FUAM
Journal of Pure
and Applied Science

Economic Analysis of Rice Processing in Ebonyi State, Nigeria

E.S. Esheya

Department of Agricultural Economics and Extension, Faculty of Agricultural Sciences,
National Open University of Nigeria Abuja, Kaduna Campus, Kaduna State.
Correspondence E-mail:: sesheya@noun.edu.ng

Abstract

This study was undertaken to evaluate the profitability of rice processing in Ebonyi state, Nigeria. The state has three agricultural zones with rice industrial clusters located in each of them. One rice industrial cluster was selected from each of the three agricultural zones for this study; and one hundred respondents were randomly selected from each of the clusters. Thus, three hundred respondents were used as sample size for the study. Results of the multiple regression analysis showed that education level, household size, income level and years of rice processing experience had positive effects on profitability and were statistically significant at 5% level of probability. The results further revealed that the net farm profit of rice processors was N49,000.00 per 1000kg of paddy rice processed and hence it was concluded that rice processing is a profitable agribusiness enterprise in Ebonyi state, Nigeria.

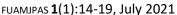**Keywords:** Rice, Paddy, Processing, Processors, Profitability.

Introduction

To say the least, rice is the most important cereal in the world and more than half of the human race needs rice as a source of calories. As a cereal grain, rice is the most widely consumed staple food for a large part of the world's human population [8]. Rice is the primary source of carbohydrates and protein. It also contains small quantities of fat, ash, fibre and moisture. Vitamins and minerals are present largely in bran and germ. The by-products of rice form important components of poultry and dairy feed [8b]. To the average Nigerian, rice needs no introduction becauseit grows across all agro-ecological zones in the country; and has become one of the most important foods consumed by both the rich and the poor.Access to improved varieties, and availability of good quality seed have been reported as the principal constraints in rice production. A persistent problem in smallholder agricultural production is the inability of farmers to process own output. This has always led to sales at poor prices, and leaving most of the gains to those who buy, process and sell to others within the value chain[4].

Rice processing is a chain-like activity which involves cleaning, soaking, steaming, parboiling, drying, husking, milling, de-stoning, polishing, grading, sorting, bagging, packing and as well as marketing of milled rice. According to [5], rice processing is limited to the three stages, namely: parboiling, drying and milling. Parboiling is carried out mostly in old 200 liters oil drums cut in half, using water and fire wood. The paddy is steamed for about 30 minutes then removed and spread out on woven mats in the sun to dry and then taken to rice mill for milling. The value addition starts from the input supply, and flows through the production, processing and marketing stages. This is because, the rising demand for processed agricultural products in the global market creates opportunities for farmers in the rice downstream sector to leverage on value chains through vertical and horizontal integration [3].

Obviously, the processing of rice is characterized by different actors who play significant roles and are linked to other stages in the chain. The various functions these actors perform and their links in the value chain of rice, as well as, the distribution of gains within the value chain of rice in Ebonyi State is not yet ascertained, because, it is not well understood who actually benefits from the higher prices that consumers pay for high quality rice. That is, whether it is beneficial for rice farmers to produce paddy only, or if they should be encouraged to add value by processing and marketing. Only by understanding the costs and returns to farming and other stages from production until the final market can policymakers begin to understand the incentives for production and processing, as well as the incentives for improvement in each stage.

14

Unfortunately, there is still dearth of information on the extent of value addition as well as profit margins in rice processing in the state. This calls for more empirical evidence in order to ascertain their viabilities so as to enable investment decisions as well as interventions by both private and public agencies. Against the foregoing background, there is need to examine the economic analysis of rice processing in Ebonyi State, Nigeria. The specific objectives of this study were to: describe the socio-economic characteristics of rice processors; determine the economic returns of rice processing; and establish the influence of socio-economic variables of rice processors on their profitability in the study area.

Materials and Methods

The study was carried out in Ebonyi State which is located in South-East Nigeria. The state lies in the humid tropical agro-ecological zone of Nigeria within Longitudes 70 30′E and 80 30′E and Latitudes 50 40′N and 60 45′N [9]. It has a land area of 5,935 km^2 with a projected population of 2,253,140 persons in 2016 using a growth rate of 3.5% [7]. The State shares boundaries on the North by Benue State, to the West by Enugu State, to the East by Cross River State and to the South by Imo and Abia State. The climate of Ebonyi State is that of a humid tropical climatic region. The mean annual temperature stands at 28^{0}C with an average rainfall of 1200 - 2500mm [1]. Ebonyi state is one of the major rice producing areas and market for locally produced rice in Nigeria. This makes it a reference point for rice production in the country. There is prevalence of rice farmers adopting different production systems in the state. The state also boasts of the presence of cottage, industrial, private and government owned integrated rice mills. The Abakaliki rice mill is a commercial hub for rice processing and trade for rice within and beyond the state.

A multi-stage sampling procedure was adopted in the selection of respondents. Ebonyi State was purposively selected for this study because it has the highest output of paddy rice in southeast Nigeria [6]. The state has rice industrial clusters located in the three agricultural zones. So, one rice industrial cluster was selected from each zone; and one hundred respondents were randomly selected from each of the three selected rice industrial clusters. Thus, three hundred respondents were used as sample size for this study. The lists of registered rice processors were obtained from the Agricultural Development Programme (ADP) office and Millers Association of the respective clusters. The primary source of data was adopted using personal interview method with the aid of a well- structured questionnaire. Data were analyzed using descriptive statistics, econometric as well as farm budgeting techniques: frequency, percentage, cost and returns analysis, gross margin analysis as well as multiple

regression analytical models. The models were specified as follow:

a. Gross margin and net revenue analysis

GM = TR – TVC   (1)
TC = TVC + TFC   (2)
NR = GM –TFC   (3)
RRI = NI/TC X100   (4)
Where,

TC = total cost, TVC = total variable cost, TFC = total fixed cost, GM = gross margin, TR = total revenue, RRI rate of return on investment, NI = net income.

b. Multiple regression analysis
The implicit form of the model is specified as: $Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) + e$ (5)

The explicit form of the model is stated in the linear forms as: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e$ (6)

Where:
Y = Profit (Naira/1000kg of paddy processed)
β_0 = intercept
X_1 = gender (dummy: male = 1, female = 0)
X_2 = age (years)
X_3 = Educational level (years)
X_4 = Household size (number)
X_5 = Cost of paddy (dummy: high = 1, low = 0)
X_6 = Labour cost (dummy: high = 1, low = 0)
X_7 = Processing experience (years)

e = Stochastic error term

Results and Discussion

Socio-economic characteristics of respondents

Table 1 shows the distribution of respondents by socio-economic characteristics. Results obtained indicate that rice processing in Ebonyi state is a male dominated (82.0%) agribusiness venture. The age distribution of the respondents also reveals that majority (72.3%) fell between the active working age range of (1 – 30) years. This is encouraging as an active age implies increased productivity and enables the respondents to engage in other value adding activities in rice processing chain. The result further shows that at least (89.7%) of the respondents had access to formal education. This result implies that an average rice processor in Ebonyi state is enlightened. This makes them more receptive to information on the adoption of best practices for improved rice processing techniques that would harness the quality of rice and

15

enhance profit. Majority (55.3%) of the respondents maintained large family size as a ready source of labour and operated at a relatively small scale as (54.3%) of them had income level of ₦100,000 – ₦200,000 per annum. Results obtained for rice processing experience show that

majority (60.7%) of the respondents had rice processing experience of between (11 – 20) years. This shows that rice processing agribusiness venture is a livelihood that has been sustaining many households in the study area for decades.

Table 1: Distribution of respondents by socio-economic characteristics

Variable	Frequency	Percentage (%)
Gender		
Male	246	82.0
Female	54	18.0
Age		
1 – 30	217	72.3
Above 30	83	27.7
Educational level		
No formal	31	10.3
Primary	173	57.7
Secondary	84	28.0
Tertiary	12	4.0
Household size		
1 – 10	97	32.3
11- 20	166	55.3
Above 20	37	12.4
Income level		
100,000 – 200,000	163	54.3
200,000 – 300,000	85	28.3
Above 300,000	52	17.3
Labour access		
hired	91	30.3
family	209	69.7
Processing experience		
1 – 10	73	24.3
11 – 20	182	60.7
Above 20	45	15.0

Cost and returns analysis of rice processing per 1000kg of paddy rice

The cost and returns analysis of rice processing per 1000kg of paddy rice in table 2 showed that the rice processors spent ₦100,000.00 on paddy, and another₦31,000.00 on other variable inputs and recorded a total revenue of ₦190,000.00 per 1000kg of paddy processed. Thus, cost of paddy, labour and utilities composed the major variable cost items. According to the results, the processors encountered minimal fixed cost variables. It was observed that, full capacity utilization by the processors is subject to the farmers producing sufficient paddy to feed the rice mills. Inadequate supply of paddy rice results in idle hours that would have increased the income of the processors as well as their profit. More

so, high demand for locally produced rice would motivate farmers to produce more paddies, which will in turn increase paddy supply to processors [3]. Summarily, the results of the profitability analysis for the 300 rice processors per 1000kg of paddy rice processed showed that the rice processors made gross income of ₦59,000 and net farm income of ₦49,000.0 per 1000kg of paddy rice processed. The high values of both gross income and net farm income is an indication that rice processing is a profitable agribusiness venture in the study area. Furthermore, the rate of return of ₦34.75 recorded indicated a N34.75 return on every ₦1.00 spent on rice processing in the study area.

16

Table 2: Cost and returns analysis for the processing of 1000kg of paddy rice

S/N.	Item	Unit	Quantity	Unit Price (₦)	Total Amount (₦)
1.	**Revenue:**				
	Sales of milled rice	Bushels	20	9,500	190,000
	Total Revenue (TR)	-	-	-	**190,000**
2.	**Variable Cost:**				
	a.Cost of paddy	Per 100kg	10	10,000	100,000
	b..Firewood	Bundle	4	1,000	4,000
	c.Soakin/steaming	Mandays	2	2,000	4,000
	d.Drying/bagging	Mandays	2	2,000	4,000
	e..Transport to mill	Per 100kg	10	200	2,000
	f.Milling	Bushel	30	500	15,000
	g.Miscellaneous	-	-	-	2,000
	Total Variable Cost (TVC)	-	-	-	**131,000**
3.	**Fixed Cost:**				
	Depreciation	-	-	-	10,000
	Total Fixed Cost (TFC)	-	-	-	**10,000**
4.	**Total Cost (TC)**	-	-	-	**141,000**
	Gross margin	-	-	-	**59,000**
	Net farm income	-	-	-	**49,000**
	Rate of return on investment	-	-	-	**34.75**

Socio-economic determinants of profitability in rice processing

Results in table 3 show the estimates of socio-economic determinants of profitability in rice processing in Ebonyi state.Cobb - Douglas function was chosen as the lead equation based on the high R-squared (0.771) value and in conformity with apiori expectations. R-squared value of 0.771 implies that 77.10% of the total variations in profit were accounted for by the independent variables. The result indicated that education level influenced profit level positively in rice processing venture and was significant at 1% probability level. This implies that it is a major factor influencing profitability in rice processing in the study area. This is in conformity with a prior expectation that as farmers get educated they become more innovative and earn more profit [8].

Household size had positive relationship with profit of rice processors and was significant at 5% level. Increase in household size would result to readily availability of cheap labour. This reduces variable cost with consequent increase in profit level. Income level also had positive relationship with profitability of rice processing and was significant at 5% level. This indicates that income level is a determinant of profitability in agribusiness rice processing because this enables the processors to take advantage of business opportunity when it becomes available.

Years of rice processing experience also had positive relationship with profitability and are significant at 5% level of probability. This implies that farmers with greater business experience had increased profit than new entrants in rice processing agribusiness venture because experience they say is the best teacher. Thus, The combined effects of all variables (Gender, age, education, household size, labour, income level and processing experience) explained (77.10%) of the total variation in the profit of rice processors at 1% and 5% levels of probability respectively.

17

Table 3: Estimates of socio-economic variables influencing the profitability of rice processors

Variable	Coefficient	t-value
Constant	8.699***	4.639
Gender	0.019	0.48
Age	0.277	0.450
Education	0. 906***	3.744
Household size	0.439**	2.105
Income level	0.459**	1.894
Labour	0.044	0.187
Processing Experience	0.527**	2.025
Number	300	
R-squared	0.771	
F-Ratio	4.830***	

*** & ** significant at 1% and 5% level of significance respectively.

Conclusion

This study analysed the economic returns on rice processing in Ebonyi State, Nigeria. Findings indicated that rice processing is a viable agribusiness enterprise in the study area. However, private and public interventions were needed to improve rice production for steady supply of paddy rice to enable processors remain in business. Besides, government should increase the number of rice industrial clusters in Ebonyi state in order to make milling machine and equipments readily available for processors at reduced cost.
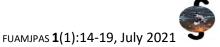
Declaration of conflicting interests

The authors declared no potential conflicts of interest

References

[1] Ebonyi State Agricultural Development Programme, 2015. **Data on rice production**. EBADEP/PM/M. 10(20): 87-92.

[1b] Ebonyi State, 2017. A Publication of the Ebonyi State Ministry of Information and State Orientation. ebonyistate.gov.ng. Accessed 20thFebruary 2021.

[2] Eboh, E.C., 2009. **Social and economic research: Principles and methods**, 2ndedition. African Institute for Applied Economics, Enugu state, Nigeria.Pp 262.

[3] Chidiebere-Mark, N.M, 2017. **Analysis of value chain in rice production systems in Ebonyi state, Nigeria**. Unpublished M.Sc. Thesis submitted to the Department of Agricultural Economics, Federal University of Technology Owerri, Imo state, Nigeria.Pp 26 – 52.

[4] Dayo, P;Olumuyiwa, O;Jayeoba, Y.N, and Fatunbi, O., 2018**. Innovation opportunities in the rice value chain in Nigeria.** FARA Research Results, 2(3): 18-23.

[5] Ewuzie, C.O; and Anetoh,J.C., 2020. **Profitability of actors in rice value chain in Nigeria: A comparative analysis.** *International* Journal of *Innovative Research and Advanced Studies*, 7 (7): 60-66.

[5] Offor, E.I;Onu, D. O. and Nnamani, G.N, 2017. **Economics of banana marketing in Umuahia South Local Government Area of Abia State, Nigeria.** *Journal of Agriculture, Food and Environment,* 13(3): 65-69.

[6] National Bureau of Statistics, 2011. **Collaborative survey on National Agriculture Sample Survey** (NASS) 2010/2011. http://www. nigerianstat.gov.ng. Accessed 15th February 2021.

[6b] FAO, 2015. Food and Agriculture Organisation. Quaterly Report.

[7] National Population Commission, 2006. **Provisional of state and local government totals of the 2006 population census of the Federal Republic of Nigeria,** 2006. Retrieved from: http://www. nigerianstat.gov.ng on 17th February 2021, 131- 153.

[8] Idenyi, E.O, 2010. Practical **guide to farm skill acquisition in agriculture for schools. Abakaliki,** Willyrose & Appleseed Publishing Company, Pp 77 – 81.

[8b] Nwaobiala, C.U, 2010. **Economic analysis of swamp rice production in Ebonyi southern agricultural zone of Ebonyi state,** Nigeria.

Journal of Agriculture and Social Research, 10 (2): 135-141.

[9] Okereke, C. O, 2012. **Challenges of risk management among smallholder farmers in Ebonyi State, Nigeria: Implications for national food security**. *International Journal of Agricultural Economics* and Rural Development, 5 (1): 20-29.

Cite this article

Esheya E.S. **(**2021). Economic Analysis of Rice Processing in Ebonyi State, Nigeria . *FUAM Journal of Pure and Applied Science*,1(**1**): 14-19.