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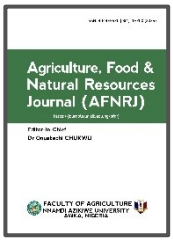

Original Article

Determinants of profitability in rice processing among women in Patigi, Kwara State, Nigeria

OPEN ACCESS

Hussaina Ummikhanni MAHMUD*[1], Zainab Tope SAKA[1], Oluwakemi Korede ODEDIRE[2] & Mariam Ajoke IBRAHIM[1]

[1]*Department Agricultural Economics and Extension Services, Kwara State University, Malete. Kwara State, Nigeria*
[2]*Department of Agricultural Management and Vocational Studies, Federal College of Agriculture, Ibadan, Oyo State, Nigeria*

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ABSTRACT

Rice processing is a vital economic activity for women in Patigi, Kwara State, Nigeria, providing employment and income opportunities. Rice processing activities, excluding milling, are traditionally performed by women in the study area. However, these women rice processors face various challenges that affect their profitability. This study examines the determinants of profitability among women rice processors in the study area. Multistage sampling was used in selecting 80 women rice processors for the survey. The analytical tools employed include descriptive statistics and regression analysis. The results from descriptive statistics revealed that most (75.6%) of the respondents were married, with a mean age of 36 years and 7years of processing experience. The results from regression analysis indicated that market access (0.031, p=0.002), cost of paddy per bag (-2.219E-5, p<0.001), and fixed costs (-1.746E-6, p=0.040) were statistically significant determinants of profitability, with an R-squared value of 0.729 and an F-ratio of 18.061 (p < 0.001). Specifically, the results indicate that a unit increase in market access is associated with a 3.2% increase in profitability, and equally a decrease of a unit of paddy cost could increase profitability by 11.87%. The findings suggest that improving market access, reducing costs, and providing training and capacity-building programs can enhance the profitability of women rice processors in Patigi. The study thus recommends training on marketing strategies, access to market information systems, bulk purchasing, and adopting cost-saving technologies to promote the growth of the rice processing industry in Nigeria.

KEYWORDS: *Market access, Regression analysis, Rice milling, Women entrepreneurship*

INTRODUCTION

Nigeria's rice farming industry is a thriving sector, employing diverse processing techniques to convert harvested paddy into finished rice. As a staple food in Nigeria, rice plays a critical role in the country's food security, employment, poverty reduction, and national development (Msendoo, 2016). The industry's growth is evident in the increasing local production of paddy rice, which rose from 4.47 million tonnes in 2010 to 8.9 million tonnes in 2023 (FAOSTAT, 2025). The process of converting paddy rice into finished rice involves several steps, including threshing, milling, and polishing. Threshing separates the grain from the straw, while milling removes the husk and bran layers, leaving only the white endosperm (Adebayo, 2023). The quality of the finished rice depends on the efficiency of these processing steps.

Onya *et al*. (2019) noted that rice is a staple food in Nigeria, found in the homes of both the rich and the poor. Nigeria's dependence on rice imports highlights the need to improve local production and processing. As Nwike & Ugwumba (2015) observed, the increasing demand for rice can be attributed to its

*Corresponding author: bilkisuhussaina@gmail.com

numerous uses and importance as a source of food. Despite the growth of the rice industry in Nigeria, the country remains one of the largest rice importers in the world; only about 57% of the 6.7 million metric tonnes of rice consumed in Nigeria annually is locally produced, leading to a supply deficit of about 3 million metric tonnes (FAO, 2022). The country is also a major rice producer, though domestic production wasn't sufficient to meet local demand, paving the way for substantial imports, with a USDA projection of about 2.2 million metric tonnes for the year 2022 (USDA, 2022). This paradox highlights the need to improve the quantity, quality, and competitiveness of locally processed rice.

The quality of rice has become a significant concern among Nigerian consumers, who often prefer imported rice due to its perceived higher quality (WARDA, 2015). This preference has created competition between imported and locally processed rice, underscoring the need for Nigerian rice processors to adopt improved processing technologies. As a result, the rice processing industry in Nigeria faces significant challenges in meeting the growing demand for high-quality rice. The rice supply chain in Nigeria plays a crucial role in the processing of rice, connecting farmers with rice millers and processors to ensure proper storage and transportation of the rice to the market (Adebayo, 2023). In Nigeria, consumers' preference for well-milled rice has resulted in significant price disparity between imported and locally produced rice. Interestingly, imported rice enjoys a significant price premium, selling at an average price of ₦2,500 per kilogram, which is up to 17.4% more than the local rice (₦2,065), in the country (NBS, 2025). This underscores that processing activities, especially milling, play a critical role in the post-production of rice, aiming to remove the husk and bran layers and produce an edible, white rice kernel that is sufficiently milled and free of impurities (IRRI, 2018).

Micro-enterprises, including those involved in pre- and post-harvest handling activities, have become a significant component of the economies of developing countries like Nigeria (Isaac *et al*., 2016). Rice processing is one such micro-enterprise that provides employment opportunities and income for millions of Nigerians. According to Erhie *et al*. (2022), the agricultural industry employs 36% of Nigeria's workers and generated around 22% of the country's GDP in the first quarter of 2020. Rice is also a significant source of food for millions of Nigerians, with the country being Africa's leading producer and consumer of rice (FAO, 2017). The importance of the rice sector in Nigeria cannot be overstated. As Atera *et al*. (2018) noted, rice is one of the most important food crops globally, providing food for over 50% of the world's population. In Nigeria, the rice sector can serve as a means of conserving foreign exchange and improving the nation's economy.

Patigi Local Government Area is renowned for its rice production, with a unique gender-based division of labour where men dominate cultivation and milling aspects of processing, and women dominate other activities such as soaking, parboiling, drying, and winnowing. Though rice processing is a vital source of income for the women in the area, their profitability is likely influenced by many factors that limit their earnings. Thus, there is a need to identify the key determinants of profitability in rice processing in Patigi Local Government Area to inform interventions that can improve their economic outcomes and overall well-being. This study aimed to describe the socioeconomic characteristics of these women and also analyse those factors that affect their profitability in rice processing in the area.

MATERIALS AND METHOD

The study was conducted in Patigi Local Government Area (LGA) of Kwara State, Nigeria. Patigi LGA lies within Latitudes 8º 30' N and 8º 57' N and longitudes 5º 30' E and 6º 11'. The area is located to the northeast of the state capital. One of the major industries found in the study area is the rice milling industry. Patigi LGA consists of ten wards and is a riverine area, bounded by the River Niger from the west end of the LGA and surrounded by other secondary rivers (Kampe, Egwa Mama, Duku, etc). These rivers leave behind the fine silt of an alluvial deposit, which makes it possible for the cultivation of rice in the study area. The main crops cultivated in the area are swampy and upland rice, sorghum, maize, millet, groundnut, and melon. The major occupation of the people in the study area is farming and fishing, with a few engaged in blacksmithing and trading. While the major tribes found in the area are Nupes, other tribes found are settlers who engage in both farming and trading. These tribes are Gwari, Hausa, Yoruba, and Tivs (Kwara State Government, 2020).

Data Collection and Sampling Procedure

A cross-sectional survey was employed, and data were collected using a well-structured questionnaire. Data on socio-economic characteristics, rice processing activities, costs, and profitability were collected.

A multistage sampling technique was used in the selection of the rice processors. In stage one, 4 wards were randomly selected from the 10 wards in the LGA. In stage 2, two villages each were purposely picked, which are involved in high-intensity rice production and have milling industries. While in stage three, ten women are randomly selected from each of the eight villages previously picked. This gives a sample size of 80 respondents for the study.

Analytical Techniques

Descriptive statistics such as means, frequencies, and percentages were used to describe the socio-economic characteristics of the respondents. Regression analysis was used to examine the factors influencing profitability in rice processing. The model was explicitly expressed as:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \ldots + \beta 9X9 + \mu \quad (1)$$

Where: Y= Profitability, X1= Age (Years), X2= Experience (Years), X3= Level of education (Years), X4= Household size (Number), X5= Marital status (Nominal, 0,1,2,3), X5= Cost of paddy rice (Naira ₦), X6=Fixed cost (after depreciation in Naira), X7= Milling cost(Naira ₦), X8= Market access (Dummy, Yes =1, otherwise = 0), X9= Credit access (Dummy, Yes =1, otherwise = 0), β0 = Constant parameter, β1 – β9 = Coefficients of the variables, X1-X9 = Independent variables, μ = Error term

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Women Rice Processors

The socio-economic characteristics of women rice processors in Patigi Local Government Area (LGA) of Kwara State, Nigeria, were examined in this study. The results show that the average age of these women is approximately 36 years, indicating that most are relatively young and active in carrying out value addition processes in rice processing (Olumayowa, 2024). This finding suggests that women rice processors in this region are likely to be in their prime working years, with the physical strength and energy required to engage in rice processing activities. Furthermore, the average household size of women rice processors is around 7 people, with about 6 to 10 household members. This indicates that they often come from large families. This finding is consistent with previous studies, which have reported that women in rural areas of Nigeria often have large family sizes (Ugwu *et al*., 2014). In terms of marital status, most women rice processors (71.25%) are married. This finding is consistent with previous studies, which have reported that marriage is a common institution among women in rural areas of Nigeria (Obisesan *et al*., 2017).

However, the educational background of women rice processors is a concern. The majority of these women (60%) had between an Islamic and a primary education, indicating that they have limited formal education. This finding is consistent with previous studies, which have reported that women in rural areas of Nigeria often have limited access to education (Bello *et al*., 2020). The limited formal education of women rice processors may hinder their ability to adopt new technologies, access credit, or negotiate better prices. Despite these educational limitations, women rice processors have significant experience in the field. The average number of years of experience is 12 years, indicating that these women have developed significant skills and knowledge in rice processing. This finding is consistent with previous studies, which have reported that experience is an important factor in determining the economic efficiency of rice processing (Obisesan *et al*., 2017; Abdullahi *et al*., 2021).

In addition, most women rice processors (90%) have access to markets, indicating that they are able to sell their products easily. Contrarily, many of these women (78.75%) had no access to credit, indicating that they are not able to access financial resources to support their businesses. These findings suggest that women rice processors in this region have no access to important resources that can support their economic activities.

Table 1. Socioeconomic Characteristics of Women Rice Processors.

Range	Freq.	%	Mean	Std. Dev.
Age				
21-30	26	32.5	36	9.842
31-40	25	31.25		
41-50	20	25		
51-60	9	11.25		
Household size				
0-5	26	32.5	7	2.725
6-10	43	53.75		
11-15	9	11.25		
16 and above	2	2.5		
Literacy level				
Not literate	17	21.25		
Islamic school	19	23.75		
Primary school	29	36.25		
Secondary school	13	16.25		
Tertiary	2	2.5		
Experience				
0-10	31	38.75	12	6.46
11-20	37	46.25		
21-30	10	12.5		
31 and above	2	2.5		
Marital status				
Single	2	2.5		
Married	57	71.25		
Divorced	15	18.75		
Widowed	8	10		
Market access				
Yes	72	90		
No	8	10		
Credit access				
Yes	17	21.25		
No	63	78.75		

Source: Field survey, 2023.

Determinants of Profitability among Women Rice Processors

The regression analysis results presented in Table 2 reveal the factors affecting the profitability of rice processing. The results revealed that the cost of paddy, fixed costs, and market access are significant factors in the profitability of rice processing in the study area. The results further revealed that the cost of paddy per bag had a significant negative effect on profitability ($p < 0.001$). This implies that reducing the cost of paddy per bag, through bulk purchasing or negotiations with suppliers, could

help improve profitability. Also, fixed costs were found to have a significant negative effect on profitability ($p = 0.040$). This finding highlights the importance of effective cost management strategies, such as reducing overhead expenses or improving operational efficiency. This result is consistent with the findings of Egwu (2018) and Akolgoa & Asumboya (2016). Furthermore, market access had a significant positive effect on profitability, with a positive coefficient of 0.031 ($p < 0.002$). This suggests that improving market access for women rice processors in Patigi could have a significant positive impact on their profitability.

Contrarily, age, education, household size, experience, marital status, credit access, and milling cost had no significant effect on profitability. The regression model was found to be a good fit for the data, with an R-squared value of 0.729. This implies that approximately 72.9% of the variation in profitability can be explained by the independent variables. The F-ratio (18.061) was also significant, indicating that the variance explained by the regression model is significantly larger than the variance of the residuals.

Table 2: Determinants of Profitability in Rice Processing

Variables	Coefficient b	Std. Error	t	Sig
Constant	0.923	0.067	13.709	<0.001
Market access	0.031***	0.010	3.212	0.002
Credit access	-0.006	0.006	-1.009	0.317
Marital status	0.006	0.004	1.443	0.154
Education	0.003	0.003	1.053	0.296
Experience	0.001	0.001	0.967	0.337
Household size	0.002	0.001	1.562	0.123
Age	0.000	0.000	-0.421	0.675
Milling cost	-1.421E-5	0.000	-1.065	0.291
Cost of paddy/bag	-2.219E-5***	0.000	-11.877	<0.001
Fixed cost	-1.746E-6*	0.000	-2.098	0.040
R-squared	0.729			
F-statistics	18.061***			<0.000

Field survey, 2023.

CONCLUSION AND RECOMMENDATIONS

Based on the results, the study concludes that market access, cost of paddy, and fixed costs are crucial determinants of profitability among women rice processors in Patigi. Thus, the following recommendations were made. Firstly, efforts should be made to improve market access for women rice processors in Patigi. This can be achieved by providing training on marketing strategies, facilitating access to markets, and establishing market information systems. Secondly, women rice processors should explore ways to reduce the cost of paddy per bag, such as bulk purchasing, negotiating with suppliers, or adopting cost-saving technologies. Thirdly, women rice processors should adopt effective cost management strategies, such as reducing overhead expenses, improving operational efficiency, and investing in cost-saving technologies. In addition, training and capacity-building programs should be provided to women rice processors to enhance their skills and knowledge in areas such as marketing, cost management, and entrepreneurship. Finally, the government should provide support to women rice processors, such as access to credit and training, to enhance their profitability and competitiveness.

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Authors Contributions

HUM conceptualized the study, collected and sorted the data, and interpreted the results, while OKO and ZTS supervised the collection, data coding, and analyzed the data and methodology. HUM and MI wrote the original draft, reviewed, and edited the manuscript.

Ethical Statement

Not applicable

REFERENCES

Abdullahi, A., Muhammad, K. M., & Bako, R.U. (2021). Analysis of Rural Women Participation In Rice Processing under IFAD-VCDP in Bida and Wushishi Local Government Areas of Niger State, Nigeria. Proceedings of the conference of the National Association of Agricultural Economist, Lafia, Nasarawa State, Nigeria

Adebayo, A (2023). 2023 Rice farming in Nigeria: harvesting and processing. Afrimash Blog. http://Afrimash.com

Akolgoa, J. A., & Asumboya, G. A. (2016). Economic analysis of rice processing by women in Navrongo municipality of Upper East region of Ghana. *International Journal of Sciences: Basic and Applied Research* (IJSBAR), 26(2), 221-230.

Atera, E.A., Onyancha, F.N. & Majiwa, E.B.O. (2018). Production and marketing of rice in Kenya : Challenges and opportunities. *Journal of Development and Agricultural Economics*,10:64- 70.

Bello, R.S., Saliu, M.I., Olaniyan, A.A., Bello, M.B. & Ikechukwu, G.O. (2020). An assessment of the quality assurance programmes in Nigerian rice processing sector. *Discovery Agriculture*, 6(16): 144-158

Egwu, W. E. (2018). Profit analyses and determinants of value-added rice among farmers in Abakaliki metropolis, Ebonyi State, Nigeria. *Nigerian Agricultural Journal*, 49(1), 273- 278.

Erhie, E., Iwelumo, M., Agbeyi, E., Oladipo, O., Oyaniran, T., Akinbiyi, A., & Adegunle, E. (2022). Boosting Rice Production through Increased Mechanization. Lagos: PricewaterhouseCoopers Limited (PWC).

FAOSTAT (2025). Crops and livestock data. https://www.fao.org/faostat/en/#data/QCL

Food and Agriculture Organisation (2017). Food and Agriculture Organisation of the United Nations, Rice Market Monitor, Vol. XX ISSUE No.2, July 2017.

Food and Agriculture Organisation (2022). Nigeria at a glance. Food and Agriculture Organisation of the United Nations. https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/

IRRI (2018). International Rice Research Institute. Milling. http://www.knowledgebank.irri.org/step-by-step-production/postharvest/milling

Isaac A., Gerald, A., Etornam, K. A. & Ernest, K.(2016). Postharvest handling practices and treatment methods for tomato handlers in developing Countries: A mini review *International Journal of Agronomy,* 6:1-6

Kwara State Government (2020). Local Government Areas. https://kwarastate.gov.ng/government/lgas/?amp

Msendoo, N.T. (2016). Adoption and Impacts of Improved Rice Processing Technology: A Case Study of the Cameroon Grains Development Project. Economics Working Paper 80-100.

National Bureau of Statistics (NBS) (2025). Selected Food Price Watch. (January 2025). from https://microdata.nigerianstat.gov.ng

Nwike, M.C. & Ugwumba, C.O.A. (2015). Profitability of rice production in Aguata Agricultural Zone, Anambra State, Nigeria: A profit function approach. *American Journal of Agricultural Science.* 2(2), 24-28

Obisesan, O. O., Salmann, K. K., & Akintayo, O. (2017). Analysis of profit efficiency among rice Processors in Ekiti and Ebonyi States, Nigeria. *Research Journal of Agricultural and Applied Sciences,* 3(63), 148-155.

Olumayowa, O. (2024). Value Addition and Profitability of Local Rice Processing in Obafemi-Owode Local Government Area, Ogun State, Nigeria. *Ethiopian Journal of Environmental Studies & Management*, 17(1): 42 – 54 https://ejesm.org/doi/v17i1

Onya, S.C., Okezie, C.A. & Ejiba, I.V. (2019). Double hurdle modelling approach to local rice consumption in Ikwuano Local Government Area of Abia State, Nigeria. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension*,18 (2), 20-25

Ugwu, J. N., Mgbakor, M. N. & Chitor, C. C. (2014). Assessment of value addition in rice and processing in Adani Uzouwani Local Government Area of Enugu State, Nigeria. *International Journal of Agriculture Science & Veterinary Medicine*, 2(4), 53-68

USDA (2022). Grains and feed update. USDA Foreign Agricultural Services. https://apps.fas.usda.gov

WARDA. (2015). Essence of WARDA, the reason why Nigerians are hooked to rice women's involvement in the agroprocessing enterprise of the national special programme for food security in Imo State, Nigeria. Report and Opinion, 2(7): 69-73