization may be due to its surplus at harvest time.

Labour has a marginal value product of 5.19 naira and an average acquisition cost of 250 naira which is higher than the MVP, thus implying that an increase in cost of labour by 1 unit would lead to an additional expense of 250 naira while revenue would increase by 5.19 naira. Since additional revenue cannot cover the additional cost emanating from the last unit of labour utilized, processors are said to be over-utilizing the resource. Thus the over – utilization could be attributed to lack of improved processing technology. Labour can be efficiently utilized with the use of improved processing technology. The respondents' profit can be greatly enhanced by decreasing the use of this input.

The allocative efficiency index of operating expenses was found to be 7.79. This indicates that the resource was under – utilized since the ratio of the MVP to MFC is clearly greater than unity. Jirgi *et al,* (2007) found similar results and proffer that the under - utilization of these resources could be attributed to inadequate funds at the disposal of the respondents.

Table 3: Computation of Allocative or Price Efficiency

Variables	MVP (₦)	MFC (₦)	Allocative Efficiency
Cassava (X_1)	3.01	600	0.005
Labour (X_2)	5.19	250	0.021
Water (X_3)	1.91	50	0.038
Operating cost (X_4)	7.79	1	0.794

Source: Field Survey Data, 2017

The constraints associated with cassava processing in the study area were presented in Table 4. The High cost of transports ranked the first as it is agreed by every respondent that the cost of transportation is high compared to its value. This conforms to *a priori* expectation and also the findings of the MVP in terms of resource use efficiency. The next important factor militating against increased local processing of cassava into *alibo* in the study area is the labour cost. 95.83% of the processors lamented the high cost of labour, peeling, grating, drying among others. This is in agreement with the studies undergone by Owa *et al.* (2007). The reason to this could not be for from that of the former. Poor pricing of processed product (*alibo*) caused problem to about 76.67% of processors whereas 78 of them had the high cost of processing implements as their major problem. This was similar to the studies of Owa *et al.* (2007); Hussaini *et al.* (2010) and Abdullahi *et al.* (2015).

Table 4: Distributions of Respondents by Constraints Militating Against Cassava Processing.

Constraints	Frequency	Percentage	Ranking
Inadequacy of cassava supplies for processing	108	90.67	3rd
High cost of labour	115	30.00	2nd
High cost of transports	120	39.17	1st
High cost of processing implements	78	20.00	5th
Low price of products	92	95.83	4th
Poor technical know –how	36	100.00	7th
Poor extension services	47	65.00	6th
Difficulty in accessing credit	25	76.83	10th
Inadequate supply of water	34	28.83	8th
Others	6	5.00	11th

Source: Field Survey Data, 2017

CONCLUSION AND RECOMMENDATIONS

The study concludes that resources were not efficiently utilized by the cassava processors in the study area and therefore, recommends that government and Community Based Organizations (CBOs) should find ways of addressing the problem of rural infrastructure especially the construction of rural feeder roads which will ease the transportation quagmire. Improved processing technologies already exist that help reduce the labourious nature of the local processing activities. Effort should be made to organize capacity building training and workshops for *alibo* processors through the Plateau Agricultural Development Programme (PADP) in order to empower them with such technologies. Formation of cooperative groups will also make it possible for them to identify and access credit facilities to both practising and intending cassava processors to enable them expand to a large scale production. This will help them take the advantage of economy of scale.

REFERENCES

Abdullahi, I. M., Danwanka, H. A. and Hamidu, B. (2015). *Economics of Indigenous Processing of Cassava into Flour among Rural Women in Shendam LGA, Plateau State, Nigeria.* Proceedings of the 29th Annual National Conference of FAMAN, pp255 – 261

Adeolu, B.A and Akinola, A. (2007). *Economic Analysis of Cassava Processing Industry in Oyo State.* Proceedings of the 9th Annual National Conference of NAAE, pp237 – 241.

Ani, D. P.; Umeh, J. C. and Weye, E. A. (2013) Profitability and Economic Efficiency of Groundnut Production in Benue State, Nigeria. *African Journal of Food, Agriculture, Nutrition and Development,* **13**(6): 8091 – 8106

Bose, A. A., Abdullahi, I. M. and Okoye, I. J. (2017). *Profitability Assessment of Sachet Water Enterprises in Bauchi Metropolis, Bauchi State, Nigeria.* Proceedings of the 31st Annual National Conference of FAMAN, pp141 – 149

Food and Agriculture Organization FAO (2016). *A Cassava Industrial Revolution in Nigeria.* Retrieved on 20th July, 2010 from *www.fao.org/docs*

Federal Institute of Industrial Research, Oshodi (FIIRO). (2017). FIIRO Annual bulletin. Retrieved on 18th July, 2018 from *www.nigeriafirst.org/doc*

Google (2018). UN Jobs. A Swiss Association: Nigeria: Plateau: Shendam. Retrieved on 1st July, 2018 from *http://www.preventionweb.net/files/1300_Nigeria[1].pdf*

Hussaini, Y. I., Napoleon, D. S., Hassan, I. I. (2010). An Evaluation of Groundnut Processing by Women in a Rural Area of North Central Nigeria. *Journal of Agricultural Science,* **2**(1): 206 – 213.

Jirgi, A. J., Tanko, L. and Olorubumi, S. A. (2007). *Economics of small Scale Cassava Processing in Yagba East LGA of Kogi State.* Proceedings of the 10th Annual Conference of NAAE held at Sokoto, pp 563 – 567.

Kareem, R. O; Dipeolu, A. O; Aromolaran, A. B. and Akegbejo-Samson (2008). Analysis of Technical, Allocative and Economic Efficiency of Different Pond System in Ogun State, Nigeria. *African Journal of Agricultural Research,* **3**(4):246 – 254.

National Population Commission (2006). *National Population Census 2006 Provisional Results,* Abuja, Nigeria.

Owa, O., Mailumo, S. S. and Atang, A. (2007). *Economic Analysis of Cassava Production in Jos East LGA of Plateau State, Nigeria.* Proceedings of the 9th Annual conference of NAAE held at Sokoto, Nigeria pp228 – 23.

Plateau Agricultural Development Project (2017). Annual Bulletin of the PADP, Shendam Zonal Office, Plateau State, Nigeria.