.

Profitability of *Garri* Processing in Ijebu Ode Local Government Area of Ogun State, Nigeria

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Abstract

Garri is one of the major staple food commodities produced from cassava in Nigeria. This study examined the profitability of garri processing in Ijebu Ode Local Government Area of Ogun State. Primary data collected through the use of well structured questionnaires was used for the study. A multi-stage sampling technique was employed to randomly select 125 respondents used for the study. The data collected were analyzed using descriptive statistics, budgetary technique and multiple regression model. The result revealed that the average age of the processors was 39 years. The processors were predominantly female (71.2%). The average household size was 7 and about 42.4% of the processors had between 11 and 20 years of experience. The costs and returns analysis for garri processing showed that the total cost of production was ₦191,404.00 and total revenue was ₦239,772.80. The gross margin and net profit of garri processors was ₦73,384.80 and ₦48,368.80 respectively. The result of the regression analysis showed that age, level of education, household size and years of experience significantly affected the level of profitability of garri processing. The profitability index of 20% revealed that garri processing business is a profitable and viable enterprise in the study area. The constraints encountered by the garri processors were inadequate fiance/capital, high transport cost, high cost of cassava, fluctuation in prices, scarcity of good quality tubers, high perishability of cassava, labour scarcity or supply, poor access road, high cost of fuel and inadequate access to water. The study recommended that government should encourage farmers to produce improved varieties of cassava in commercial quantities so as to meet the high demand by processors for good quality tubers and also create awareness on modern methods of processing cassava into garri.

Keywords: Garri, processors, profitability, budgetary analysis

Introduction: Cassava (*Manihot esculenta Crantz*) is one of the most affordable staples and is predominantly a key income generating arable crop in Nigeria (Okoye , F.U., Okoye, A.C. and Umeh, S.I. (2021); Ibitunde, I.O., Ajayi, F.O., Bamiwuye, O. A& Sulaiman, O.A. (2021) & Ezike, K.N.N., Nwibo, S.U. & Odoh, N.E. (2011). It is one of the fastest growing crops with a total output of over 277 million metric tonnes in 2016 as against 71 million metric tonnes in 1961 (FAO, 2018). Aturamu O.

A., A. E. Akinbola, O. O. Omosehin and D. T. Oguntuase (2021) reported that the latest trends in cassava production and demand showed that it is expanding globally and its cultivation is extending to the semi-arid regions where it had not been cultivated for many years. According to Knoema.com (2023), Nigeria accounts for about 20% of the world cassava production with about 63 million metric tonnes of cassava produced per annum. Cassava is one of the most consumed foods in Nigeria (Apeh, C. C., Ugwuoti, O. P & Apeh, A. C., 2023 & IITA, 2010) and has a shelf life of 24 to 48hours after harvest. Most frequently, cassava is traditionally consumed by processing the fresh roots into *garri* (cassava flakes), *lafun* (cassava flour) and *fufu* (starch) (Obayelu A. E., Olaleke O. A., Oke F.O. and Oladeji S. A. (2018). Six traditional processing steps are involved in turning cassava to *garri* and these are peeling, washing, grating, drying, sifting, and frying (Samuel A. U., Akinlabi, E. T. Okokpujie, I. P. and Fayomi, O. S. I. (2021). According to Ibitunde *et al*. (2021), an estimated 90% of cassava produced is processed into food and 70% of the cassava processed into food is turned to *garri. Garri* is a granular product characterized by a faint aroma and sour taste which is due to the fermentation of fresh cassava tubers (Samuel *et al.,* 2021). According to NBS (2015), over 5.8 million metric tons of *garri* is produced annually. It is majorly consumed as a core meal (eba) but can be taken as a snack when soaked in cold water, with sugar and mostly with roasted groundnut, coconut or dry fish. *Garri* is a staple food and it is consumed in most households in Nigeria, particularly in the southern and eastern parts. It takes a major share of total food expenditure (Okoye *et al.*, 2021; Salau, S.A., Nofiu, N.B and Jimoh, A,T., 2019; Ben-Chendo, G.N., Gbolagun, A. O., Ehirim, N.C., Obasi, P.C., Nwaiwu, I.U. and Essien, U.A., 2017 & IITA, 2010). Therefore, *garri* appears to be a "food choice" even in the face of alternate food options in both rural and urban areas. Cassava's bulkiness is diminished when processed into *garri* and also makes it easier for transportation. In addition, processing into *garri* also helps to increase the shelf life of cassava and there is increase in the farmers' income when they engage in cassava processing (Aturamu *et al.,* 2021).

Garri processors are constantly faced with problems of seasonal variations in price of cassava tubers and high cost of fuel needed for frying fermented cassava into finished product – *garri* (Obayelu *et al.,* 2018 & Ibitunde *et al*., 2021). This study is significant at this period that the Nigerian government is encouraging diversification into agriculture and food production. The country is presently going through economic crisis and food shortage, the findings of this research therefore is relevant in encouraging greater participation in cassava processing to meet the food demand in the country. The study aimed at proffering answers to the following research questions within the context of Ijebu Ode Local Government Area**:** what are the socio-economic characteristics of *garri* processors? Is *garri* processing a profitable

enterprise? What are the determinants of the profitability of *garri* processing? What are the constraints to *garri* processing? This study is significant at this period that the Nigerian government is encouraging diversification into agriculture and food production. The country is presently facing a period economic crisis and food shortage, the findings of this research therefore is relevant in encouraging greater participation in cassava processing to meet the food demand in the country.

Empirical Studies on the Profitability of *Garri* Processing

Abasilim *et al.* (2019) examined the profitability and credit accessibility among garri processors in Epe, Lagos State, Nigeria. The data collected were analysed using descriptive statistics, profitability analysis and logit regression model. The study revealed there were more females (89.1%) than male (10.9%) garri processors with most (68.2%) of them married and a mean year of experience of 16 years. They found out that an average weekly total cost incurred by the respondents was ₦33,531.39 while total revenue was ₦51,211.82. A rate of return on investment (RRI) of 53% showed an earning of 53% profit on every naira invested. Their findings also revealed that about 68.2% of the respondents did not belong to any cooperative society which resulted in a low access to credit facilities which limited them to small-scale garri processing. The problems militating against credit accessibility from other financial institutions included high interest rate, low income, no savings and lack of information on credit availability.

In the same vein, Adesope, A. A., Olumide-Ojo, O., Oyewo, I. O., Ugege, B. H. and Oyelade, A. A. (2020) analyzed the costs and returns of processing cassava into flour and *garri* and also determined the factors influencing its profitability. A two- stage sampling technique was used to generate primary data used for this study. The first stage involved the purposive

selection of Ibarapa North Local Government Area (LGA), because it has more cassava producers and processors than other LGAs. The second stage involved the random selection of 15 villages out of the 23 in the LGA. From the selected villages, 170 respondents were randomly selected. Results from the primary data shows that 28.3% of *garri* producers had no formal education and 46.7% were between the ages of 30 and 39years. The regression analysis shows that the quantity of garri sold (ß =5.4099), transportation cost (ß =-0.2994), peeling cost (ß = -0.4249), and grating cost (ß = 0.6878) were all significant to the total revenue of cassava flour sold. Price, inadequate capital, transportation, land tenure and markets were factors influencing garri and cassava flour production. Analysis of the costs and returns revealed that processing cassava into garri gave a higher gross margin even though processing of cassava was profitable, indicating that there is a significant difference between flour and garri production.

Anagah F. I., Anayochukwu V. E. and Nwukor P. O. (2020) examined garri processing and marketing amidst the COVID-19 lockdown in Ohaukwu Local Government Area of Ebonyi State, Nigeria. The result of their study revealed that majority (75%) of the Garri marketers/processors were females that were still in their economically active age group. All the respondents were aware of the outbreak of COVID-19. The rate of return on investment of 30% indicated that the respondents earned 30% profit on every cost associated with garri processing. The benefit cost ratio of 1.30 which implies that for every ₦1 invested in processing cassava to garri, a return of ₦1.30 and a profit of ₦0.30 were realized. Majority were wholesalers and most of them sold in market stall during the outbreak of COVID-19. The respondents made more profit during the lockdown because of inflation in prices of staple food. The study

revealed the processing cassava to garri was a profitable and viable business.

Aturamu *et al.* (2021) estimated the profitability of *garri* processors, determined the factors influencing the choice of market outlet employed by the processors and identified the main constraints faced in processing garri in Ondo State, Nigeria. The results revealed that female (63.3%) dominated the enterprise. The mean age was 49 years and many (80%) of them were literate. The result established three main market outlets and they were: producer gate (43.3%), open market (20.0%), and middlemen (36.7%). The result of budgetary analysis revealed that the venture was profitable with a gross margin and profit as ₦82,972.58 and ₦71,694.68, respectively. A rate of return on investment of 2.37% indicated that ₦2.37 was realized on every naira spent. The result of MNL revealed that marital status, education, years of experience and profit accrued were the significant factors influencing the choice of market outlet in the area. They also found out that price fluctuations, poor road network and high cost of transportation were the main constraints faced by garri processors in the area. They concluded that garri production business was viable and therefore capable of reducing hunger and poverty if properly managed with functioning and organized market outlets and structure.

Esheya (2021) determined the economic analyses of garri processing in Ebonyi State, Nigeria. Using primary data obtained from 300 cassava processors, the study revealed that garri processing was economically viable as it generated an average gross margin and net farm income of ₦35,000.00 and ₦24,500.00 respectively per 1,000kg of cassava root processed. The major cost components of garri processing were found to be the total variable cost – mainly cassava root, labour, and transportation costs. Results of the multiple regression analysis showed that age, gender and cost of cassava roots had a significant and negative influence on the profitability of garri processing; while access to labour, years of processing experience, household size, income and access to credit had positive influence on the economic returns of garri processing.

Morris *et al.* (2022) comparatively analyzed the profitability of *garri* production and marketing in Khana LGA of Rivers State, Nigeria. The result showed that most (63.3%) of the respondents were female and literate (80%). The profitability analysis indicated that return from *garri* production was lower than marketing. The net farm income/plot was ₦52,853.36 with an average gross margin/plot of ₦64,752.22 was realized in *garri* marketing. The gross ratio of 0.56 for *garri* production while 0.46 for marketing and the operating ratio of 0.44 for garri production while 0.34 for marketing. The study concluded that garri marketing was more profitable than production.

Materials and Methods
The study was carried out in Ijebu-Ode Local Government Area of Ogun State, South Western Nigeria. It has an estimated population of 222,653 (NPC, 2006) and a total land mass of approximately 192km^2 (74m^2). The study made use of primary data obtained through the use of well structured questionnaires. Multistage and purposive random sampling techniques were used to select *garri* processors in the study area. The first stage involved a purposive selection of five (5) communities where there are many processors and in the second stage, twenty five (25) processors were randomly selected from each of the communities, giving a sample frame of one hundred and twenty five (125) respondents. The data collected were analyzed using descriptive statistics, budgetary technique and ordinary least square multiple regression technique.
Model Specification

The cost and return of cassava processing was estimated using the budgetary analysis. The profitability was measured using profitability ratio analysis specified below:

Profit (π) = Total Revenue (TR) – Total Cost (TC)

TC = Total Variable Cost (TVC) – Total Fixed Cost (TFC)

The gross margin, net farm income, profitability index and rate of return on investment were obtained from the results of the budgetary analysis.

a. Gross Margin (GM)
$$= TR - TVC$$

b. Net Farm Income (NFI) $= TR - TC$

c. Profitability Index (PI) $= \dfrac{NI}{TR}$

d. Rate of Return on Investment (RRI) = $\dfrac{NI}{TC} x \dfrac{100}{1}$

The factors that affect the profitability of *garri* processing were analyzed using the ordinary least square (OLS) regression model. The profit function was fitted into the data and estimated using Ordinary Least Square (OLS) regression model. Various forms of regression model were tried and the best fitted equation was used to analyze the determinants on the profitability of *garri* processing. The lead equation was chosen based on statistical and econometric criteria and a prior expectation of the variables.

The model is implicitly expressed:-

$$Y = f\left(X_1, X_2, X_3, X_4, X_5, X_6, e\right)$$

Where:

Y = Profit (naira)
X_1 = Age (in years)
X_2 = Marital status (dummy, married =1; 0 = otherwise)
X_3 = Sex (dummy, male =1; 0=female)
X_4 = Level of education (in years)
X_5 = Household size (in numbers)
X_6 = Experience (in years)
e = Error term

The constraints to *garri* processing were measured using 5-point Likert scale. Sampled processors were asked to rate the constraints to *garri* processing on a 5 point numerical rating scale of 0 to 4. Respondents were expected to tick how serious a constraint was to them.

RESULTS AND DISCUSSION

The result of the socio-economic characteristics of respondents analyzed is presented in table 1. As shown in the table, majority of them (89.6%) were not more than 50 years old indicating that they were still very economically active with a mean age of +/-38.77years. Garri processing in the study area was dominated by women (71.2%) and this corroborates the findings of Morris *et al.* (2022) and, Ibitunde *et al.* (2021) and Aturamu *et al.* (2021). Majority of them were married (54.4%) and with a mean household size of 7 members. The level of literacy among the respondents was high (59.2%) with 32%of them having primary education, 25.6% secondary education and 1.6% tertiary education. Most of them had processing experience of between 11 and 20 years with a mean experience of 15.8 years.

Table 1: Distribution of respondents by their socioeconomic characteristics

AGE	FREQUENCY	PERCENTAGE
20-30	15	12.0
31-40	61	48.8
41-50	36	28.8
>50	13	10.4
MEAN	+/-38.77	
SEX		

MALE	36	28.8
FEMALE	89	71.2
MARITAL STATUS		
SINGLE	7	5.6
MARRIED	68	54.4
DIVORCED	42	33.6
WIDOWED	2	1.6
SEPARATED	6	4.8
EDUCATIONAL LEVEL		
NO FORMAL EDUCATION	51	40.8
PRIMARY EDUCATION	40	32.0
SECONDARY EDUCATION	32	25.6
TERTIARY EDUCATION	2	1.6
HOUSEHOLD SIZE		
3-5	21	16.8
6-8	77	61.6
9-11	24	19.2
12 ABOVE	3	2.4
MEAN	7	
YEARS OF EXPERIENCE		
1-10	34	27.2
11-20	53	42.4
21-30	35	28.0
31 ABOVE	3	2.4
MEAN	15.8	

Source: Field Survey, 2023

The result of the budgetary analysis for *garri* processing in the study area is presented in table 2. It showed that costs of transportation (2.2%), firewood (3.3%), fresh cassava (78.3%), water (2.4%) and labour (0.7%) made up of the total variable cost which was 86.9% of the total cost of *garri* processing while the total fixed cost was (13.1%) of the total cost of processing *garri.* The total cost of production was ₦191,404.00 and total revenue was estimated as ₦239,772.80. The gross margin and net profit of *garri* processors in the study area was estimated as ₦73,384.80 and ₦48,368.80 respectively. The profitability index was 20% while operating expenses ratio was 0.69. However, rate of return on investment of 25.27% implies that the *garri* processors made an average net profit of ₦25.27 over every ₦1.00 expended. This shows an appreciable proportional return on investment and further confirmed that *garri* processing business is a profitable and viable enterprise which can drive high income generation for the people to earn a living vis-à-vis boast food production and employment opportunity. These findings corroborate those of Esheya S. (2021); Ugege, B. H., Tunde-Francis, A. A., Odeyale, O. C. and Ibode, R. T. (2022); Morris *et al,* (2022); Abasilim, C. F., Balogun, O. L. & Adeyemi, A. A. (2019) and Obayelu *et al*. (2018)

Table 2: Cost and Return of *Garri* Processing

ITEMS	MEAN VALUE (₦)	PERCENTAGE
Variable cost (VC)		
Cassava tubers	149,912.00	78.3
Transportation	4,288.00	2.2
Fire wood	6,260.00	3.3
Water	4,648.00	2.4
Labour	1,280.00	0.7
Total Variable cost (TVC)	**166,388.00**	*86.9*
Fixed Cost (FC)		
Total Fixed Cost (TFC)	**25,016.00**	*13.1*
Total Cost	*191,404.00*	*100.0*
Total Revenue	*239,772.80*	
Gross revenue	*73,384.80*	
Net Income	*48,368.80*	
Profitability Index	*0.20*	
Rate of return on investment	*25.27*	
Operating expense ratio	*0.69*	

Source: Field Survey, 2023

Determinants of the Profitability of *Garri* Processing

The double log function was selected as the lead equation from all the four functional forms tested. This was done based on the number of significant variables and the value of coefficient of multiple determinations (R^2) and significant F-value. R^2 was 0.417 and the F-value was significant at 8.789. Four out of six variables; age, level of education, household size and years of processing experience of the respondents were statistically significant at 10% and 1% level of significance. The coefficients of age, level of education and household size positively influenced the level profit made from *garri* processing implying that a unit increase in these variables will lead to a proportionate increase in the level of profits of the processors. On the contrary, years of experience negatively influenced the level of profit meaning that as the numbers of years of experience increases, level of profit decreases. This finding is contrary to *a priori* expectation but corroborates the findings of Esheya S. (2022) and Ijigbade J. O., Fatuase A. I. and Omisope E. T. (2014). *Ceteris paribus*, it is expected that profit level will increase with increase in the years of experience.

Table 3: Factors Influencing Profitability of *Garri* Processing (Double log function as lead equation)

Functional Forms	Linear	Semi-log	Double-log	Exponential
Variables	**Coefficient/ T-value**	**Coefficient/ T-value**	**Coefficient/ T-value**	**Coefficient/ T-value**
Constant	20066.856 (1.241)	-122691.585 (-1.988)*	6.926 (5.192)***	10.052 (29.157)***
(X_1) Age	865.215 (1.493)	58246.829 (2.645)***	1.239 (2.639)***	0.017 (1.379)

(X_2) Marital status	-5718.347	-6014.708	-0.157	-0.146
	(-1.092)	(-1.152)	(-1.426)	(-1.316)
(X_3) Sex	-53.632	421.309	0.095	0.091
	(-0.011)	(0.083)	(0.884)	(0.848)
(X_4) Level of education	1602.689	45.851	0.098	0.035
	(2.856)***	(0.794)*	(1.863)*	(2.958)***
(X_5) Household size	2662.033	21134.559	0.409	0.049
	(1.737)*	(1.892)*	(1.723)*	(1.496)
(X_6) Experience	-1574.229	-30222.437	-0.585	-0.027
	(-2.578)***	(-3.642)***	(-3.352)***	(-2.131)**
R^2	0.149	0.161	0.417	0.315
Adjusted R^2	0.106	0.118	0.412	0.311
F-value	3.444	3.772	8.789	5.427

Source: Field Survey, 2023   *** Sig. at 1%, ** Sig. at 5%, * Sig. at 10% levels

The constraints encountered by the *garri* processors are presented in table 4. The criterion means was 3.00. Inadequate finance/capital, high transport cost, high cost of cassava, fluctuation in prices, scarcity of good quality tubers, high perishability of cassava, labour scarcity or supply, poor access road, high cost of fuel and inadequate access to water all had mean greater the criterion mean. From this result, it is clear that inadequate finance is the main constraints that cassava processors face in the study area and this resonates with the findings of Ibitunde *et al.* (2021) and Adeoye, A., Oyeleye, A.A., Ajibade, A.J., Daud, S.A., Alabi, A.F and Amao, S. A. (2018).

Table 4: Constraint to *Garri* Processing

Constraints	Mean Score	Rank	Remark
Good Quality cassava tubers	3.49	5th	Agreed
Fluctuation in prices	3.61	4th	Agreed
High transport cost	3.70	2nd	Agreed
Poor access road	3.26	8th	Agreed
Lack of Finance	3.76	1st	Agreed
Scarcity of labour	3.40	7th	Agreed
Inadequate water access	3.00	10th	Agreed
High perishability of cassava	3.41	6th	Agreed
High cost of cassava	3.68	3rd	Agreed
High cost of fuel	3.01	9th	Agreed
Hazard of Smoke	2.54	11th	Disagreed
Injury during grating	2.10	12th	Disagreed
Marketing challenges	1.77	13th	Disagreed
Electricity problem	1.56	14th	Disagreed

Source: Field Survey, 2023   **Criterion mean: >3.00**

Conclusion/Recommendation

The study concluded that *garri* processing was dominated by women who were still in their economically active age. The profitability index shows that *garri* processing business is a profitable and viable enterprise in the study area.

Age, level of education, household size and processing experience were the major determinants of the profitability of *garri* processing. The constraints encountered by the *garri* processors were scarcity of good quality cassava tubers, fluctuation in prices, high transport cost, poor access road, high perishability of cassava, scarcity of labour, lack of finance/capital, high cost of cassava and fuel. Based on the findings of the study, the following recommendations are made: 1. Garri processors should be encouraged to form cooperative societies to be able to access credit timely and at low interest rates. This will assist them in acquiring necessary machines such as peeling machines, grating machines, pressing and frying machines needed for their enterprise. 2. The government should encourage farmers to produce improved varieties of cassava in commercial quantities so as to meet the high demand by processors for good quality tubers. 3. There is the need for the government and non-governmental organizations to create awareness on modern methods of processing and use of improved equipments for processing the cassava into *garri*.

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