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ANALYSIS OF PROCESSING CASSAVA TUBERS INTO GARRI IN ISOKO NORTH LOCAL GOVERNMENT AREA OF DELTA STATE, NIGERIA

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ABSTRACT: *Inadequate capital and lack of improved technology for cassava processing have become major challenges in the development of the agricultural sector of the Nigerian economy. This had prompted this study on the analysis of processing of cassava tubers into garri in Isoko north local government area of Delta state, Nigeria. Cross sectional data were collected using purposive and simple random sampling techniques with the aid of well-structured questionnaire for the 2012 processing season. Purposive sampling technique was used to select six towns from the study area based on their involvements in cassava processing activities. Thereafter ten (10) respondents were randomly selected from each of the towns making a total sample size of sixty (60) respondents. Data were analyzed using simple descriptive statistics such as mean, frequency distribution, percentages and inferential statistics including gross margin and regression analysis. The results showed that 95% of the respondents were females. the highest proportion (38%) of the respondents were within the age group of 50>60 years and 33% had secondary school leaving certificates, 75% of the respondents were married and 58% had household size within the range of 5>8 persons, 66% of them were into cassava processing on part-time basis, while 33% had 11 > 15 years of processing experience and 67% of them used family labour. The estimated annual total revenue was ₦610,000, total variable costs was ₦370,000 and the gross margin was ₦240,000 per annum per respondent which represented 64.86% of the total variable cost of production. The implication was that for every one naira invested in the processing of cassava, the farmer gained 65 kobo. The result of the regression analysis revealed that 57% of the variability of the estimated revenue per annum (Y) was being accounted for by the independent variables in the specified model. Inadequate capital and fund, lack of improved technology, inadequate processing and storage facilities, small sized enterprises with low earnings, poor markets characterized by low pricing of products were the major constraints encountered by the processors in the industry. It was therefore recommended that credit facilities should be channeled to processors through the current micro-credit scheme of the Delta State Government, Government policies should be modified to include the provision of training programme to disseminate scientific knowledge to cassava processors, the Research-Extension Farmer linkage should be strengthened to furnish the processors with modern labour saving processing techniques, Processors should form co-operative association to establish garri-added- value- centres for improved weighing and packaging methods; Government and non-governmental organizations/agencies should assist in educating the cassava processing farmers through effective extension system on improved cassava processing technology, to bring about improved production, marketing and profitability; and in doing so, improves livelihood, income and food security of the people.*

KEYWORDS: Cassava Processors, Gross margin, Regression analysis, Constraints, Delta State, Nigeria.

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INTRODUCTION

Cassava (*manihot esculenta crants*) is well known as a staple root crop for over 80 million people around the world; (Food and Agricultural Organisation, 1996). It plays a food security role in Africa where annual production feeds over 80million people annually; (Nweke and Eneta, 1999). World cassava production by 2005 was projected to increase to 209 million tonnes (fresh weight) or by 2.2%, reflecting both yield improvement and area expansion; (F.A.O. 1996). Nigeria is currently the largest producer of cassava in the world with annual production of over 34 million tonnes of tuberous roots; (Federal Ministry of Agriculture and Natural Resources (FMANR), (1997). Global cassava production is expected to show continued growth over the next five years with Africa leading the way. Five countries; Brazil, the democratic republic of Congo, Indonesia, Nigeria and Thailand account for almost 79% of the world's cassava production, (Spore, 2001). F.A.O. (1996) predicted that from 1996 t0 2050, cassava production had to rise by more than 700% in the 21st centuries in West Africa, Central and East Africa.

According to Sanni, Sobminwa, Modupe-Eyinola, and Rolina (2008), cassava roots are perishable and contain potentially toxic glycosides, therefore, there is the need for it to be processed. Nweke (2003) is of the opinion that cassava cyanogens can be eliminated during processing by using well known traditional processing methods. He further noted that, today, cases of cyanide poisoning are now rare and fear of it therefore should not discourage public or private investors in the cassava processing food industry. Processing of cassava roots prior to consumption is essential because of its cyanide content and generally, they do not store for a long time after harvest (IITA, 2005). Ndaliman (2008), also, noted that there is a need to process cassava within twenty four to forty eight hours after harvesting due to its toxicity and perishability. Hahn and Onabulu (1998) on the other hand, remarked that it is only sweet cassava with low hydrogen cyanide (HCN) content that can be consumed without processing and preservation of harvested produce which minimizes post harvest loss and thus help to offset shortage in food supply and increase in shelf life.

Garri, which is a dry granule made from root of cassava through a series of actions is a cheap alternative to many other energy giving food in Nigeria (Sanni, 1994). Processing garri, starch and tapioca (popularly known as kpokpogarri) from cassava is one of the major economic activities of the women of Isoko nation of Delta State in Nigeria. Garri is produced mainly as staple food and it is consumed daily in one form or the other by almost everyone in Nigeria; and hence there is need for massive production, processing, utilization and storage for marketing of the product. The use and consumption of garri have transcended ethnic and state boundaries in Nigeria. Indeed, garri is considered the most widely consumed stable food in Nigeria, today. In the southern part of the country, garri accounts for about 60% of the total calorie in-take of the people; Ugwu; (1992). Cassava can be processed into garri using the following pattern from harvesting to storage: Harvest---→ Peeling-→ Washing--→Grating/Milling--→Fermentation-→Pressing-→Shifting--→Frying--→Cooling--→Sieving-→Packaging--→Storing in a cool/dry place.

Cassava is a leading staple food for over 90 millions people living in the rural and urban areas and it is a key component of urban worker diets of Nigerians (IITA, 1988). Aside from its use as human food, it can be used for the production of flour for confectioneries, formulation of animal feeds and the production of industrial starch, industrial alcohol, adhesive and gums; Balogun (2003).

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Cassava is considered as the most productive crop and source of food energy in the tropics. Worldwide, fifteen countries produce in excess of one million tonnes per annum of these, brazil, Indonesiia, Nigeria, Thailand and Zaire are the highest producers and together account for 63 percent of the world's output (Omorjire, 2005). According to Nweke (1996), Africa, Asia and Latin America/Caribeans produce 48%, 32% and 28% respectively of world cassava (FAO STAT 2005). Nigeria also accounted for 23.1% of world production in 2000 when the production increased to 147 million per annum with Nigeria contributing 34 million tones; (Kalu, 2003).

Cassava is the most widely cultivated crop in Sub-saharan Africa because of its tolerance to extreme ecological stress conditions and poor soil condition.

Cassava is one of the most important root crops in the tropics and has been considered a preferred crop for resource use for poor farmers in most of Sub-saharan Africa (IITA, 1990).

Sequel to the reduction of cassava production in the country, the Federal Government of Nigeria and International Fund for Agricultural Development (IFAD) jointly initiated the Cassava Multiplication Programme (CMP) with the aim of promoting cassava utilization as a commodity based approach against food insecurity (Adeniji & Jimoh, 2000).

Cassava (Manihot esculenta or Manihot utilissima) is believed to have originated from Brazil and introduced to West Africa by the Portuguese. It is considered as the most productive crop and source of food energy in the tropics worldwide. Fifteen countries produce in excess of one million tonnes per annum; of these Brazil, Indonesia, Nigeria, Thailand and Zaire are the highest producers and together account for 63% of the world's output (Omorjire, 2005) According to Austin (1985), processing involves transformation and preservation through physical or chemical alteration, storage, packaging and distribution. The nature of the processing and the degree of transformation can vary tremendously, ranging from the cleaning, grading and boxing of apples to the milling of rice to the cooking, mixing and chemical alteration that create a textured vegetable snack food. Raw food and fibre are transformed into edible and useable products, to increase storagibility, to obtain a more easily or economically transportable form, and to enhance palatability, nutritional value and consumer convenience.

Despite the enormous potentials of garri and edible starch in improving the economic activities of the predominantly female processors who are very critical to the economic base of the individual family unit (Egharevba, 1992), all is not well. This is because producers of garri and edible starch are perennially plagued with the age longed problem of seasonal variations in product prices, a phenomenon that has been identified as ''cyclic effect'' in previous studies (Obinne and Anyanwu, (1991); RTEP, (2001); Emokaro and Erhabor, (2006)). Consequently, processors in the study area are unduly cautious enough to ensure that garri and edible starch are not produced on a large scale in order to prevent any glut in the market. In line with this development, can one say that garri and edible starch producers are operating profitably in the region? Although several works has been done in the area of cassava production, processing and marketing, not much information is available on garri and edible starch processing and production, particularly in Isoko North Local Government Area of Delta State.

Thus, the main objective of this work, therefore, was the economic study of cassava processing into garri in Isoko North Local Government Area of Delta State, Nigeria. To achieve this objective, the study examined the socio-economic characteristics of cassava processors, determined the cost and revenue structures of processing cassava into product of garri,

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ascertained the relationship that exists between the revenue and the major independent variables affecting it and also identified the major constraints encountered by processors in cassava processing in the study area.

METHODOLOGY

The study was carried out in Isoko North Local Government Area of Delta State, Nigeria. Delta State is located in the southern part of Nigeria within latitude 6º6' and 6º' N; and longitude 6º13' and 6º25' E, with annual mean rainfall and temperature of 2000-23000mm and 28-30ºC respectively (Nwajei, 1993). Its elevation above sea level is about 150m (Nwajei, 1993). The River Niger runs through the lower part of the eastern boundary; it is bounded on the West by Ondo State, on the South by Rivers and Bayelsa States, North by Edo State and on the east by Anambra State. Two geographical seasons are identified in the state; the rainy season which is from late March to the end of October and dry season which is from November to early March.

Isoko North Local Government Area of Delta State was selected to study based on prevalent activities of production and processing of cassava in Nigeria. It was created out of the defunct Isoko Local Government Area on 27th August 1991. It is bordered on the North by Ndwokwa West, on the East by Ndokwa East, on the South by Isoko South and on the west by Ughelli North Local Government Areas respectively. The population figure of the local government was 144,155 by the last national population census conducted in 2006 (Delta Beckons, 2011).

There are eight (8) clans within the local government area, comprising of about forty-three communities. These clans include; Ozoro , Iyede , Owhe , Emevor , Ofagbe , Okpe-Isoko , Ellu, and Oyede, (Delta Beckons, 2011). The Local Government Area has very rich potential for agriculture and is suitable for food crop farming, tree crop farming, fish farming and livestock farming. The major occupation of the people in the area is farming and the crops commonly cultivated include cassava, rubber, oil palm and fishing occasionally.

The study used both primary and secondary data. Cross sectional data were collected using purposive and simple random sampling techniques with the use of well-structured questionnaire. A purposive method of sampling was used in selecting the market to be used for the study, because there are clusters of small scale garri processors in localities of the local government area . The local government area has contributed substantially and is still contributing to the total garri production in Delta State. Purposive sampling technique was used to select six towns from the study area based on their involvements in cassava processing activities; the selected towns were: Ozoro, Ovrode-Ellu, Oto-owhe, Akiewe, Emevon and Ellu. Thereafter ten (10) respondents were randomly selected from each of the towns making a total sample size of sixty (60) respondents.

Descriptive statistics such as frequency distributions, means and percentages were used to analyze the socio-economic characteristics of the cassava processors in the area.

Gross Margin analysis was used to determine the costs, returns and profitability of cassava processing in the study area. Objective was achieved by the use of Gross Margin as a statistical tool which is relevant in this study because most respondents were rural small scale producers with enterprise holdings of less than one tonne of processed garri per processing activity. According to Upton (1972), this group of farmers/processors hardly have over head capital investment. They depend mainly on customized services for their value added livelihood

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practices. Depreciation of capital assets does not pose a problem in this type of analysis at all. The model for Gross Margin analysis states that:

TEP= (TER-TEC) (Upton 1972)

Where TEP= Enterprise Total Profit

TER= Enterprise Total Revenue

TEC= Enterprise Operational Total Cost

While

$TEP=\sum^{n}_{ij=I}(TER-TEC)$ = Total Farm Profit (TFP)

TFP is the sum of each enterprise profit for all enterprises embarked upon by the farmers.

Regression analysis was used to find the relationship between the dependent and independent variables. The implicit function relating to the processors profit can be expressed thus:

$Y = f(b_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e)$ (Adapted from Olayide and Heady, 1982)

Where

Y = Estimated revenue per annum
b_o = Constant
b_1 - b_6 = Coefficients of multiple regression
x_1 = Labour costs
x_2 = Processing costs
x_3 = Selling price
x_4 = Quantities of tubers processed costs
x_5 = Packaging costs
x_6 = Miscellaneous costs

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents.

Table 1 shows the socio-economic characteristics of the respondents. The results showed that 95% of the respondents were females. This could be attributed to the fact that the processing of food is believed to be the responsibility of women in the society. This is also in agreement with the findings of Erhabor et al (2004), which showed an ageing population among cassava processors in Edo State with a predominantly female population (90%). The results also showed that the highest proportion (38%) of the respondents were within the age group of 50>60 years, 33% had secondary school leaving certificates, 75% of the respondents were married and 58% had household size within the range of 5>8 persons, 66% of them were into cassava processing on part-time basis, while 33% had 11 > 15 years of processing experience and about 67% used family labour. Most of the socio economic features showed that the cassava processors are illiterates with large family size and of older age range which showed that some accommodate their grand children and used then as family labour to contribute to economic activities within the household.

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Table 1.

Variable	Category	Frequency	Percentage (%)
Sex	Female	57	95.0
	Male	3	5.0
Age Group (Years)	<30	7	11.7
	30>40	7	11.7
	40>50	17	28.3
	50>60	23	38.3
	>60	6	10.0
Educational Level	No formal education	4	6.67
	Primary	34	56.67
	Secondary	20	33.33
	Tertiary	2	3.33
Marital Status	Single	7	11.7
	Married	45	75.0
	Widowed	8	13.3
Household Size	<5	12	20
	5>8	35	58.3
	9>12	13	21.7
Farming Status	Part-Time	40	66.7
	Full-Time	20	33.3
Farming Experience (years)	<5	6	10.0
	6>10	8	13.3
	11>15	20	33.3
	16>20	10	16.7
	>20	16	26.7
Source of Labour	Family labour	40	67.7
	Hired labour	20	33.3

Source: Field Survey Data, 2012

Estimated Annual Variable Cost Per Respondent.

Table 2 shows the estimated annual variable cost per respondent. The cost of purchase of fresh cassava tubers was N229,400 which accounted for 62% of the total variable cost of production of one metric tonne of garri. The cost of fresh cassava tubers accounted for the largest total variable cost which indicates that fresh cassava tubers is a significant variable in garri production. Labour cost was N46,250 which was 12.5% of the total variable cost. The costs of grating/milling, pressing/frying, packaging and miscellaneous were N31,450 (8.5%), N18,500(5.0%), N16,650 (4.5%), and N27,750 (7.5%) respectively of the total variable costs.

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Table 2: Estimated Average Annual Variable Cost Per Respondent.

Item	Cost Per Tonne (₦)	Percentage
Fresh tubers	229,400	62
Grating/Milling	31,450	8.5
Pressing/frying	18,500	5.0
Labour	46,250	12.5
Packaging	16,650	**4.5**
Other Miscellaneous	27,750	**7.5**
Total Variable Cost	**370,000**	**100**

Source: Computed from Field Survey Data, 2012.

Gross Margin Analysis

Table 3 shows the estimated annual total revenue of N610,000, total variable costs of N370,000 and the determined gross margin was N240,000 per annum per respondent which represent 64.84% of the total variable cost of production. The implication is that for every one naira invested in the processing of cassava, the farmer gained 65 kobo. This finding is in consonant with the findings of Emokaro et al (2008) who obtained gross margin values of N211,275 in one month in the peak season with the clause that if he gets regular supply of raw cassava tubers and a ready market for the product. This result also compares favourably with the findings of Erhabor et al (2004), who obtained gross margin values of N12,900 and a return per naira invested of N1.08 for garri and starch production in Oredo with higher values of N17,250 and N1.56 respectively in Egor. These findings show that the processing of cassava to garri and edible starch in Egor and Oredo Local Government Area of Edo State was a profitable venture. In the same vein, it could also be inferred that cassava processing is a profitable venture in Isoko North Local Government of Delta State.

Table 3: Estimated Annual Total Revenue and Gross Margin of Respondent in the Study Area.

Variable	**Amount (₦)**
Total Revenue	610,000
Total variable cost	370,000
Gross Margin	240,000

Sources: Computed from Field Survey Data, 2012

Regression Result of Returns to Cassava Processing.

Table 4 shows that the independent variables; labour cost (0.717), processing costs (0.173), selling price (0.132) and quantities of tubers processed (0.420); all have positive values of their coefficients and had significant effects in determining the farmer's income. On the other hand, it is also shown on the table that packaging costs (0.024) and miscellaneous costs (0.162) had no significant impact in determining the farmers' income.

Since the Fcal (4.711) is greater than Ftab (3.123) and the adjusted R squared was (0.567), it implies that there is significant relationship between the processing input costs of the processors and their income levels. The adjusted R^2 =57% (0.567) shows that the variation in income levels of processors is accounted for by the variations in all the variables put together.

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This also implies that the independent variables explain the behavior of the dependent variable at 5% level of confidence.

Table 4: Determinants of Income of Cassava Processor

Processing	(Multiple Regression)		Probability Level
	B	T	
Constant	28.465	2.727	0.013
Labour costs	0.717	1.672	0.081
Processing costs	0.173	2.403	0.023
Selling price/bag	0.132	2.538	0.001
Quantities of Tubers Processed	0.420	4.667	0.000
Packaging costs	0.024	0.234	0.815
Miscellaneous	0.162	0.385	0.701

Significant at 5% level ($p<0.050$)

$F=4.711$ ($p<0.050$), adjusted R squared=0.567

Processing Constraints: Table 5 shows the constraints encountered by cassava processors in the study area. Respondents of cassava processing enterprise were required to state freely and clearly the obvious constraints encountered from the point of procurement of cassava tubers through processing to the final distribution stage. Based on the feedback from the respondents, five items were ranked on a Likert-type scale in order to measure relevant variables that were major constraints to cassava processing in the study area. These were

-inadequate capital and fund
-Lack of improved technology
-inadequate processing and storage facilities
-Small sized enterprises with low earnings
-Poor markets characterized by low pricing of products.

Ranking of these constraints revealed that inadequate capital and fund as the most serious with 2.28 mean score. This rating was followed by lack of improved technology with mean score of 2.12, inadequate processing and storage facilities with mean score of 1.92, small sized enterprises with low earnings mean score of 1.87, Poor markets characterized by low pricing of products with mean value of 1.47

Table 5: Processing Constraints Faced by Respondents

Processing Constraints	Mean	Rank
Inadequate capital	2.28	1st
Lack of improved technology	2.12	2nd
inadequate processing and storage facilities	1.92	3rd
Small sized enterprises with low earnings	1.87	4th
Poor markets characterized by low pricing of products	1.47	5th

Source: Field Survey Data, 2012

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CONCLUSION AND RECOMMENDATIONS.

The findings of this study established the fact that cassava processing into garri is a profitable venture in the study area with the estimated annual total revenue of N610,000, total variable costs of N370,000 and the gross margin was N240,000 per annum per respondent. It could therefore be concluded that processing cassava into garri is not only a source of livelihood to the individual processor but also a source of wealth to the nation if properly harnessed and funded.

Based on the findings of this study, the following recommendations were advanced towards alleviating the constraints encountered by cassava processors in order to increase their profitability.

Credit facilities should be channeled to processors through the current micro-credit scheme of the Delta State Government to enable producers strengthen their enterprises by acquiring processing inputs which they claim are currently beyond their reach.

Government policies should be modified to improve on the provision of training programme to disseminate scientific knowledge to cassava processors to enable them use the available resources efficiently and increased productivity.

The Research-Extension Farmer linkage should be strengthened to furnish the processors with modern labour saving processing techniques that would enhance their productivity and profitability.

Processors should form co-operative association to establish garri added value centres for improved weighing and packaging methods. This would enhance the market value of their products and help in commanding stable market prices and cushion the effect of seasonality in production.

Government and non-governmental organizations/agencies should assist in educating the cassava processing farmers through effective extension system on improved cassava processing technology. Therefore, extension needs of cassava processing should be given special and urgent attention. Thus the situation can be improved through the action research on crops and livestock systems to bring about improved production, marketing and in doing so, improves livelihood, income and food security of the people.

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