Unveiling economic potential of rice processing among women in Patigi LGA, Kwara State: Challenges and opportunities

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ABSTRACT

Rice processing is a vital agricultural activity in Patigi Local Government Area (LGA) of Kwara state, with untapped economic potential. However, despite its significance, the sector faces several challenges that hinder its growth and profitability. This study examines the economic viability of rice processing among women, identifies challenges, and explores prospects for growth. A cross-sectional survey of 80 women rice processors was conducted using a multistage sampling technique. The analysis of costs and returns in paddy rice processing reveals a total variable cost of ₦225,237.17, total revenue of ₦343,938.46, and a profit of ₦104,433.06, with an average profit of ₦14,494.13 per bag of paddy processed per day. The study also reports a profit margin of 30.4%, indicating that for every ₦100 revenue recover from processing, the processors earn ₦30.40 as profit and a rate of return on investment (RORI) of 43.6%, suggesting that the processors earn a return of 43.6% on their investment. The study also reported a BCR of 1.43, indicating that for ₦1 invested in rice processing, ₦1.43 is returned as benefit. The study identifies opportunities for increased profitability and poverty reduction as well as challenges such as high paddy costs and limited access to finance. The study concludes that women's participation in rice processing has economic potential but requires strategic interventions to address challenges. The study recommends government support, women empowerment, and capacity buildings to unlock the sector's potential and enhance food security.

Keywords: Rice processing; women's empowerment; economic viability

INTRODUCTION

Rice farming is a pivotal agricultural activity in Nigeria, leveraging the country's fertile soil and favourable climate (FAO, 2016). As a vital source of livelihood for millions of farmers, Nigerian rice cultivation ensures food security and income generation. The crop's significance extends to internal and subregional trade in Nigeria and Africa, with substantial volumes traded locally (World Grain, 2016). Rice has become a vital food security crop in Nigeria, ranking as the third-most consumed staple food after maize and cassava (FAO, 2016). The population growth in Nigeria has been steadily increasing, with a 404.9% growth from 45.14 million in 1960 to 227.88 in 2023 (Worlddata.info 2025). The population has grown significantly, to approximately 236-237 million people and an average annual growth

rate of 2.37% as of 2025, thus making the Nigeria's demand for rice to continues to grow. However, rice consumption exceeds production in Nigeria with the current production standing at 7.0 million metric tonnes and consumption demand of 10.5 million metric tonnes creating a deficit gap of 2.5 million metric tonnes (CBN, 2024). To bridge this gap, Nigeria imports rice from countries like Thailand, India, and the USA, incurring a daily expense of approximately $5 million (KPMG, 2019); in 2023, the country imported rice worth $7.26M, making it become 158th largest importer of rice the world (OEC, 2023).

Rice processing is increasingly creating employment for new processors while the old processors have diversified into processing tree crops like cocoa and rubber in which their prices are unpredictable over years now. Income and employment generation in rice processing has been substantial (Msendoo, 2016).

Studies have examined the profitability and challenges of rice processing in Nigeria. Inuwa *et al*. (2011) assessed the profitability of rice processing and marketing in Kano State, revealing a Net Present Value of ₦10,555,709 at 22% and an Internal Rate of Return of 140%, indicating the viability of milling as a business. Subsequent research by Ibitoye *et al*. (2014) confirmed the profitability of rice processing in Nigeria but noted that net returns were significantly influenced by factors such as educational status, household size, distance to farm, and processor's sex. The study also identified inadequate capital, price fluctuations, and high transportation costs as major challenges. Amolegbe *et al*. (2016) identified parboiling and milling operations as crucial processing stages along the value chain, generating average revenue of ₦424,838 and incurring costs of ₦256,612, resulting in an average processing market margin of ₦168,225. They emphasized the importance of improved processing equipment and quality control. Chidiebere-Mark (2017) reported a gross margin of ₦55,800 per metric ton of basic milled rice, with processing costs of ₦2,600, including de-stoning and bagging. Uke *et al*. (2018) found that rice farmers earned significantly more from selling milled rice (₦525,000 /ha) than paddy (₦300,000/ha), highlighting the benefits of value addition. Olumayowa (2024) study revealed a breakdown of costs analysis in rice processing to comprise of total cost of paddy (46.7%), value addition operations (16.8%) and labour (15.1%). The gross margin was ₦315,261.26 with a profitability index of 0.56. Major constraints recorded were poor processing/ storage facilities (80.0%), high cost/ scarcity of paddy (75.0%) and output price fluctuation (68.3%). Most recently, Omoare and Oyediran (2020) analyzed value addition along the rice value chain in Ogun State, finding that value increased from ₦350/kg at production to ₦750/kg at marketing. They stressed the importance of value addition in lifting rural poor farmers out of poverty. Adebayo *et al*. (2022) conducted a study on the impact of credit on rice production, surveying 115 rice farmers. Notably, the study's results indicate that access to credit unexpectedly had a negative effect on rice output in the study area. These studies collectively underscore the potential of rice processing as a profitable enterprise in Nigeria, while highlighting challenges and areas for improvement.

Rice processing faces a lot of challenges in Nigeria, such as lower demands for the locally produced rice, higher production costs and lower yields outdated technology, and shortage of paddy supply hindering efficiency and quality. These challenges are similar to those faced in Thailand and India which includes low yields due to climate related issues, high production costs and competition in the global market, (Mishra *et al* 2015). In Patigi Local Government Area, the rice processing industry remains underdeveloped, resulting in unrealized economic opportunities. Despite abundant rice production, the rice processing industry in Patigi LGA faces significant challenges. Inadequate processing facilities and

infrastructure hinder value addition and commercialization. However, a critical knowledge gap exists in the lack of comprehensive data and analysis on cost structure and profitability of rice processing. This knowledge gap limits rice processors' ability to determine costs, set competitive prices, and make informed investment decisions, which ultimately constrained the industry's growth and development.

This study aims to uncover the key opportunities and challenges in rice processing in Patigi Local Government Area, identifying strategies to unlock its economic potential and promote sustainable development in the region. To achieve this, the study aims at determining the costs and returns, identifying the challenges and constraints, and the prospects in rice processing in the study area.

MATERIALS AND METHODS

Study Area

Patigi LGA lies between latitudes 8° 30'N and 8°57' and longitudes 5°30'E and 6°11'E. The area is located to the northeast of the state capital. The Local Government area has a land area of about 2924.62 sq.km, with a humid climate that is characterized by wet and dry seasons each lasting for almost six months. The total annual rainfall in the area is between 800 to 1200mm with a mean temperature of 30°C to 35°C. Patigi LGA is a riverine area, bounded by River Niger from the west end of the LG and surrounded by other secondary rivers (Kampe, Egwa and Duku) (KWADP, 2007). These rivers leave behind the fine silt of alluvial deposit which makes it possible for cultivation of rice in the study area. The main crop cultivated in the area are swampy and upland rice, sorghum, maize, millet, groundnut, and melon. (Kwara State Government, 2020). One of the major industries found in the study area is rice milling industries.

The major occupation of the people in the study area is farming and fishing, with few engaged in blacksmith and trading. While the major tribes found in the area are Nupes and other tribes found are settlers and indulge both in farming and trading. These tribes are Gwari, Hausa, Yoruba, and Tivs (Kwara State Government, 2020).

Sampling Technique and Data Collection

A multistage sampling technique was used in selection of the rice processors. In the first stage, four (4) wards were randomly selected from the 14 wards in the LG.A. In the second stage, two (2) villages each were purposively picked which are involved in high intensity rice production and have milling industries. While in the third stage, 10 women were randomly selected from each of the eight villages selected. This gives a sample size of 80 respondents for the study.

Primary data were used for the study. A cross-sectional survey was employed, and data were collected using a structured questionnaire. Data collected includes socioeconomic and demographic data such as age, education household size, farm income, input and output prices, problems faced by the processors.

Analytical Techniques.

To assess the profitability of rice processing, the net farm income was used. This is an absolute measure of profitability. It represents the returns to unpaid labour, management, and owner equity (Olson and Westra, 2022). This is presented as:

$$GM = GR - TVC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 1$$
$$NFI = GM - TFC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 2$$

The model used for estimating net farm income can be expressed by the equation:

$$NFI = \sum_{i=1}^{n} P_{yi}Y_i - \sum_{i=1}^{n} P_{xj}Y_{ij} - \sum_{k=1}^{k} F_k \dots\dots\dots\dots\dots\dots\dots\dots\dots 3$$

Where:
GM= Gross Margin
NFI= Net farm income
Y_i = Enterprise's Product(s) (where i = 1, 2, 3……………..... n products)
P_{yi} = Unit price of the product
xj= Quantity of the variable inputs (where j =, 1, 2, 3……… m variable inputs)
P_{xj} = Price per unit of variable inputs.
F_k = Cost of fixed inputs.
TVC = Total Variable Cost includes costs of paddy rice, firewood, labour, milling, water, and transportation.
GR = Total Revenue or Gross Receipts is the total output multiplied by the price per mudu of rice
TFC= The cost of the fixed assets used in parboiling and processing of paddy was depreciated. This asset includes basins, drums, pots, sacks, drying polythene etc. Straight line depreciation was used. This is given as
$$D = \frac{(CA-SV)}{L} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4$$
Where:
D= Annual depreciation expense (depreciated value of asset)
CA = Initial cost of asset
SV = Expected salvage or residual value at the end of its useful life
L = Expected total years of life.

Return on investment was further used to examine the costs and return of the processors.

RESULTS AND DISCUSSION

Cost and Returns in Rice Processing

The financial performance of rice processing activities in Table 1 reveals significant insights into the sector's profitability. The analysis of costs and returns in paddy rice processing reveals that the total variable cost (TVC) per week is ₦225,237.17, accounting for 94.04% of the total cost. Notably, the cost of paddy (₦183,526.00), milling/destoning (₦14,777.46) and transportation (₦14,140.00) constitute substantial components of the TVC, highlighting the need for efficient paddy sourcing and labour management, and also emphasizing the importance of investing in effective technology to ensure high-quality output. This collaborates the work of Olumayowa (2024). On the other hand, the total fixed cost (TFC) of ₦14,268.23 represents a relatively modest 5.96% of the total cost. The investment in improvised pots (₦8,019.15) is a notable fixed cost, suggesting that equipment upgrades can enhance processing efficiency.

The gross revenue (GR) from selling milled rice is ₦343,938.46, resulting in a profit of ₦104,433.06. This translates to an average profit of ₦14,494.13 per bag of paddy processed, with a profit margin of 30.4%, indicating that for every ₦100 spent on processing, the processors earn ₦30.40 as profit. While the rate of return on investment (RORI) is 43.6%, suggesting that the processors earn a return of 43.6% on their investment. The main costs are paddy, labour, and milling/destoning. These findings indicate that rice processing is a profitable venture, with opportunities for growth and expansion. This collaborates the work of Inuwa *et al.*, (2011), Nzeh and Ugwu, (2015), Uke *et al.* (2018) and Olumayowa (2024).

Overall, these results have some implications particularly in rice processing. Economically, the results imply that paddy rice processing is a profitable venture, with a significant profit margin and RORI. This could encourage more entrepreneurs to invest in the business, leading to increased production and employment opportunities. Socially, the findings suggest that the processors, mostly small-scale farmers, can improve their livelihoods through paddy rice processing. The profit earned can be used to enhance their living standards, educate their children, and improve their health. Additionally, the increased production and employment opportunities can contribute to poverty reduction and food security in the region.

Table 1: Costs and returns in paddy rice processing

Activities	Naira/bag	Percentage of Total Cost
Costs		
Total bag of paddy processed/week.	7	
Cost of bag of paddy	183,526.00	76.63
Cost of water	1844.54	0.77
Wood	3770.43	1.57
Cost of milling/destoning	14,777.46	6.17
Labour	7,178.74	3.00
Transportation	14,140=00	5.90
TVC	225,237.17	94.04
Fixed costs (depreciated)		
Improvised pots	8,019.15	3.35
Improvised drums	3,809.26	1.59
Clay pots/Plastic pots	1,129.17	0.47
Sack mats	1,306.36	0.55
TFC	14,268.23	5.96
TC=TVC+TFC	239,505.41	100.00
Revenue		
Price of milled rice /bag	343,938.46	
N1755/28mudus (bag of paddy processed) x7		
Average profit/bag	14,494.13	
Gross Margin	118,701.29	
NFI	104,433.06	
Profit margin (%) =NI/TR*100		30.4
Rate of return-on-investment RORI = NI/TC		43.6
Operating expense ratio =TVC/TR*100		65.5
Benefit cost ratio = TR/TC		1.43

Field survey (2023)

Challenges Faced by Women Processors in the Study Area

Paddy rice processing is a crucial agricultural activity in the region, providing livelihoods for many small-scale farmers and processors. However, the sector faces several challenges that hinder its growth and profitability. Figure 1 highlights the key problems confronting paddy rice processors in the region, based on a survey of 80 respondents.

High Cost of Paddy: The most significant challenge facing paddy rice processors is the high cost of paddy, cited by respondents (87.5%). This is a critical issue, as it directly affects the profitability of the processing business. This resonates Olumayowa (2024) findings.
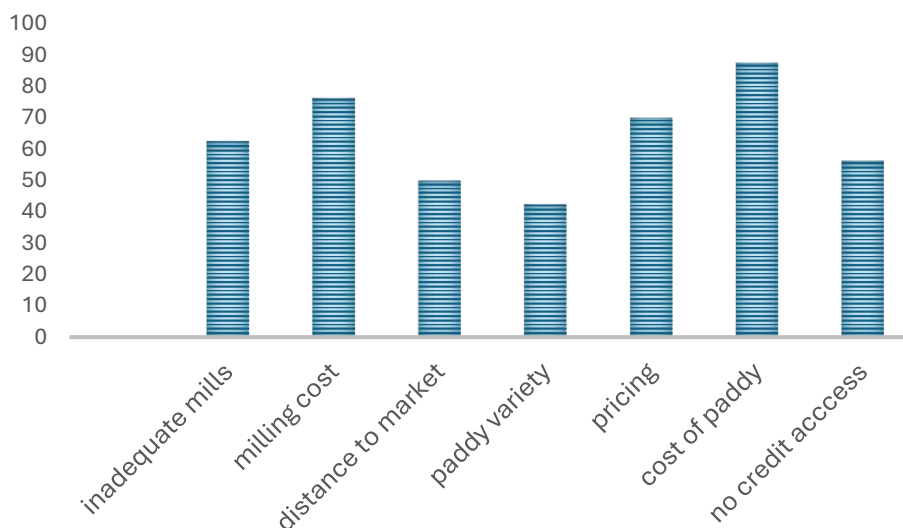

Figure 1: Challenges faced by rice processors.

Milling cost: 76.25% of respondents found milling cost to be the second most significant constraint, constituting 6.17% of the total production costs and also the second most important variable cost from the results of cost analysis. This suggests that the high cost of millings is a major burden on rice processors affecting their profit margin.

Low Prices of Product: The third most significant challenge is inefficiency in the market, resulting in low prices for the processed product. This issue was cited by 70% of respondents, indicating a need for improved market structures and pricing mechanisms. This resonates the findings of Nwackukwu *et al*, 2020 and Olumayowa (2024).

Inadequate Milling Machines: The fourth most significant challenge is the inadequacy of milling machines, cited by 62.5% of the respondents. This highlights the need for investment in modern and efficient processing equipment.

No credit access/inadequate capital: This ranked fifth in the study, with (56.25%) processors affected. This collaborates with the findings of Nwackukwu *et al*, 2020 who noted in their work that price fluctuations, inadequate capital, poor pricing among others as being factors that constrained rice processors in Enugu. Tondo (2017) also noted inadequate capital being a major constraint to rice processing.

Other Challenges: Other challenges facing paddy rice processors include different varieties of paddy requiring appropriate treatment and distances to the market. The challenges facing paddy rice processors in the region have significant implications for the sector's growth and profitability. Addressing these challenges is crucial to ensuring the sector's sustainability and competitiveness.

CONCLUSION

Rice processing is a profitable venture among women processors in Patigi LGA with a gross revenue (GR) of N343,938.46/week and also a profit of N104,433.06. This translates to an average profit of N14,494.13 per bag of paddy processed, daily. The profit margin of 30.4% was earned, indicating that for every ₦100 spent on processing, the processors earn ₦30.40 as profit. While the rate of return on investment (RORI) is 43.6%, suggesting that the processors earn a return of 43.6% on their investment. The major costs incurred in processing are, the costs of paddy, labour, and milling/destoning. Basically, the study also recorded some challenges faced by the processors, which includes high paddy costs, milling, low product prices, inadequate Mills, no credit access, farther distances to market and different varieties of paddy requiring different conditions of processing. Though in the face of these challenges the profit margin earned by these women has not been hampered. Thus, the study concludes that rice processing among these women is very profitable as they were able to cover up 65.5% of their operating expenses. Invariably this translates to better economic prospects and more food for them, which in turn could bring about poverty reduction, food security and job creation in the study area.

Based on the findings of the study, the following recommendations were made:

The government should support and empower the women engaged in rice processing through provisions of credit. These would empower them to increase volume of production; The women should form cooperative bodies to be able to have better market access/linkages; The government should invest in rural infrastructure (roads, storage). This could reduce high cost of transportation.

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