



PROFIT ANALYSES AND DETERMINANTS OF VALUE ADDED RICE AMONG FARMERS IN ABAKALIKI METROPOLIS, EBONYI STATE, NIGERIA

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Abstract

The study assessed the practice of value addition among rice farmers in Ebonyi State, Nigeria. This study looked at the various constraints militating against value added rice in the study area, and factors affecting profitability within the value chain. Fifty rice farmers (respondents) were drawn at random from Abakaliki metropolis, for detailed analyses. Primary data were obtained through a well-structured questionnaire. The descriptive statistics used were frequency counts and percentages, and the predictors of rice value addition profit were analyzed using multiple regression analysis. The results revealed that 60% of the farmers sold rice as paddy, while 40% added value to their harvests. Lack of fund to expand the value addition enterprise was identified by 42% of the farmers as the major constraint to their desire to develop the rice value addition enterprise. The regression analysis revealed that cooperative membership, rice value addition as a primary occupation, household size, cost of labour, packaging and bagging are the significant and positively influenced the profit of rice value addition while the costs of purchasing seeds, paying for rent, and transportation were significant and negatively related to the profitability of the rice value addition farm enterprise. Based on the findings of this study, it is recommended that extended credit facilities should be employed to aid farmers to adopt innovations to prevent losses before and after harvest. There is also need for policies aimed at encouraging the formation of cooperatives societies among farmers to enable them reap the economics of scale within the value chain.

Keywords: Processing, Paddy, Value-Addition, Constraints, Rice

Introduction

Rice, being a staple food consumed by almost all the households in Ebonyi State and cultivated by the three agricultural zones in the state, plays a significant role in food security and job creation through the value chain development. But the rice value chain is far from being maximized. Rice is critical for African food security, particularly in Nigeria. For many years, rice had the fastest-growing consumption rate among staple crops, owing mainly to massive urban areas' demand. For decades, Nigeria has been a net importer of processed rice from Asia, which has hampered domestic rice production because local rice farmers cannot compete with price of imported and quality due to low-value addition levels. Nigeria has an inherent comparative and competitive advantage in rice farming because of its market size of over 200 million rice consumers, enabling savings on rice imports if the rice value chain is maximized (Oyediran, 2016). According to statistics, Nigerians consumed 6.9 million tons of processed rice in 2018, while domestic production was 3.7 million tons, with rice produced locally accounting for 57% of domestic rice consumption (KPMG, 2019). The

President's administration's drive for rice self-sufficiency is centered on this massive consumption and domestic supply gap. This policy push has resulted in the production of high-quality domestic rice that can effectively compete with imported rice. Nonetheless, to boost the value chain of rice sustainably, more farmers and entrepreneurs must be lured into it (Madu and Aniobi, 2018). Producing only paddy rice is insufficient; increasing the rice value chain's economic potential includes more job opportunities and export potential. Nigeria's agricultural economy is still dominated by the production and sale of agricultural products in their raw state, with hardly any facility to convert raw produce into other value-added goods. Due to socioeconomic, fiscal, environmental, and technological limitations, farmers cannot add value to their products, resulting in this situation. These limitations have resulted in low production efficiency and a limited range of products produced. These manifestations may have contributed to farmers' deficient wealth creation, resulting in low farm and household incomes.

The value addition rationale is based on increasing

income levels, job opportunities, and investment opportunities. A small-scale operator must focus on value addition. The value added by small-scale operators will enable investment in extra processing facilities, allowing marketable surpluses to be pushed to processors and farmers to reduce post-harvest losses, thereby increasing rural incomes. Farmers can benefit from adding value by claiming a significant portion of the untapped profit in the production of food, fiber, industrial, or other products from rice. Value addition activities are a set of activities designed to enhance a product from its original condition to a higher value level through economic activity and innovation (WEF, 2017). The addition of value is vital for Nigeria's agricultural sector to realize various governments' economic agenda of increasing agricultural GDP and diversifying economic activities away from the oil sector. Chidiebere-Mark (2019) and Omoare *et al.* (2015) identified farmers' various rice value-adding techniques. To the best of their knowledge, there seems to be paucity of empirical evidence on the determinants of rice value addition practice among rice farmers in Ebonyi State, Nigeria, which is the research gap that this study filled. Therefore, this study assessed the determinants of the practice of rice value addition among rice farmers in Ebonyi State, Nigeria. Specifically, this study critically identified the value added to rice in the area; examined the constraints of rice value addition; and factors affecting profit earned by rice farmers through value addition.

Methodology

The study area is Ebonyi State, Nigeria, located on longitudes 7°00E and 8°00E and latitudes 4°45N and 6°17N. Purposive and Simple Random Sampling techniques were used to select the respondents. Random sampling technique was used to select 50 rice farming households from Abakaliki metropolis for this study. A well-structured questionnaire was used to collect primary data. Frequency counts and percentages are among the descriptive statistics used. In determining the variables that influence profit of rice value addition in the study area, the ordinary least square regression technique was used. The following is the empirical model that was used in the study:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 \dots \dots b_{17}x_{17} + e$$

Where;

Y= Profit of value added rice in naira (N)

X₁ = Sex of the farmer (1 if male, 0 if female)

X₂ = Age of the rice farmer (years)

X₃ = Marital status (dummy variable; 1=married, 0=otherwise)

X₄ = Household size (number of persons)

X₅ = Educational level (years)

X₆ = Hours spent in rice farming (primary occupation)

X₇ = Membership of cooperative society (dummy variable; 1=yes, 0=no)

X₈ = Cost of seed in naira per season

X₉ = Cost of fertilizer in naira per season

X₁₀ = Cost of herbicides in naira per season

X₁₁ = Depreciated cost of machinery in naira per season

X₁₂ = Cost of labor in naira per season

X₁₃ = Cost of processing (other variable costs) in naira per season

X₁₄ = Cost of bagging in naira per season

X₁₅ = Cost of packaging and labeling in naira per season

X₁₆ = Cost of transportation in naira per season

X₁₇ = Cost of storage in naira per season

e is the error term or disturbance term and b's are parameters to be estimated

Results and Discussion

Distribution of Value added activities among Rice Farmers in the study area

The value added by rice farmers in Ebonyi State is shown in Table 1. It showed the percentage value addition of each operation at the processing stage. The husk and bran layers are removed during rice milling, giving edible white rice. Rice husk could be used as a fuel, and the ash (a by-product of combustion) could be used as a fertilizer amendment and an additive in the cement and steel industries (IRRI, 2018; Kumar *et al.*, 2012). According to the findings, 60% of farmers added no value to the paddy they grow and sell directly to processors. The use of modern mills, de-stoning, and parboiling was reported as value addition activities by 12 per cent of the farmers each, while only 4% packaged the processed rice.

Table 1: Distribution of Rice Farmers' Methods of Value Addition

Methods of value addition	Frequency (N)	Percentage	Cumulative
No value addition	30	60.00	60.00
Milling and modern rice mill	6	12.00	72.00
Packaging	2	4.00	76.00
Destoning	6	12.00	88.00
Parboiling	6	12.00	100.00

Source: Field Survey, 2019

Cost and Returns analyses of value added rice in the study area

The analysis of cost and returns associated with producing one metric tonne of milled rice is presented in Table 2. It presents the revenue, net profit, gross profit among the rice farmers. The variable cost item include; cost of seed, fertilizer, herbicides, labour, processing, bagging, packaging, and branding. On the other hand, rent, machinery, tool, equipment were recorded as a fixed cost of rice farming. On average, rice farmers

incurred a total variable cost of N2, 968,860 and a total fixed cost of N59505.2. The total cost of rice (TC) was calculated by addition of the total variable cost (TVC) and total fixed cost (TFC), while the gross profit of rice was calculated by deducting the total variable cost incurred in rice production from the total return of rice (Revenue). The net profit was calculated to evaluate the profitability of value added rice, which is estimated to be N6057074.8.

Table 2: Market margin of value added rice in the study area

(a) Revenue (₦)	9085440
Variable cost (₦)	
Transaction cost	11630
Cost of seed	519580
Cost of fertilizer	453900
Cost of herbicide	457300
Cost of labour	193100
Cost of processing	637000
Cost of bagging	386050
Cost of packaging/ branding	310300
(b) Total variable cost (₦)	2968860
Fixed cost(₦)	
Rent	50680
Machinery, tool, equipment (depreciated)	8,825.2
(c) Total fixed cost	59505.2
(d) Total cost (b + c)	3028365.2
Gross profit (a – b)	6116580
Net profit (a – b – c)	6057074.8

Source: Field Survey, 2019

Determinants of profitability of value added rice in the study area

The results in Table 3 show the regression estimates of the determinants of profitability of value added rice among the respondents in the study area. The coefficient of depreciated cost of machinery, tool and equipment has a negative sign and was significant at 10% level. This is better explained by the fact that processing and value addition machinery and equipment are very costly; such machines, tool and equipment are capital intensive with longer payback periods and requires a relatively high-interest rate (Ajibola and Zalla, 2007). This longer payback period and high interest rates adversely impact the profit of the farming households. Sex was significant at 5% level and positive, implying that male processors accrued more profit compared to their female counterparts. Though based on the reports on the influence of gender on value chain activities of some selected farm produce, females are active players in all aspects of the value chain except the primary production aspects (Otunba-Payne, 2020; Ejike *et al.*, 2018; Adam *et al.*, 2018; Belete, 2019). This result indicates that the sex of the rice farmers determines the set of value chain activities the farmers will be actively involved in and the profit accruing from such activities. Household size was statistically significant at 10% and positively related to farmers' profitability. Large household size entails an increase in available cheap labour to complement paid labour in the rice value chain (FAO, IFAD and ILO, 2010; Iheke and

Onyendi, 2012). Rice value addition as the primary occupation is statistically significant at 10% and positively influenced the farmers' rice value addition profit. Farmers that are more preoccupied with the rice value chain enterprise pay more attention to the details, thereby ensuring the farm enterprise is profitable. Cooperative membership, as calculated by the financial benefits accruable to farmers as a result of their membership, is statistically significant at 10% and has a positive influence on the profitability of farmers' rice value addition. The financial benefits from cooperative funding, production, and marketing along the rice value result in profit growth (Effiom, 2014; Adekunle, 2018; Oluguni *et al.*, 2021). Costs of fertilizer, seeds and herbicides were significant at 10%, 5% and 1% respectively and negatively related to rice value addition enterprise's profit. The costs of some essential inputs have been noted to be significantly high by some authors, resulting in the reduction of the profitability of the rice value addition enterprise (Chidiebere-Mark *et al.*, 2019; Awotide *et al.*, 2015; Madu and Aniobi, 2018). George (2020) and Tondel *et al.* (2020) reported that despite the policy on the ban on the importation of value-added rice, the high cost of rice production due to the high cost of inputs locally had kept smugglers in business. Cost of labour was significant at 10% and positively related to the value added profit by rice farmers. The cost of labour increases with the increase in the number of workers in the enterprise; this increases output and subsequent profit (Obadan and Odusola,

2000). The addition of extra unit labour will increase output, and with proper management techniques, the farm enterprise will take advantage of the synergy effect of increased labour, while hedging against diminishing returns. Cost of bagging and packaging were significant at 10% and positively related the profitability of value added rice among the farmers. Bagging and packaging

add more value to the value-added rice and attract a higher price for the rice, resulting in more profit. Cost of rent and transport were significant at 1% and 10% respectively and negatively related to profitability. The cost of transportation and rent is high and accounts for a significant amount of the total operation cost for the business enterprise (Johnson and Masias, 2016).

Table 3: Multiple regression analysis of the factors affecting rice value addition profit

Variables	Coefficient	Standard error	T-value
Sex	3.269	1.091	3.000**
Age	0.661	1.901	0.348
Marital status	-1.105	1.007	-1.097
Household size	1.604	0.931	1.723*
Education	1.075	1.045	1.029
Primary occupation	1.938	1.095	1.770*
Membership of cooperative society	2.099	1.155	1.817*
Cost of seeds	-1.966	0.763	-2.577**
Cost of fertilizer	-1.571	0.796	-1.974*
Cost of herbicides	-3.957	0.801	-4.940***
Depreciated cost of machinery, tool, equipment	-0.191	0.117	-1.632*
Cost of labour	0.308	0.123	2.504*
Cost of processing (husking, milling, parboiling etc.)	-0.267	0.191	-1.397
Cost of bagging	0.69	0.254	2.717**
Cost of packaging	0.774	0.238	3.252**
Cost of transport	-0.469	0.24	-1.954*
Storage cost	-0.967	0.162	-5.969***

*** Significant at 1% level, * significant at 10 % level, F- value= 6.22***, R² = 0.783, Adjusted R= 0.657

Constraints militating against Value addition among the rice farmers in the study area

Constraints militating against value addition among rice producers in the study area are presented in Table 4. From the findings, there are several challenges to rice value addition in the study area, among which were lack of funds (42%), lack of appropriate technology (26%), inadequate agricultural extension support on training and capacity building (18%), pest and diseases incidence (8%), and dearth of viable seed and agrochemical (6%). Low technology and base, decaying infrastructure, and lack of funds are significant impediments to Nigeria's agricultural sector

(Akinwunmi, 2013). Only 6% and 8% reported the incidence of pest and disease incidence and dearth for viable seed and agrochemical; this may imply that majority of the farmers use insecticides and pesticides and receive seeds, fertilizers from the Ministry of Agricultural on time, hence do not suffer a major setback from pest and disease attack and late supply of inputs. Rice requires prompt application of agrochemicals such as insecticides and herbicides to mitigate the menace of pest and disease infestation resulting from weeds' overgrowth. Pests and diseases attack the rice plant and reduce paddy rice (Chidiebere-Mark et al., 2019).

Table 4: Constraints militating against value addition among the respondents in the study area

Constraints of value addition	Frequency	Percentage	Cumulative
inadequate agricultural extension support on training and capacity building	9	18.00	18.00
(lack of funds)	21	42.00	60.00
(lack of appropriate technology)	13	26.00	86.00
pest and diseases incidence	4	8.00	94.00
dearth for viable seed and agrochemical	3	6.00	100.00

Source: Field Survey, 2019

Conclusion

Rice is a very important staple crop consumed daily by most households; therefore, there is an urgent need to develop Nigeria's rice value chain. The determinants of the profitability, constraints and the methods of value addition of rice farming are important aspects considered to make a scientific contribution to the gaps on the rice value chain. The methods of value addition

identified are modern rice mills, parboiling, destoning, and packaging. The major constraint identified among the rice farmers was lack of adequate fund for their business. The costs and return analysis revealed that the rice value addition is profitable despite the high level of variable and fixed costs. The regression analysis revealed that cooperative membership, rice value addition as a primary occupation, household size, and

cost of labour, packaging and bagging were significant and positively influenced the profit of rice value addition, while the costs of purchasing seeds, rent, and transportation were significant and negatively related to the profitability of the rice value addition enterprise. Based on the findings of this study, it is recommended that extended credit facilities should be employed to aid farmers to adopt innovations to prevent losses before and after harvest. There is also need for policies aimed at encouraging the formation of cooperatives societies among farmers to enable them reap the economics of scale within the value chain.

References

- Adam, A. G., Bidoli, T. D., Ammani, A. A. and Oduehie, T. C. (2018). Gender Participation in Rice Processing Value Chain in Kebbi and Sokoto States, Nigeria. *Global Journal of Science Frontier Research: D Agriculture and Veterinary*, 18(2): 54-60.
- Adekunle, A. (2018). Effect of Membership of Group-Farming Cooperatives on Farmers Food Production and Poverty Status in Nigeria. 30th International Conference of Agricultural Economists July 28 – August 2 at Vancouver.
- Ajibola, F. and Zalla T. (2007). Making Nigerian Agricultural Markets Work for the Poor. Monograph Series # 9 Value Chain Study of Small-Scale Agricultural Mechanization. The PrOpCom Monograph Series. <http://www.propcommaikarfi.org/wp-content/uploads/2013/08/9-Value-Chain-Study-of-Small-Scale-Agricultural-Mechanization-1-1-2-07-1.pdf>
- Awotide, D. O., Ikudaisi, O. J., Ajala, S. O. and Kaltungo, J. H. (2015). Input Use and Profitability of Arable Crops Production in Nigeria. *Journal of Sustainable Development*, 8(3): 139-149.
- Belet, M. (2019). Women Role in Agricultural Value Chain: Review in Ethiopia. *Journal of Culture, Society and Development*, 45: 16-19.
- Chidiebere-Mark, N. M. (2017). Analysis Of Value Chain In Rice Production. A Thesis Submitted To The Post Graduate School Federal University Of Technology, Owerri. In Partial Fulfillment of the requirements for the award of the Degree of Doctor of Philosophy (Ph.D.) In Agricultural Economics
- Chidiebere-Mark, N. Ohajianya, D., Obasi, P. and Onyeagocha, S. (2019). Profitability of rice production in different production systems in Ebonyi State, Nigeria. *Open Agriculture*, 2019; 4: 237–246
- Effiom, R. A. (2014). Impact of Cooperative Societies in National Development and the Nigerian Economy. *Global Journal of Social Sciences*, 13: 2014: 19-29.
- Ejike, R. D., Osuji E. E. and Effiong J. A. L. (2018). Gender Dimension in Agricultural Food Value Chain Development in Nigeria: The Women Perspective. *International Journal of Agriculture and Earth Science*, 4(3): 37-45.
- FAO, IFAD and ILO (2010). Gender dimensions of agricultural and rural employment: Differentiated pathways out of poverty Status, trends and gaps. https://www.ifad.org/documents/38714170/40187194/GRE_WEB.pdf/9fb80e6a-0463-4571-b6df-234635454aab
- George, L. (2020). A growing problem: Nigerian rice farmers fall short after borders close. *Commodities News*. <https://www.reuters.com/article/us-nigeria-economy-rice-idUSKBN1ZM109>
- Iheke, O. R. and Onyendi, C. O. (2012). Enterprise Combination and Food Security among Rural Farm Households in Ebonyi State of Nigeria. *International Journal of Applied Research and Technology*. 1(4): 30-36.
- IRRI (2018). International Rice Research Institute. Milling. <http://www.knowledgebank.irri.org/step-by-step-production/postharvest/milling>.
- Johnson, M. and Masais, I. (2016). Assessing the State of the Rice Milling Sector in Nigeria. The Role of Policy for Growth and Modernization. Working Paper 40. https://www.canr.msu.edu/fsp/publications/researchpapers/Assessing_the_state_of_the_rice_milling_sector_in_Nigeria_The_role_of_policy_for_growth_and_modernization.pdf
- KPMG (2019). Rice Industry Review. <https://assets.kpmg/content/dam/kpmg/ng/pdf/audit/rice-industry-review.pdf>. Accessed 14/07/2020.
- Kumar, A., Mohanta, K., Kumar, D. and Parkash, O. (2012) Properties and Industrial Applications of Rice Husk. *International Journal of Emerging Technology and Advanced Engineering*, 2: 86.
- Madu, A. B and Aniobi, U. J. (2018). Profitability analysis of paddy production: A case of agricultural zone 1, Niger State Nigeria. *Journal of Bangladesh Agricultural University*, 16(1): 88–92.
- Madu, A. B. and Aniobi, U. J. (2018). Profitability analysis of paddy production: A case of agricultural zone 1, Niger State Nigeria. *Journal of Bangladesh Agricultural University*, 16(1): 88–92. DOI: 10.3329/jbau.v16i1.36486
- Obadan, M. and Odusola, A. (2000). Productivity And Unemployment In Nigeria. UNDP Africa Economists Working Papers 307335, United Nations Development Programme (UNDP).
- Olagunju, K.O., Ogunniyi, A.I., Oyetunde-Usman, Z., Omotayo, A.O. and Awotide, B. A. (2021). Does agricultural cooperative membership impact technical efficiency of maize production in Nigeria: An analysis correcting for biases from observed and unobserved attributes. *PLoS ONE* 16(1): e0245426. <https://doi.org/10.1371/journal.pone.0245426>
- Omoare, A.M., Fakoya, E.O. and Oyediran, W.O. (2015). Value Addition of Sweet Potato (*Ipomoea batatas* L. Lam): Impending Factors on Household Food Security and Vitamin A Deficiency (VAD) in Southwest and Northcentral Nigeria. *Journal of Agriculture & Veterinary Science*, 8: 06-14.
- Otunba-Payne, G. (2020). An Analysis of the Role of Women in the Cassava Value Chain in Nigeria. Faculty of the Graduate School of Cornell University. <https://ecommons.cornell.edu/bitstream/handle/18>

- 13 / 72664 / Gabriella_Otunba - Payne_MPS_Capstone.pdf?sequence=1&isAllowed=y
- Oyediran, W. O. (2016). Assessment of Paddy Rice (Ofada) Processing in ensuring Rural Women livelihood sustainability in Ogun State, Nigeria. *International Journal for Research in Agricultural Research*, 2(2): 59 - 70.
- Tondel, F., D'Alessandro, C., Hathie, I. and Blancher, C. (2020). Rice trade and value chain development in West Africa: an approach for more coherent policies. Discussion Paper No. 283. European Centre for Development Policy Management. <https://ecdpm.org/wp-content/uploads/Rice-Trade-Value-Chain-Development-West-Africa-Approach-More-Coherent-Policies-ECDPM-IPAR-Discussion-Paper-283-2020.pdf>
- WEF (2017). World Economic Forum. Technology and Innovation for the Future of Production: Accelerating Value Creation. http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf
- Zeynep, T. (2009). The Effect of Labor on Profitability: The Role of Quality. Working Paper 09-040. https://www.hbs.edu/ris/Publication%20Files/09-040_146640ac-c502-4c2a-9e97-f8370c7c6903.pdf