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Efficiency of Rice Processing Among Women Processors in Southern Taraba, Taraba State, Nigeria

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Abstract

Rice processing plays an important role in rural livelihoods and local food systems in Nigeria; however, evidence on the economic efficiency of women processors remains essential for informing productivity-enhancing interventions. This study analyzed the efficiency of rice processing among women processors in Southern Taraba, Taraba State, Nigeria. A multi-stage sampling technique was used to select 70 respondents from Wukari and Donga Local Government Areas. Primary data were collected through structured questionnaires and analyzed using descriptive statistics, gross margin analysis, and net income estimation. The results showed that 89% of the processors were aged 50 years or below, with a mean age of 38.6 years, indicating a relatively young and active workforce. Most respondents had formal education (90%), 63% were married, and the average household size was five persons. Profitability analysis demonstrated that rice processing was a viable enterprise, with a total revenue of ₦711,064.40 and a total cost of ₦471,638.87 per processing day, resulting in a gross margin of ₦240,751.33 and a net income of ₦239,425.53. The return per naira invested was 0.51, implying that processors realized a gain of 51 kobo for every naira invested. Paddy rice constituted the largest cost component, accounting for 90.37% of variable costs. The study

concludes that rice processing among women in the study area is profitable, although its efficiency is constrained by inadequate capital, limited access to modern equipment, and insufficient technical training. These findings highlight the need for improved access to modern milling technology, credit facilities, and regular capacity-building programs to enhance processing efficiency and support broader food security goals in Nigeria.

Keywords: Rice Processing; Women Processors; Processing Efficiency; Profitability Analysis; Food Security

INTRODUCTION

Rice is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population, especially in Asia (Ango *et al.,* 2020). Rice production and consumption are among the highest in Asian populations. Rice provides up to 50% of the dietary caloric supply and a substantial part of the protein intake for about 520 million people living in poverty in Asia. In sub-Saharan Africa, rice consumption among urban dwellers has steadily grown, with a per capita consumption that has doubled since 1970 (Sumithra *et al.*, 2014). Statistics from the United State Department of Agriculture, (USDA) indicates that Nigeria is by far the largest rice importer in West Africa, with an average yearly import of 2.2 million tons of milled Rice while annual consumption per capita stands at 32kg, and this has continued to rise, induced by income growth (Ugwu, 2022).

Rice supplies 7% of total per capital calorie consumption in Nigeria (IRRI,2015), and occupies about 1.88 million hectares of arable land, making it rank second most important cereal in the world after wheat in terms of processing (CBN,2014). The domestic's consumption of rice rose from 5kg /person/week in 2012 to about 10kg/person/week in 2013. Currently, annual per capital consumption of milled rice is 25kg/person/month. The relative ease of its preservation and cooking has influenced the processing trend in its consumption (Tondo, 2017). Rice which is a staple food with highest demand in Nigeria (Gyimah-Brempong et al., 2016). Still suffers a wide gap between domestic production of rice and demand leading to massive importation of milled rice (Johnson et al., 2013). The quantity of local rice produced in Nigeria was very low at 4.8 million tons while the local capacity for rice processing is 2.8 million tons of paddy (FAO, 2016).

Nigerians prefer the locally processed rice because of its taste, affordability as well as highly nutritious. Apart from the qualitative deficiencies of pebbles, chaff and broken grains which had been attributed to the low technology input in the processing methods, the product is in short supply. In reality, the demand for local rice is higher in urban areas than rural areas due to higher population and its acceptability as a delicacy in social functions and fast food shop. Post-harvest losses are common phenomena in all grain production and it is estimated to occur between 30 – 40% of total productions of all crops in developing countries. These losses occur right from the field during harvesting and throughout the processing operations. The noticeable problem now is that of processing activities; parboiling, drying and milling, which are of small scale where special skills and technologies are lacking. (Okunola *et al.*, 2019).

Gindi (2019) discovered that most Nigerians prefer to consume imported rice brands as compared to local rice varieties. The reason could be that; most Nigerian rice processors lack adequate technology of rice processing machines that process the rice to meet international standard. Nigeria has the potential to be self-sufficient in rice production, both for food and industrial raw material needs and for export purpose. However, a number of constraints have been identified as limiting factors to rice processing. Most of the local rice produced is processed locally using different traditional methods. Many local rice processors in the study area used various traditional methods in processing their local rice and sold it locally at low price as compared to the imported one. The main problem of Nigerian rice (especially those processed through traditional method) is the presence of stones and other strange particles in the rice grains. The major sources of the stones were traditional process such as harvesting, sun-drying, and so on. It starts with the parking of paddy rice from the ground after harvesting; then through sun-drying of the paddy after parboiling where the paddy is spread over a mat (or detached sack) on the ground; and parking of the paddy after it has been sun-dried, where some of the paddy that falls off are inadvertently parked together with the pebbles (stones).

The study of this nature also has its academic importance. It is hoped that it will generate academic interest in evolving new methods and strategies needed in enhancing the production and processing of local rice for higher productivity and efficient performance which in the long run will result to economic growth and development. Hence, it will evaluate the Federal Government incentives and schemes targeted at promoting local rice production and processing in Nigeria. The findings from this research will therefore assist policy makers

in strategizing proper diversification that will efficiently increase the country's production level and income. The main objective of the study is to analyse the efficiency of rice processing among women processors in Southern Taraba, Taraba State, Nigeria**.** The specific objectives were to: describe the socioeconomic characteristics of the women rice processors in the study area; and estimate the profitability of rice processing in the study area.

METHODOLOGY

Area of Study

The study was conducted in Taraba State, Nigeria. The State lies between latitudes 6030'00" and 10036'00"North of the equator and longitudes 9010'00" and 11050'00"East of the Greenwich Meridian (Taraba State Diary, 2024). It has a land area of about fifty-nine thousand and four hundred square kilometers (59,400km2) with a population of about two million three hundred thousand (2,300,000) people (NPC, 2006). The National Population Commission had projected an annual growth rate of 3.5% which brought the estimated population figure to four million and twenty-five thousand people (4,306,750) as of 2024. Taraba State is bordered in the west by Nasarawa and Benue States (for 109 km), northwest by Plateau state for 202 km, north by the Bauchi State for 54 km and Gombe state for 58 km, northeast by Adamawa State for about 366 km and south by Northwest Region in Cameroon for about 525 km.

Sources and Methods of Data Collection

Data were collected mainly from primary source with the use of structured questionnaire. Snowball sampling technique was used in contacting respondents to identify subsequent respondents, 70 respondents were contacted for this study. The data were collected from two (2) of the five (5) local government areas of Southern Taraba, Taraba State, encompasses Ibi, Wukari, Donga, Takum and Ussa Local Government Areas.

Wukari and Gindin Dorowa communities were selected within Wukari local government while Donga and Mararaba communities were picked for Donga local government area. Information were sought on sources, quantities and prices of paddy rice, and also socioeconomic characteristics of the processors, profitability and major constraints.

Sampling Techniques

Multi-stage sampling procedure was employed in the selection of the respondents. In the first stage two local government areas were identified and purposively selected from Southern Taraba, based on their prominence in rice production and processing, accessibility as well as location of rice mills and markets. Wukari and Donga local governments were selected. In the second stage, Wukari and Gindin Dorowa communities are selected for Wukari local government, while Donga and Mararaba communities are selected for Donga local government. In the last stage, forty (40) rice processors were contacted from Wukari and Gindin Dorowa communities, thirty (30) from Donga and Mararaba communities, making a total of (70) respondents for this stud via snowball method.

Analytical Techniques

Descriptive statistics and inferential statistics were used to analyse the data. Descriptive statistics such as mean, frequency and percentage, standard deviation were used to describe the socioeconomic characteristics of the rice processors, while gross margin and net farm income was used to determine the profitability of rice processing.

Model Specification

Profitability model

Gross margin and net farm income was used to determine the profitability of local rice processing (objective iii) of the study. Gross margin is the difference between the Total Revenue, (TR) and the Total Variable Cost (TVC).

Mathematically expressed as;

GM = T R – TVC…….. (1)

Where GM = Gross Margin,
TR = Total Revenue,
TVC = Total Variable Cost.

Net income is the difference between the Total Revenue (TR) and the Total Cost (TC)

Mathematically expressed as;

$$NI = TR - TC \quad \ldots\ldots (2)$$

NI = Net Income

TR = Total Revenue

TC = Total Cost

RESULTS AND DISCUSSION

Socioeconomic characteristics

This concentrated on the socio-economic characteristics of respondents; age, education level, household size, marital status, household head status.

Age of the respondents

Age describe the period of time a person or thing has been alive or has existed. Table 1 showed that most (89%) of the respondents were 50 years or less, while only 11% of them were more than 50 years of age and the mean age was 38.6. This implied that, the younger people have more energy and skills to deliver in rice processing than their older counterparts that are weak to deliver in such activities for better outputs.

Education level respondents

Literacy level depicts the education background of the respondent as whether they had formal education or not. Table 1 showed that most (90%) of the respondents had one form of education or the other, while only 10% of them had no formal education. This suggested that the people involved in rice processing were literate and knowledgeable, which placed them better in adopting and utilising new innovations in rice processing activities for optimum output.

Marital status of the respondents

From table 4, it shows that 63% of them were married, while 11% were single, 17% and 9% of the rice processors were widowed and divorced respectively. This depicts that most of the respondents were married with responsibilities of family burden, which makes them engage in such an activities to earn and settle basic needs of their dependents.

Household size of the respondents

Household size consists of person himself, his wives, children and any other person(s) who live with him/her and drive benefit from the family (NPC 2006). Table 1 showed that most (87%) of the respondents had 10 and less members in their households, while only 13% of the respondents' had more than 10 members in their household, also, the mean household size was 5.4. This means that the respondents had a fewer dependants and they can work and earn to provide better for their dependants, however, such a small size households could not have family labour as compared to the larger households. The study of Negash (2007) indicated that large household size had positive influence on labour source. More so, this

could have both positive and negative effect on households' welfare. The positive effect could arise if the large household size was used as a source of faring labour, thereby reducing the cost of labour and also cutting down production expenditure. In the same vain, a large household size could also worsen the poverty situation farming household particularly if it was composed of a large number of dependents, which means the family had more mouth to feed (Bola, Aliou and Omonona, 2012)

Head of household of the respondents

Table 1 showed that 28% of the respondents were identified as head of households while 42% were not head of their households. This opined that most of the respondents were not saddled with responsibility of family dependents for daily need, however engaging in rice processing activities by women will provide resources for them to support their husbands with basic needs of their family.

Table 1: Distribution of Respondents by Socioeconomic characteristics (n=70)

Age(years)	Frequency	Percentage (%)
≤30	9	12.86
31-40	29	41.43
41-50	24	34.28
>50	8	11.43
Total	70	100
Mean	38.6	
Education	Frequency	Percentage (%)
No formal education	7	10
Primary	22	31.43
Secondary	27	38.57
Tertiary	14	20
Total	70	100
Marital Status	Frequency	Percentage (%)
Single	8	11.43
Married	44	62.86
Widowed	12	17.14
Divorced	6	8.57
Total	70	100
Household Size	Frequency	Percentage (%)
1-5	38	54.29

Age(years)	Frequency	Percentage (%)
6-10	23	32.86
≥11	9	12.85
Total	70	100
Mean	5.4	
Head of Household	Frequency	Percentage
Yes	28	40
No	42	60
Total	70	100

Source: Field Survey 2025

Cost of Inputs Incurred during Rice Processing

The variable cost was incurred the larger portion of the cost with about ₦461,313.07 with the following breakdown; the cost of purchase of paddy accounts for most of the variable cost ₦416,900.10 which represents about 90% of the total variable cost and it accounts for the highest percentage of variable cost incurred while processing. This implies that paddy is the most important input required for carrying out rice processing activity in the study area.

The cost of labour during the processing period accounts for ₦16,749.89 which represents about 4% of the total variable cost. This implies that since majority of the rice processors operate on a small scale level; their performance requires more man labour than machineries. The other variable costs were on empty sacks, water, transport and kerosene.

The fixed cost was only about ₦10,325.80 of the total costs as depreciated on durable working equipment. Drying mats were having larger proportion 38% followed by drums that were used for storing water and steaming the paddy (29%), next were baskets, basins, buckets and rakes 13%, 9%, 7% and 5% respectively. Meanwhile the average total cost on rice processing per day was ₦471,638.87.

The revenue from paddy rice processing was dominated by proceeds from polished rice ₦707,267.14 (99%), while only ₦3,797.26 (less than 1%) was from the husks as by-products. These brought the total revenue to ₦711,064.40. The profitability analysis showed that the gross margin was ₦240,751.33 and the net income was ₦239,425.53. Meanwhile, for every naira invested 0.51 naira (51 kobo) is gained indicating profitability and viability of rice processing among women in the study area.

The cost and return ratio was estimated to be ₦0.22, which implies that for every ₦1 expended, the processor is expected to earn ₦0.22 returns. This indicates that rice processing is a profitable enterprise in the study area. This result conforms with the findings obtained by Bose et al (2020)., in a study carried out to consider the cost and returns of small scale paddy rice processing and marketing in Dass local government area, Bauchi state which posited that for every naira invested, the processor realized a return of N0.27. A similar result was obtained by Ango et al., (2018), which revealed that the processors realized ₦0.27 for every naira invested.

Table 2: Average Profitability of Rice Processing per day

Item	Unit	Quantity	Cost (₦)	Percentage (%)
Variable				
Firewood	Logs	11.7	10,647.42	2.32
Water	Drums	4.3	3,655.94	0.79
Kerosene	Litres	2.6	2,860.03	0.62
Paddy Rice	100kg Bags	16.4	416,900.10	90.37
Labour	Man-day	3.2	16,749.89	3.63
Empty Sacks	Number	13.1	7,348.91	1.59
Transport	Millage	42.51	3,150.78	0.68
Total Variable (A)			461,313.07	100
Fixed Cost				
Drum	Number	6.8	2,967.67	28.74
Basins	Number	9.2	1,324.29	12.83
Baskets	Number	4.1	976.32	9.46
Buckets	Number	3.6	678.56	6.57
Dryer	Number	6.4	3,876.87	37.54
Rake	Number	3.7	502.09	4.86
Total Fixed (B)			10,325.80	100
Total Cost (A+B)			471,638.87	
Revenue				
Polished rice	50Kg bags	13.3	707,267.14	99.46
Husks	100Kg Bag	4.2	3,797.26	0.54
Total Revenue			711,064.40	100
Profitability Analysis				
Gross Margin			240,751.33	
Net Income			239,425.53	
Return Per Naira invested			0.51 (51k)	

Source: Field Survey, 2025

CONCLUSION

The study concludes that rice processing among women in Southern Taraba is a profitable and viable enterprise dominated by relatively young, educated, and married women with considerable processing experience. The predominance of traditional processing methods among the majority of respondents, coupled with limited access to modern technology and formal training, underscores the untapped potential for productivity gains in the sector. The profitability analysis confirms that rice processing yields positive returns, with processors earning approximately 0.51 naira for every naira invested, indicating economic viability despite operational challenges. However, the significant influence of paddy quantity, labour, and power costs on processing efficiency reveals critical leverage points for intervention. The major constraints identified inadequate capital, poor access to modern equipment, high input costs, and limited technical training represent systemic barriers that perpetuate inefficiency and suboptimal output. Addressing these challenges through targeted policy interventions, including improved access to modern milling technology, credit facilities, cooperative formation, and regular training programs, would substantially enhance processing efficiency, increase productivity, and contribute meaningfully to Nigeria's quest for food security and self-sufficiency in rice production. The findings demonstrate that empowering women rice processors through appropriate technological and institutional support could unlock significant economic opportunities while strengthening local rice value chains in the study area and beyond.

Recommendations

In order to improve the production efficiency of rice processing, to tackle food security and attain self-sufficiency in rice processing in Southern Taraba and Nigeria at large; the following recommendations were made:

i. The modern milling machines and technology should be made available to the processors, to increase their quality, productivity and the efficiency. This will be done by both government, individuals and non-governmental organisation.

ii. Funds and inputs as loans to small and medium scale should also target local rice processors so as to boost their businesses and increase output.

iii. Processors should be encouraged to form cooperative societies through which they can access funding, services and self-help.

Processors should be regularly trained on modern and new technology, processes and opportunities as regards their business of rice milling and related value-chain.

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