Analysis of Profitability and Market Outlets of Smallholder Garri Producers in Ondo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author OAA designed the study and wrote the first draft of the manuscript, while author AEA proofread and contributed immensely in the interpretation and discussion of the manuscript. Authors OOO and DTO were responsible for the data collection, analysis and presentation of results cum the reference section of the manuscript. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Aims: To ascertain the socio-economic characteristics of the respondents, identify the market outlets available in the area, estimate the profitability of garri processors, determine factors influencing the choice of market outlet employed by the processors, and identify the main constraints faced in processing garri in the area.
Study Design: Primary data were used for this study and sourced through a well-structured questionnaire.
Place and Duration of Study: The study was carried out among garri producers in Ondo State, Nigeria, between June and November, 2020.
Methodology: A multistage sampling procedure was used to select 120 respondents, while descriptive statistics, budgetary technique, and multinomial logit (MNL) regression were used for the data analysis.

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Results: The results revealed that female (63.3%) dominated the enterprise, and about 81.6% of them were married. The average age was 49 years old, and many (80%) of them were literate. The result established three main market outlets and they are: producer gate (43.3%), open market (20.0%), and middlemen (36.7%). The result of budgetary technique revealed that the venture is profitable given the values of gross margin and profit as 82,972.58 and 71,694.68, respectively. The value (2.37) of return on investment, indicating that about 2.37 was realized for every naira spent. The result of MNL affirmed that marital status, education, experience and profit accrued were the significant factors influencing the choice of market outlet in the area. It was unveiled that price fluctuations, poor road network and high cost of transportation were the main constraints faced by the garri processors in the area.
Conclusion: The policy implication is that garri production business is viable, therefore it is capable to reduce hunger and poverty if properly managed with functioning and organized market outlets and structure.

1. INTRODUCTION

In achieving the Sustainable Development Goals (SDGs) of food security in Nigeria and as well building financial strength, cassava and its products is one of the key areas of priority due to Nigeria's colossal potential for cassava production [1]. [2] reported that the latest trends in cassava production and demand showed that cassava production is expanding globally, and its cultivation is extending to the semi-arid regions where it has not been cultivated for some years.

The major products processed from cassava is garri, and it is majorly consumed as a core meal (*eba*) and can be taken as a snack when soaked in cold water, with sugar and mostly consumed with roasted groundnut, coconut and dry fish. Garri is mostly taken more than once by most households in the producing areas [3], and over 5.8 million tons were produced yearly [4]. Therefore, garri appears to be a "food choice" even in the face of alternate food options in urban areas. Cassava's bulkiness is diminished when processed into garri and also make it more reasonable for transportation. Also, garri also help to increase the shelf life, and there is increase in the farmers' income when they are able to process cassava [5].

Garri can be described as a fermented and roasted granular product from cassava and its acceptability and consumption both in the rural and urban Nigeria have been established [6]. Thus, garri processing and marketing has the potential to contribute immensely to economic development in Nigeria. It is therefore, obvious that in Nigeria and some part of West Africa, garri has become an essential food supply commodity. This is evident in its demand and

considerable increase in its price over the years. The demand and price have been increased despite the increased domestic production. The high price could be attributed not only to high demand but also to the general inflation being experienced in various sectors [7].

The important role of efficient marketing of agricultural produce in ensuring cheap and adequate food for Nigeria needs cannot be over-emphasized. Efficient marketing plays significant role in regulating production and consumption which are important for development of any nation, and commonly consumed product such as garri [8]. The level of efficiency in the marketing system is a measure of market performance [9]. In Nigeria, the marketing of agricultural produce is far from being efficient [10]. Unpredictable fluctuation in the prices of various foodstuffs like garri has become a common feature of the nation's economy. The situation is such that the consumers of agricultural foodstuff pay exorbitant prices while the producers receive relatively low prices.

Despite the increased demand for garri as the major staple food mainly consumed in Nigeria, there is still poor market structure which is due to price instability, poor road network, and high cost of transportation. Participants in the marketing system may have to travel long distances in order to buy or sell their product, a situation which at times create gaps between supply and demand, and possibly hikes the product's prices. However, boosting garri production without improving its marketing outlets can lead to glut of garri in the market. This can cause a decrease in prices and as well discourage processors from garri production [11]. Marketing can pose a problem for poor farmers who may not have

resources to transport their commodities to the market, especially those living in villages with poor feeder roads. Typically, farmers transport their farm produce to the market on heads as head loads, on bicycles or in lorries [12]. Again, there are several research policies related to the development of cassava production and processing such as [10,13,14,15]. However, these studies did not adequately incorporate marketing outlets and cassava product marketing in Nigeria. This is germane because it influences the profitability of the processors. [16] observed that inadequate storage system has contributed to the persistence of the exploitation of the farmers by the middlemen, and this has contributed to increased marketing costs. It is also important to note that the more the number of the middlemen in the marketing chain, the longer the length of the chain and the greater the difference in the price paid between consumers at the end of the chain and farm gate price at the beginning of the chain. This leads to wider marketing margin between producers and final consumers. If the marketing margin is high, consumers will be exploited. Again, [17] only established the nature of marketing and determinants of net returns to garri marketers using descriptive statistics and ordinary least square regression technique, while [10] also examined the conduct and profitability of garri production using multiple regression. [15] also examined the determinants of profitability of cassava processors, and [3] evaluated the quantity and quality of garri produced. It was observed that in the recent years, no study in the literature has examined the garri market outlets and its determining factors for profitability using a multinomial logit regression, not even in the study area.

It is on this note that the study was conducted to provide empirical information on the profitability and market outlets of smallholder garri producers in Ondo State, Nigeria. Therefore, the study specifically ascertained the socio-economic characteristic of the respondents; identify the marketing outlets available in the study area; estimate the profitability of garri processors; determine factors influencing the choice of market outlet employed by the processors; and identify the constraints faced in processing garri in the area.

This study is significant at the period that Nigeria is deviating from a mono-economy of crude oil to accommodate other opportunities in other sectors including agriculture. Again, since

production is incomplete unless the product reaches the final consumers to meet their required satisfaction [18], it becomes necessary that an efficient marketing system be maintained [19]. Adequate market access and functioning market outlets would greatly discourage processing of garri and also boost the income of the farmers. As a result, efficient processing and marketing of garri can improve national food security while also eradicating rural poverty [20,21]. It would be an eye-opener to the policy-makers on building functioning organized market for garri. More so, the findings of this study will not only depict how profitable garri production is but it will also be a guide for policymakers to effectively plan for the growth and development of the industry through formulating effective processing and marketing policies. Again, this will help the processors to adjust their resources to generate sustainable income for their families and as well improve the quality of their lives as also reported by [22].

2. MATERIALS AND METHODS

The Study was carried out in Ondo State, Nigeria. The State has 18 Local Government Areas with its headquarters in Akure. It is located on longitude $4^0\ 30^1$ and $6^0\ 00^1$E and latitude $4^0\ 45^1$ and $8^0\ 15^1$ North. The State has abundant land estimated to be $13.595km^2$. Majority of the people in the State were engaged in small scale farming with major arable crops including maize, cassava, yam, cowpea, sorghum while the tree crops cultivated include cocoa, kolanut, oil palm, cashew, rubber etc. Production is usually for food consumption, market and cash for sustainability.

The data for the study were collected from the garri processors through a well-structured questionnaire and interview scheduled. For this analysis, a multi-stage sampling technique was used. The first stage involved a purposive sampling technique of two (2) Local Government Areas (LGAs) that are well known for garri processing marketing cum cassava production in the State. They are: Akure North and Owo. The second stage involved using a simple random sampling method to select three (3) communities from each LGA, making six (6) communities in total. Therefore, a simple random sampling procedure was used in stage three to select twenty (20) garri processors, making a total of one hundred and twenty (120) respondents.

Descriptive statistics, budgetary technique, and multinomial logit regression were used for the

analysis of this study. Descriptive statistics such as mean, standard deviation, frequency tables, and percentages were used to analyze the socio-economic characteristics, identify the marketing outlets for garri marketing, and constraints faced by the processors. Gross Margin Analysis and Return to investment (ROI) were used to analyze costs and returns from the garri production.

The Gross Margin formula is represented as:

G.M = TR - TVC

Where:

G.M = Gross margin
TR =Total revenue
TVC = Total variable cost

The profitability also represented symbolically by

π =TR - TC
Where: π = profit
TR = Total revenue/gross income
TC = Total cost [Total fixed cost (TFC) + Total variable cost (TVC)]

2.1 The Multinomial Logit (MNL) Model

The tool (MNL) was used to examine factors influencing market outlet preference of the garri producers in the area. The multinomial logit is a widely used model in econometrics to explain the choice of an alternative among a set of exclusive alternatives [23], and desirable for studies with small sample size as the case of this study.

Model Specification: Let Y_i be a random variable representing the market outlet chosen by any processor. The assumption is that each processor faces a set of discrete, mutually exclusive choices in the selection of market outlet. Following the approach used by [24,23,25], the equation is expressed below.

$$Prob\ (Y_i = j) = \frac{e^{\beta_j x_i}}{\sum_{k=0}^{j} e^{\beta_k x_i}}\ , j = 0, 1 \dots J$$

The above equation can be normalized to remove indeterminacy in the model by assuming that $\beta_0 = 0$ and the probabilities can be estimated as:

$$Prob\ \left(Y_i = \frac{j}{x_i}\right) = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k x_i}}\ , j = 0, 2 \dots J, \beta_0 = 0$$

The explicit function is expressed as:

$$Y_i = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + U_i$$

Therefore, market outlet is the dependent variables (Y_i) which are: producer gate (base category) (1), open market (2) and middlemen (3). It is worthy of note to report that these three outlets were the main and popular options chose by the respondents in the area. While the explanatory variables (X_{is}) were: age (years), marital status (married=1 and 0 otherwise), household size (numbers), education (1=educated and 0 otherwise), experience (years), profit (naira), labour source (hired = 1 and 0, otherwise), and distance to the nearest urban market (kilometer).
U_i is the error term.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of Garri Processors

The result in Table 1 reveals that most (75.8%) of the processors fell in the bracket age of 41 - 50 with the mean age of about 49 years old. This is in support of [26] in a study carried out in Ivo, Ebonyi State whose finding revealed that the mean age of garri processors was 52.10 years old, and also noted that age affects the working ability of the processors accordingly. Also, [10] who noted that the older the producer, the less adoptive he becomes to innovation which negatively affects the efficiency. The result also revealed that majority (63.3%) of the respondents were female, this could be as a result of the fact that men are more involved in cultivation of cassava rather than processing garri. The finding conforms with [27] who carried out a similar study in Ughelli, Delta State and found out that majority (78.6%) of the respondent involved in garri processing were female. Also, [28] confirmed that the populations of garri processors are dominated by female. Nearly 81.6% of the respondents were married, and this agrees with the findings of [29] who in their study on rural women processing cassava in Doma Local Government area of Nasarawa State, found out that 85% of the respondents were married. The result also reveals that about 44.2% of the garri processors had primary school education, 30.8% had secondary education and 5.0% had tertiary education. This shows that many of the processors can read and write in the area. This is not in conformity with the findings of [30] who reported that cassava processors are illiterates. White garri (68.3%) happens to be the

major type of garri produced in the area, this is in agreement with [10] in a study conducted in Ondo State, he revealed that the preference of garri produced in terms of colour was made known that the majority of the respondents produced white garri. The mean income of the gari processor was N124,000, and many (41.7%) of them earned between N120,000.00 and N240,000.00 in the business.

3.2 Market Outlets of the Garri Processors

According to Table 2, the main market outlets were identified by the garri producers in the area.

Market outlets are the means by which the producers sell their products after being processed. From the results, it was unveiled that many (43.3%) of the sampled respondents did sell their products at the point where it is processed. About 36.7% of the sampled respondents sold directly to the middlemen, while only 20.0% of them took their products to the open market for sale. It was observed during the survey that it was difficult to identify the outlets due to unorganized marketing system/structure in the industry. In order to achieve the aim of this objective, the producers were restricted to choose the main outlet they normally used in

Table 1. Distribution of the respondents by their socioeconomic characteristics

Variable	Frequency	Percentage	Mean (SD)
Age			
Less than 30	9	7.5	
31-40	18	15.0	48.6 (11.49)
41-50	91	75.8	
51 and above	2	1.7	
Sex			
Male	44	36.6	
Female	76	63.3	
Marital status			
Single	9	7.5	
Married	98	81.6	
Divorced	5	4.2	
Widowed	8	6.7	
Household Size			
1-5	90	75.0	
6-10	25	20.8	3.82(0.40)
11-15	5	4.2	
Level of Education			
No formal education	24	20.0	
Primary	53	44.2	
Secondary	37	30.8	
Tertiary	6	5.0	
Experience			
1-5	14	11.7	
6-10	56	46.7	6.8(2.88)
11-15	13	10.8	
16-20	15	12.5	
21-25	22	18.3	
Type of garri produced			
White	31	25.8	
Yellow	7	5.8	
Both	82	68.4	
Income			
60000-120000	31	25.8	
120001-240000	50	41.7	124,000(0.53)
2400001-480000	33	27.5	
4800001 and above	6	5.0	

Source: field survey, 2020

Table 2. Description of the main market outlet in garri production in the area

| Decision | Garri Marketing Outlets | | | | | |
| | Producer gate | | Open market | | Middlemen | |
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	52	43.3	24	20.0	44	36.7
No	68	56.7	96	80.0	76	63.3
Total	120	100.0	120	100.0	120	100.0

Source: field survey, 2020

selling their products. Therefore, the results in the Table reflected the main outlet patronized by the garri producers in the area.

3.3 Costs and Returns of Respondents in the Study Area

Table 3 depicts the costs and returns from garri production in the area. The results revealed the total cost as the addition of fixed cost (**N**11,277.90) and variable cost (**N**41,027.42). The fixed items examined in this study were: frying plate, scoop, and skillet while the variable items were the costs of labour, tuber, transportation, firewood, grating and pressing. It was noted that the depreciation cost on skillet formed the bulk of fixed cost while purchase of raw cassava tuber formed the bulk of variable cost. The result reveals that on average, the total cost incurred on processing garri was 52,305.32 per month, while the total revenue generated was 124,000.00. The gross margin and net returns were **N**82,972.58 and **N**71,694.68, respectively which indicates that the business is profitable in the area. The return on investment (ROI) was 2.37 implying that for every 1 invested on garri production, there was a return of 2.37. This reiterated that garri production business is a profitable venture in the study area. This conforms with the findings of [31,10].

3.4 Factors Affecting the Choice of Market Outlet in the Study Area

From Table 4, the results of MNL revealed that the likelihood ratio statistics was indicated by χ^2 statistics (101.87) are highly significant (P < 0.0001). This suggests that the model has a strong explanatory power. Again, based on default, producer gate market outlet was selected as the reference point. Also, as done in other studies, the MNL was run with and without many explanatory variables while some variables were later dropped because of their insignificant effect on the parameters of the estimates. The final variables used in the study were depicted in the

Table, and as well discussed in this report. Age of the respondents was negative but statistically significant in influencing open market outlets in the area. This suggests that a unit increase in the age of the producer will lead to probability of selling garri at producer gate outlet instead of open market outlet by 21.7%. The probable reason might be because of old age which might not allow them to patronize open market outlet. Also, the high cost of transportation might be responsible for not selling at the open market outlet. This is similar to the finding of [12]. The coefficient of marital status was significant under both open market and middlemen outlets at 5% level apiece. This implies that married households have the chance of not selling at open market outlet by 34% but sell for middlemen outlet by 10.2% compared with the unmarried households. The married households always have responsibility that could make them sell their product instantly or to the middlemen that bring catch because taking it to the open market outlet might take time and incur additional cost since most markets are not open daily as also observed by [15]. The coefficient of education was statistically significant under open market and middlemen outlets by 1% and 5% levels, respectively. It can be explained as educated producers are more likely to sell at open market outlet by 21%, and also likely to not to sell for the middlemen by 78.1% compared with their uneducated counterpart. It could be assumed that educated producers would want to add value to the garri by packaging and branding. This will attract more income and mostly likely command more price at the open market outlet than the other outlets. It could also be deduced that educated producers will avoid selling to the middlemen knowing fully that most of the profit will be accrued by them [15,12]. Experience was significant with positive relationship with open market outlet but it had inverse relationship with the middlemen option, and both were significant at 5% apiece. It shows that the more the experience of the producers, the more they likely avoid selling to the middlemen by 45.3% but sell in the open market

Table 3. Cost structure and returns analysis of garri production

Items	mean value Amount (₦)
Fixed Cost	
Fry Plate	641.04
Scoop	547.90
Skillet	10,088.96
Total Fixed Cost	**11,277.90**
Variable Cost	
Cost of Cassava tubers	21,087.66
Cost of Labour	5,728.34
Cost of Grating and pressing	2,859.56
Cost of Transportation	5,796.22
Cost of firewood	3,047.12
Bagging	2, 508.52
Total Variable cost	41,027.42
Total cost	52,305.32
Total Revenue from Garri	124,000.00
Gross margin	82,972.58
Net farm profit (π)	71,694.68
Return on investment (ROI)	**2.37**

Source: field survey, 2020

Table 4. MNL results for the determinants of market outlet preference

Explanatory variables	Open Market		Middlemen	
	Coefficient	P-value	Coefficient	P-value
Age	-0.217*	0.021	-1.450	0.212
Marital status	-0.340*	0.046	0.102*	0.031
Household size	0.851	0.401	-0.291	0.109
Education	0.210**	0.001	-0.781*	0.029
Experience	0.198*	0.022	-0.453*	0.041
Profit (N)	6.26E-05**	0.000	-4.11E-06**	0.000
Labour source (hired)	1.237	0.200	0.921	0.322
Distance (km)	-1.345	0.100	0.348*	0.011
Constant	1.060	0.224	3.345	0.331

*Note: **significant at 1%, *significant at 5%; No. of observation = 120; LR chi-square (16) = 101.87***; Log Likelihood = - 233.61; Pseudo- R^2 = 0.459*
[Base category = Producer gate]
Source: field survey, 2020

outlet by 19.8%. Profit accrued from the business had upward and inverse relationship with the open market and middlemen outlets, respectively. If the producers, based on their previous experience, know that they made less profit selling to the middlemen, they will do everything possible to avoid selling their product to middlemen outlet. Therefore, [23,15,22] reported that experience is a key factor in determining the profitability of cassava and its products. Moreso, distance to the nearest urban market was only significant under the middlemen outlet. It can be interpreted that a kilometer away from the point of processing will likely increase the probability of selling to the middlemen outlet. The probable reason might be because long distance always goes in line with high transport fare; this might allow the producers to sell to the middlemen outlet considering additional cost that would involve.

3.5 Constraints Faced in the Production of Garri

Table 5 showed that price fluctuation, poor road network, high transportation cost, lack of storage facilities, high cost of raw materials, theft, rodents/pest/disease infestations were the major constraints of garri processors in the study area. The percentages of each constraint to the whole were used to rank the response. The table revealed that price fluctuation is the major

Table 5. Distribution by constraints faced by garri processors

Constraints	Freq	%	Rank
Fluctuation of price	113	99.1	1st
Poor Road Network	93	81.5	2nd
High Transportation cost	84	76.3	3rd
Lack of storage facilities	84	73.7	4th
High cost of raw materials	81	71.7	5th
Rodents/pest/disease infestation	80	70.2	6th
Theft	76	66.7	7th

Source: Field Survey, 2020

constraint due to unsatiable market and channels involve in marketing, price fluctuates because of many factors such as fuel price, supplier cost and future expectation. The second on the list was bad road (81.6%) and high cost of transportation cost (76.3%) which was rank third. Hike in price of fuel coupled with the poor road networks contributed immensely to the high cost of transporting garri from the farm gate. Similar result was also reported by [12] on the study on transportation system and output market participation in Ondo State, Nigeria. Lack of storage facilities was noted as fourth serious problem in the area. High cost of raw materials, which was ranked fifth, was observed in the study area. Rodents/pest/disease infestations and pest were not seen as a major constraint in the area.

4. CONCLUSION

The study examined the profitability and market outlets of the garri producers in Ondo State, Nigeria. Budgetary technique and Multinomial logit (MNL) regression were employed in analyzing the data. It was concluded from the study that the garri producers are dominated by married female households and many of them were literate with at least primary school education. Despite the garri producers are getting older, the years of experience do not correspond with the age but the household size was moderately low compared with other studies in the area. The two types of garri (white and yellow) are popularly produced based on the demand, only that white type is a little bit produced than yellow type. Again, it was concluded that garri business is a profitable venture that could accrue at least twice of the investment. The three main market outlets are established from the study area, and the factors influencing the preference for each market outlet. Factors such as marital status, education, experience, income and distance to the nearest urban market should be given a priority in

determining the market performance and structure in garri sub-sector in the area. The policy implication is that garri production business is viable, therefore it is capable to reduce hunger and poverty if properly managed with functioning market structure and enabling environment. This makes the study submitted that processing cassava into garri is not only a source of livelihood to the individual processors but also a source of wealth to the nation if properly harnessed and funded. However, price fluctuation, poor road network and high cost of transportation were the severe constraints to garri production and marketing in the area. Based on these findings, it can be recommended that government should come up with policy reforms that will facilitate price stability garri and other agricultural products. This will further encourage stability of investment in the enterprise consequently expanding its potential for economic empowerment. Also, basic infrastructural facilities such as good rural roads network to curtail marketing cost and credit facilities to meet the financial needs of the producers should be provided to enhance production and marketing efficiency. Government and non-governmental organizations and agencies should assist in educating the garri producers through effective extension system on improved garri processing technology. Therefore, extension needs of garri processing should be given urgent attention.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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