



## ANALYSIS OF RICE PROCESSING IN YOBE STATE, NIGERIA

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### ABSTRACT

The study analyzed rice processing in Yobe State, Nigeria. A multistage sampling technique was used in selecting 70 respondents from the study area. Data were collected through the administration of structured questionnaires and interviews. Various analytical tools were employed, including descriptive statistics, Net Farm Income and market efficiency indices. Findings revealed balanced gender distribution among the respondents, with 41% female participation. The results also revealed that 42.9% of the respondents were single with only few having formal education. Almost half (48%) of the respondents fall within the age group of 31-40. Economically, rice processing in the study area was profitable, on average, processors earn a net income of ₦9632 per 75kg bag with a return of 34% per naira and marketing efficiency of 116%. Processors struggle with multiple taxation (55.71%), unreliable electricity (50%), and inconsistent raw material supply (42.86%). The study concludes that rice processing in Yobe state is profitable and based on the constraints highlighted the study recommended that there should be deliberate efforts by government and private investors to provide modern processing equipment for the local rice industries to enhance the efficiency, equity, and sustainability of rice processing in Yobe State. These investments are expected to improve the quality of Nigerian local rice, ultimately boosting its competitiveness among the various rice options consumed by households in Nigeria.

**Keywords:** Analysis, Rice and Processing

### INTRODUCTION

Rice (*Oryza sativa* L.) stands as one of the primary staple crops on a global scale. It exhibits the fastest growth rate among food commodities in sub-Saharan Africa (SSA) (Yan, 2017). Despite accounting for merely 10% of the global population, this region consumes 30% of the world's rice production (Obagbemi *et al.*, 2022). The consumption of rice in sub-Saharan Africa has experienced notable growth over the past ten years, with an annual increase of 5.57%. This is in contrast to the worldwide growth rate of 1.22%, as reported by the USDA in 2019. This growth can be attributed to the rise in both individual consumption and population (Durand-Morat, 2021).

Consequently, efforts aimed at augmenting rice productivity would contribute to the elimination of hunger, mitigation of poverty, assurance of domestic food security, and stimulation of economic growth (Michailidis & Lazaridou, 2020). Rice has emerged as a significant and indispensable crop within Nigeria, cultivated and embraced throughout the nation. Its status has evolved from being an item for special occasions to becoming a staple in numerous households, to the extent that certain families depend on it for their daily dietary needs (Oyakhilomen *et al.* 2013). Domestically produced rice is typically consumed in rural areas where the quality of domestic rice is heterogeneous and is considered inferior to imported rice. Domestic rice production is influenced by a myriad of factors that extend beyond the immediate realm of consumer rice preferences (Cui, 2023) While consumer preferences do play a role in shaping the overall demand for specific types of rice, the process of rice production is subject to a complex interplay of agronomic, economic, environmental, and cultural factors. As such, domestic rice production is not linked directly to consumer rice preferences (Takeshima & Bakare, 2016).



Paddy rice is typically harvested when the grains have a moisture content of approximately 25%. Harvesting is followed by threshing, either immediately or within a day or two. Subsequently, paddy needs to be dried to bring down the moisture content to no more than 20% before threshing and milling (Riaz *et al*, 2017). In some cases, the paddy rice is parboiled before milling. Parboiling is the hydrothermal treatment of paddy before milling. It involves soaking the paddy in water for about 30 minutes, heat-treating the wet paddy by steam, and drying the paddy to a safe moisture content (Ageze Mihretu, 2022). In some places, the parboiling process is carried out manually using drums. Parboiled rice is dried on mats by roadsides. Milling involves the removal of the 2 outer layers of rice covered by the husk (outer layer) and bran. When the husk is removed, it results in brown rice. Subsequently, if the bran is removed, it produces white rice (Gyimah-Brempong, Johnson, & Takeshima 2013). The milled rice can further be processed by picking out the stones manually or using de-stoners (a machine that separates the rice grain from the stones). Other further processing activities include polishing, sorting, grading, packaging, and branding. All these activities add value to the final product.

The broad objective of this study is to analyze the profitability of rice processing in Yobe State. The specific objectives are to:

- i. Describe the socio-economic characteristics of rice processors in the study area.
- ii. determine the costs and returns accruable to rice processing in the study area; and
- iii. Identify the constraints faced by rice processors in Yobe State.

## METHODOLOGY

### The Study Area

The research was conducted in Yobe State. Yobe State is situated in the North-East geopolitical zone of Nigeria, it was carved out of Borno State and it covers a total land area of approximately 45,502 square kilometers and comprises of 17 local government areas. The state is located within latitude 10° 27' North to 13°23' North and longitudes 9°40' to 12°30' East of the equator, it lies in the semi-arid region of Nigeria, characterized by sparse vegetation, high temperatures, and low annual rainfall. It borders four states: Bauchi, Borno, Gombe, and Jigawa. Yobe State shares borders with Borno State to the east, Gombe State to the south, Bauchi and Jigawa States to the west and Niger Republic to the north. (YBSG, 2022). Because the state lies mainly in the dry savanna belt, conditions are hot and dry for most of the year, except in the southern part of the state which has more annual rainfall. The climate condition of Yobe is warm with daily temperature of 37 °C (98.6 °F). Yobe's economy is predominantly agrarian, with rice production playing a key role. As of the 2006 census, its population was approximately 2.32 million which was projected to 4,309,375 in 2024 at 3.5% population growth rate (YBSG, 2022). The State's agricultural produce include rice, gum arabic, ground nuts, cowpea, millet and sorghum. The population for this study includes registered rice processors (Parboilers and Millers) selected from three (3) LGAs (Bade, Fika and Potiskum) of Yobe State.

### Sampling Procedure and Sample Size

A multistage sampling technique was used to select respondents for this research work. The first stage was the purposive selection of three LGAs (Bade, Fika and Potiskum) base on the high concentration of rice processors in these LGAs. The second stage was the purposive selection of three major rice processing wards from each LGA selected. In the third stage, for Potiskum LGA, list of registered rice processors was obtained from their registered organ (Potiskum Rice Processors Association), while for Bade and Fika LGAs, a reconnaissance survey was conducted by the researcher to identify all processors in the selected wards. In the fourth stage, 83% of the total processors identified in each LGA which corresponds with the total sample size were randomly selected by balloting.



**Table 1: Sample Frame and Sample Size**

LGAs	Selected Wards	Sample frame	Processors Sampled
BADE	• Gwio Kura	6	5
	• Lawan Musa	4	3
	• Zango	8	7
	<b>Total</b>	<b>18</b>	<b>15</b>
FIKA	• Ngalda Dumbulwa	3	3
	• Mubi Fusami	2	2
	• Gadaka Shambire	1	1
	<b>Total</b>	<b>06</b>	<b>06</b>
POTISKUM	• Bolewa A ward	14	11
	• Bolewa B ward	26	22
	• Yerimaram Ward	20	16
	• Total	<b>60</b>	<b>49</b>
<b>Grand Total</b>		<b>84</b>	<b>70</b>

**Source:** Field Survey 2025

### Data Collection and Analysis

Data for the study were collected through the administration of structured questionnaire to the respondents. The data collected were analyzed using both descriptive statistics and Net Farm Income. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were utilized to achieve objectives 1 and 3. Net Farm Income Analysis, efficiency ratio and market efficiency were used to obtain objective 2,

### Model Specification

**Descriptive Statistics:** These are concerned with scientific methods for summarizing, presenting and analyzing data, drawing valid conclusions, and making reasonable decisions based on such analysis. This is done with the aid of mean, percentage and frequency distribution.

Mean; this is the sum of values in the data group divided by the number of values. It is the most useful and fundamental measure of location 
$$X = \frac{\sum fx}{f} \dots\dots\dots(1)$$

Percentage; this is the proportion obtained by dividing the number of observations in each class by the total number of observations multiplied by a hundred

Percentage = (actual change)/(original amount) x 100.....(2)

Frequency Distribution; this is an organized display of a data set which falls into each mutually exclusive class. Therefore, for easy comprehension of findings of this research and its contribution to knowledge, field data was grouped into frequency distribution tables, bar charts, pie charts and percentage tables.

### Net Farm Income

The Net Farm Income analysis was used to determine the costs and returns of rice processors in the study area. Mathematically expressed as:

$$NFI = TR - TC \text{ (TVC + TFC)} \dots\dots\dots(3)$$

Where;

TR = Total revenue (Output Unit Price x Quantity of Output)

TC = Total Cost = Total Variable Cost + Total Fixed Cost

### Shepherd Method Analysis

Shepherd method analysis was used to obtain marketing efficiency objective (3). Shepherd has suggested that the ratio of the total value of goods marketed to the marketing cost may be used as a measure of efficiency. The higher the ratio, the higher the efficiency. This method eliminates the problem of measurement of value added (Shepherd, 1965).

The marketing efficiency model is stated from shepherd's formula, which states that market efficiency of 100% is perfect efficiency. While above 100% is excess profit. The shepherd formula is given as 
$$E = V/C \times 100 \dots\dots\dots(4)$$



where;

E = Market efficiency

V = Value of marketed rice (product) (₦)

C = Total marketing cost (₦) (sum of cost of transport, storage, labour, other costs per 100 kg bag of rice)

**Table 2.** Marketing Efficiency Analysis Using Shepherd's Method

Particulars	Processors
Consumer Price (V) per 75kg Paddy Rice	Price in Naira
Total Marketing Cost (C) of 75kg Rice	Price in Naira
Shepherd's Marketing Efficiency: $ME=(V/C) \times 100$	

Source: Field Survey 2025

### Return on Investment

The return on investment analysis is used to determine the profit made on any Naira invested in a business, it helps to evaluate the performance of an investment and compare different investment opportunities. It is calculated as:

$$ROI = \frac{\text{Income on investment} - \text{Cost of investment}}{\text{Cost of Investment}} \times 100$$

## RESULTS AND DISCUSSION

### Socio-Economic Characteristics of Rice Processors

Table 2 below presents the socio-economic characteristics of the respondents which include variables like gender, marital status, educational status, age, house hold size and experience levels. These factors can significantly influence their agricultural practices, decision-making, and economic viability. The result shows a fair distribution of gender with 58.6% being male and 41.4% female. Most of the respondents (43%) were single (not married) and many (44.3%) having only quranic education. The highest age distribution among rice processors fall within the 31-40 years age range with a mean age of 44years which suggests a relatively mature workforce in the agricultural sector. The mean household size is 10 which reflects a relatively larger family unit, which may be indicative of a community-based agricultural practice. A significant proportion of the respondents (44.29%) have 21-30 years of experience with a mean years of 22years, this indicates that most of the respondents have a wealth of experience that can be leveraged for efficient product development and market strategies. It can be expected that experience relates to productivity and innovation, meaning that processors with considerable experience will implement more modern methods, which can benefit the entire supply chain (Nayal *et al.*, 2023).



**Table 3:** Distribution of Respondents Based on Socio-Economic Characteristics o

Variables	Freq.	Percentage (%)
<b>Gender</b>		
Male	41	58.6
Female	29	41.4
<b>Marital</b>		
Single	30	42.9
Married	20	28.6
Divorced	10	14.3
Widow	6	8.6
Separated	4	5.7
<b>Educational Level</b>		
Primary	15	21.4
Secondary	14	20.0
Tertiary	7	10.0
Arabic	31	44.3
Non formal	3	4.3
<b>Age</b>		
20-30	1	1.43
31-40	34	48.57
41-50	24	34.29
51-60	11	15.71
61-70	-	-
<b>Total</b>	<b>70</b>	<b>100</b>
Mean	43.88	
<b>HH/Size</b>		
1-6	27	38.57
7-12	21	30.00
13-18	15	21.43
19-24	7	10.00
25-30	-	-
<b>Total</b>	<b>70</b>	<b>100</b>
Mean	10.21	
<b>Experience</b>		
1-10	17	24.29
11-20	15	21.43
21-30	31	44.29
31-40	7	10.00
<b>Total</b>	<b>70</b>	<b>100</b>
Mean	21.75	

**Source:** Field Survey 2025

### **The Cost and Returns Analysis for Rice Processing in the Study Area.**

The result presented in Table 3 below provides a comprehensive overview of the costs and returns associated with rice processing. This analysis is crucial for understanding the economic viability of rice processing as an enterprise. The cost of paddy rice (75kg/bag) constitutes the largest portion at ₦44,685.71, accounting for 78.05% of total costs. This indicates that the price of raw materials significantly impacts the profitability of rice processing. Other variable costs include transportation (₦2,410 or 4.21%), fuel wood (₦1000 or 0.17%), and cost of electricity (₦315 or 0.55%). These costs are essential for the operational aspects of rice processing, highlighting the importance of efficient logistics and resource management. Total fixed costs amount to ₦7900



representing only 13.8% of total costs, which indicates that rice processing relies more on variable inputs than fixed assets. The depreciation of equipment such as drums, tarpaulins and milling machine is minimal compared to operational costs.

The total cost of production is ₦57,248 which encompasses both variable (N49,348) and fixed inputs (N7900). And the average price per kilogram is reported at ₦1,520, with an average yield from processing 75kg of paddy resulting in about 44 kg of milled rice contributing to a total gross margin of ₦66,880. The average total processed milled rice obtained from paddy is approximately 32.20 bags per day. The net farm income/margin/bag stands at ₦9,632 indicating that after covering all costs, this amount remains as profit for the processor. The return per naira invested is calculated at ₦0.34, suggesting that for every naira invested in processing, there is a return of ₦0.34 (34k). The market efficiency of 116% indicates excess profit. The high percentage of costs attributed to paddy rice indicates that fluctuations in paddy prices can substantially affect profitability; thus, processors must seek stable supply chains or negotiate better prices with suppliers.

**Table 3:** Cost and Returns Analysis for Rice Processing

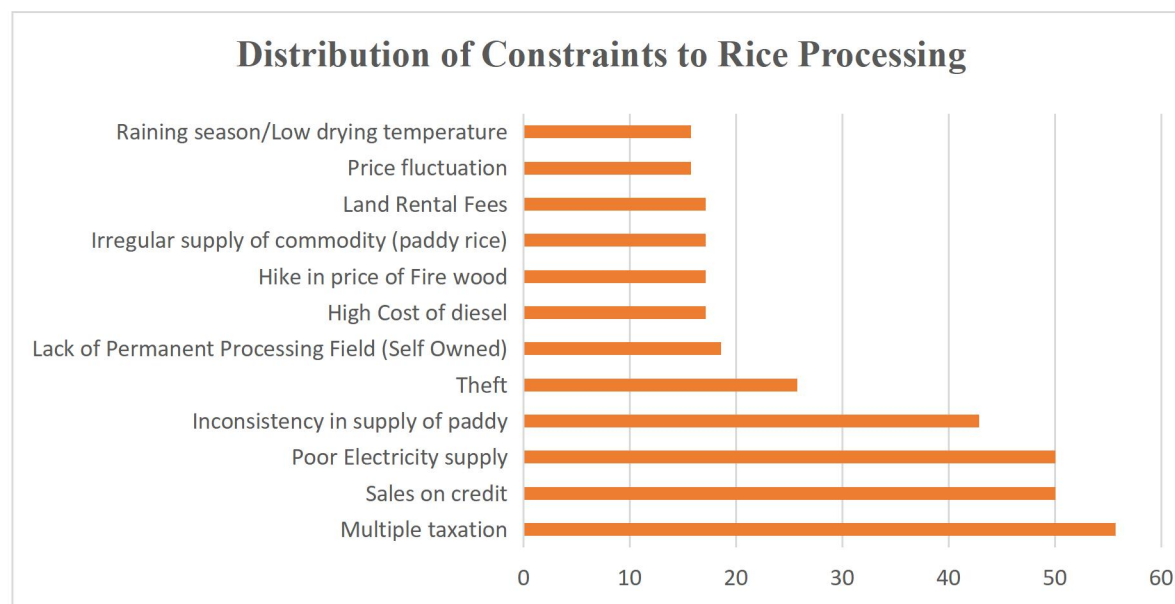
Variables	Qty	Unit Cost (₦)	Cost (₦)	Percent
Cost of paddy rice 75kg/bag	1bag	44685.71	44686	78.05
Transportation	1bag	2410	2410	4.21
On/off load	1bag	300	300	0.52
Labour	2	500	1000	0.17
Water	4 Jerry cans	100	400	0.69
Fuel wood	1 bundle	1000	1000	0.17
Commission	1	200	200	0.34
Cost of Electricity for Milling/bag	6 units	52.51	315	0.55
Casual Mill Workers/Cleaners	2	100	200	0.34
Revenue/Tax			150	0.26
<b>Total variable cost</b>			<b>49,348</b>	
<b>Fixed inputs depreciation</b>				
Plastic bucket	1	500	500	0.87
Tarpaulin (MAT)	1	700	700	1.22
Rake	1	200	200	0.34
Wheel barrow	1	500	500	0.87
Vapor (container)	1	3000	3000	5.24
Milling Machine	1	3000	3000	5.24
<b>Total fixed cost</b>			<b>7900</b>	<b>13.8</b>
<b>Total cost of production</b>			<b>57,248</b>	<b>100</b>
<b>Returns</b>	-	-	-	-
Average price		1520	1520/kg	
Average processed milled rice obtained from 75kg/bag of paddy			44kg	
Gross margin/bag			<b>66,880</b>	
Net Farm Income/bag			9,632	
Return per naira invested			34%	
Market Efficiency			116%	

**Source:** Field Survey, 2025

### Constraints of Rice Processing in the Study Area

The study identified several key challenges that processors face, thus potentially hindering rice sector productivity and quality. The result presented different limitation, how often they happen and their ranking by frequency. It was revealed from the result that most prominent constraint face by rice processors (55.71%) was multiple taxation. This problem creates a great economic burden on

processors, which decreases its profitability and makes it less attractive to invest in processing plants. This is in line with the findings of Naylor, (2011) who also indicates that heavy taxation may hamper growth of agricultural sector through increase on operating costs. The growing and potential for further growth of the sector makes it crucial for policymakers to address multiple taxations and harmonize tax regimes for small-scale processors to stimulate investment and growth in the sector.



**Source:** Field Survey 2024

**Figure 1:** Constraints to Rice Processors

## CONCLUSION AND RECOMMENDATION

The study concludes that rice processing is profitable in the study area with the market efficiency of 116% which indicates excess profit. Also high percentage of costs attributed to paddy rice indicates that fluctuations in paddy prices can substantially affect profitability; thus, processors must seek stable supply chains or negotiate better prices with suppliers.

Government should introduce focused educational programs aimed at enhancing rice processors' understanding of modern processing techniques, financial literacy, and business management. Such initiatives would help processors achieve more profits and increase their overall income.

There should be deliberate efforts by government and private investors to provide modern processing equipment for the local rice industries. These investments are expected to improve the quality of Nigerian local rice, ultimately boosting its competitiveness among the various rice options consumed by households in Nigeria.

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