ASSESSMENT OF SMALL SCALE PADDY RICE PROCESSING AND MARKETING IN DASS LOCAL GOVERNMENT AREA, BAUCHI STATE, NIGERIA

Bose, A. A.[1], Jatbong, J. N.[2], Danwanka, H. A.[1] and Zayyad, B.[1]
[1]Department of Agricultural Economics and Extension A.T.B.U. Bauchi, Nigeria
[2]Department of Agricultural Economics and Extension, Taraba State University, Jalingo, Nigeria
Corresponding author: abdullahi.bose@yahoo.com

ABSTRACT

The study assessed small scale paddy rice processing and marketing in Dass Local Government Area of Bauchi State, Nigeria. Purposive and random sampling techniques were used and data were collected from 75 respondents with the aid of a structured questionnaire. Data were analyzed using descriptive statistics, farm budget model and regression analysis. The result reveals that average age of the farmers was 40.3 years and majority (60%) of the respondents were female. Also, 93.3% of the respondents had acquired various forms of formal education and 58.7% of the respondents engaged in rice milling and marketing as their primary occupation. The total variable cost and gross income for processing a 100kg bag of paddy rice were ₦8,938.40 ($24.83) and ₦11,394.42 ($31.65), respectively. The marketing margin and marketing efficiency were 33% and 284%, respectively. Net income and Return per naira invested were ₦2,456.02 ($6.82) and ₦0.27, respectively. Thus, small scale paddy rice milling is a profitable enterprise in the study area. The average quantity of paddy milled was 97.5 bags per week. Result on regression reveals that price had positive coefficient and significant at P<0.05, which implies that increase in selling price, might lead to increase in gross income. Cost of milling had negative coefficient and significant at P<0.001, which implies that decrease in milling charges might lead to increase in gross income. The R^2 was estimated at 0.947 which implies that about 95% of the variation in the gross income is explained by the explanatory variables included in the model and F-value of 165.038 was significant at P<0.001. However, inadequate market information; inadequate credit facilities; variability in price of rice and high cost of milling machines were some of the constraints affecting small scale paddy rice milling in the study area. The study recommends that rice processors/marketers should be encouraged to form co-operatives so as to have easy access to credit facilities and to market their products collectively.
Keywords: Marketing, Nigeria, Paddy rice, Processing, Small-scale

INTRODUCTION

Rice, Oryza sativa (Asian rice) or Oryza glaberrima (African rice) is one of the world's most important cereals, being the staple food for over 50% of the world population (Ibitoye et al., 2014). Rice is indispensable in the strategy for food security in Sub-Saharan Africa (SSA), because it provides 27% of the energy and 20% of protein needs in developing countries, including African countries. In Sub-Saharan Africa, West Africa is the leading producer and consumer of rice and accounts for 64.2% and 61.9% of total production and consumption, respectively (Basorun, 2013). Nigeria is the one of the largest producer's and a leading consumer of rice in West Africa (Bayou, 2009). Nigeria accounted for 48% of the total rice output in West Africa (Jonathan, 2014). Rice is the most important component of food consumption in Nigeria. It has emerged as one of the fastest growing subsector and has also moved from a ceremonial to staple food in many Nigerian norms within the last three decades. In Nigeria, total consumption of rice stands at about 5.4 million

metric tonnes annually while output is about 3.8 million tons (NSADP, 2014). The deficit in production is made up by massive importation of milled rice to bridge the gap between domestic demand and supply. Nigeria's rice processing capacity is 2.8 million tonnes of paddy annually (USAID, 2009). The volume of rice importation into Nigeria (in metric tonnes) has declined drastically in 2018 (Bayou, 2009). The Federal Government of Nigeria in the 2011-2015 dispensation focused on 'Value Chain' in the agricultural sector. Some programs implemented under the Value Chain scheme are; Nigerian Incentive-based Risk Sharing for Agricultural Lending (NIRSAL), Growth Enhancement Scheme (GES), and Crop value chains, etc. The priority crop value chains include, rice, cassava, sorghum, cocoa and cotton. The crop value chain was aimed at increasing local production of staple crops for food and nutrition security as well as to make the country self-sufficient in production of certain crops.

However, there is still dearth of information on the extent of value addition as well as profit margins in rice production in the State. The value chain 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 Dass local government area is not yet ascertained, because, it is not well understood who actually benefits from the higher prices that consumers pay for high quality rice. It is not known empirically, if it is beneficial for rice farmers to produce paddy only, or if they should be encouraged to add value by processing and marketing. By identifying the value per Naira invested in the paddy rice value chain, actors will be certain of the extent of value addition that would be beneficial to them. Only by understanding the costs and returns on 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. Value addition along the value chain of paddy rice has been highlighted in many empirical literatures, yet the weak links along the value chain of rice in Dass local government area, Bauchi state, Nigeria is not sufficiently documented for intervention. The result of this study will enable the people living in the study area to know the problems and constraints as this will also help stakeholders to make policies that will tackle such problems. Also the result of this study will educate farmers especially those in the study area the importance of value-addition on rice production and processing in order to improve productivity and gross income.

Objectives of the Study
The specific objectives of the study are to:
i.   Determine the socio-economic characteristics of the rice processors;
ii.   Compute profit level of paddy rice milling;
iii.   Examined factors influencing gross income on rice milling; and
iv.   Identify constrains affecting their enterprises in the study area.

MATERIALS AND METHODS

Study Area

The study was conducted in Dass Local Government Area of Bauchi State in north geo-political zone of Nigeria. It is located at latitude $90^{\circ} 30`$ North and longitude $8^{\circ} 45`$ East with an estimated population of 200,987 (Information Department Dass Local Government Area, 2017). The climate is characterized by two distinct seasons, dry and wet seasons. The area recorded rainfall of about 1000mm annually. The people of Dass Local Government Area engages in various form of farming activities for livelihood. Different varieties of crops are produced in the area which include rice, millet, sorghum, beans, spinach, sugar cane, groundnut and soya beans. Also people engaged in livestock production such as sheep, goat and cattle, among others.

Sampling Procedure and Sample Size

Multi-stage sampling technique was employed in this study. In the first stage, five districts were purposely selected namely; Baraza, Bazali, Lukshi, Wandi and Dott. In the second stage, one community was randomly selected from each district namely; Bakin Kogi, Kuletu, Bajar, Bagel and Dabardak, making a total of five (5) communities. In the third stage 15 paddy rice millers were randomly selected from each community giving a total of 75 processors. The sampling procedure is presented in Table 1:

Table 1: Sampling Procedure and Sample Size

Districts	Towns/Villages	Sampling frame	Sample size (10%)
Baraza	Bakin-kogi	182	18
Bazali	Kuletu	134	13
Lukshi	Bajar	130	13
Wandi	Bagel	150	15
Dott	Dabardak	160	16
Total		756	75

Data Collection

Primary data were used for this research. Data were collected using structural questionnaires. The information collected was on socio-economic characteristics of the paddy rice processors; costs and return on milling; and constraints affecting rice millers in the study area.

Method of Data Analysis

Data were analyzed using descriptive and inferential statistics as well as farm budget model.

Descriptive Statistics

The descriptive statistics was used to achieve objective one, three and four. The descriptive statistics used include: percentage, mean and frequency distribution.

Farm Budgeting Model

This involves calculation of expected gross income, expenditures and net farm income (Olukosi et al, 2005). The farm budget model used in this study is specified as:

$$GM = GI - TVC \quad \dots (1)$$

where;

GM = Gross margin 100kg/bag

GI = Gross income 100kg/bag

TVC = Total variable cost 100kg/bag

Return per naira invested in rice enterprise is given as:

$$RNI = \frac{NI}{TVC} \quad \dots (2)$$

where;

RNI = Return per naira invested

NI = Net income

TVC = Total variable cost

Marketing Margin

The differences between the price paid to the primary producer/market of paddy rice and resell price of the milled rice represent the market margin. Marketing margin is calculated as:

$$Mm = \frac{RP - PP}{RP} \times 100 \quad \dots (3)$$

where;

MM = Marketing margin

RP = Resell price of milled rice

PP = Purchase price of paddy rice

Marketing efficiency

This can be defined as the maximization of the ratio of output to input in marketing. The decision rule stated that the higher the efficiency ratio, the more the marketing of the commodity is efficient (Igboji et al., 2015). The model is specified as:

$$ME = \frac{VA}{CMS} \; x \; 100 \qquad\qquad \dots (4)$$

where;

ME = Marketing efficiency

VA = Value added on paddy rice milling

CMS = Cost of marketing services on paddy rice milling

Regression Analysis

Multiple regressions was used to achieve objective four, which deal with factors influencing gross income on rice value-addition (rice milling). The mode is specified as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e \qquad \dots (5)$$

where;

Y = Gross income (₦)

X_1 = Age (years)

X_2 = Sex (1 = male, 0=female)

X_3 = Education (years of formal education)

X_4 = Quantity of milled rice (kg)

X_5 = Price of milled rice (₦)

X_6 = Milling cost (₦)

X_7 = Transportation (₦)

X_8 = Experience (years)

X_9 = Other cost (₦)

a = Constant

b_1-b_9 = Regression coefficients

e = Error term

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

Table 1 shows that the average age of the farmers was 40.3 years. This indicated that rice enterprises in the study area were carried out by youth who are active and can take rational decision affecting their enterprise. As reported by FAO (2014) a population between ages of 20-49 were economically productive. A similar result was obtained by Benjamin and Richard (2019) who reported 41.2 years as average age of respondents in the study area. The result reveals that majority (60%) of the respondents were female. This implies that female dominated the paddy rice milling enterprises in

the study area. The result contradicted the finding of Abdurrahman et al. (2018) who reported that rice milling was dominated by male (96.7%) in Bauchi Local Government Area. of the respondents were female while 36% were male, in rice enterprise. The result reveals that about 93.3% of the respondents had acquired various forms of formal education. Their educational levels are probably good enough to take rational decision affecting them and it might be good enough to influence the adoption of any improved technology on paddy rice milling enterprise A similar result was reported by Abdurrahman et al. (2018) that majority (91.7%) of the respondents had formal education which will positively influence their managerial skill on milling enterprise. Also, that majority (58.7%) of the respondents engaged in rice milling and marketing as their primary occupation in the study area. This indicates that apart the respondents diversified their source of income for livelihood. The average family size was of seven persons. This implies that the household size was moderate and serve as a source of family labour which may be used in rice milling activities. The average years of milling experience was 10.5 years. This implies that the more they will be willing to adopt new milling and marketing technologies. Thus, number of years of business people had spent in the marketing could give an indication of practical knowledge which has been acquired over a number of years.

Table 2: Socio-economic Characteristics of the Rice Processors

Variables	Frequency	Percentage	Mean
20 – 30	20	26.7	40.3 years
31 – 40	26	34.7	
41 – 50	10	13.3	
51 – 60	10	13.3	
61 – 70	09	12.0	
Sex			
Male	30	40.0	
Female	45	60.0	
Educational Level			
Qur'anic	05	6.7	
Adult education	08	10.0	
Primary	20	27.3	
Secondary	32	42.7	
Tertiary	10	13.3	
Occupation			
Rice milling only	08	10.0	
Rice milling and marketing	44	58.7	
Rice milling and civil service	08	11.3	
Rice milling and mixed farming	15	20.0	
Household Size			
1 – 5	25	33.3	7 persons
6 – 10	39	52.0	
11 – 15	07	9.3	
16 – 20	02	2.7	
21 – 25	02	2.7	

Milling Experience			
1 – 5	07	9.3	10.5 years
6 – 10	33	44.0	
11 – 15	28	37.3	
16 – 20	05	6.7	
21 – 25	02	2.7	

Source: Field Survey, 2019

Table 3 shows that the average cost and returns of rice milling per one bag in the study area. The most important component of variable cost was the cost of paddy which constitute 85.10%. Followed by milling charges which covered about 8.84%. While the least important components was water 1.16%. This implies that cost of paddy rice covered substantial amount of the total variable cost in the study area. The total variable cost and gross income for processing one bag of paddy rice were ₦8,938.40 and ₦11,394.42, respectively. Net income and Return per naira invested were ₦2,456.02 and 0.27, respectively. The return per naira invested of 0.27 implies that in every naira invested a farmer realized a return of ₦0.27. Thus, small scale paddy rice milling is a profitable enterprise in the study area. The result is in line with the findings of Okpe et al. (2014) that rice millers recorded an average profit of ₦254,620.00 and a return of ₦0.91on every naira invested in rice milling activities in Katsina-Ala rice milling area. Similar result was obtained by Inuwa et al. (2011) that millers obtained a net income of ₦3,378,855.08 per respondent per year. This indicates that millers were operating on large scale milling enterprise in Kano State, Nigeria. Also, Akarue and Ofoegbu (2012) who reported that small scale paddy milling business is a profitable enterprise. Furthermore, the result reveals that marketing margin and marketing efficiency were 33.24% and 284.39%, respectively. A marketing efficiency of 284% indicates that paddy rice milling and marketing was very efficient. The higher the efficiency ratio the higher the marketing efficient (Igboji et al., 2015).

Table 3: Costs and Return of Paddy Milling 100/Bag in the study area

Items	Amount (₦)	% Total Variable Cost
Cost of paddy rice	7,606.40	85.10
Transportation	130.00	1.45
Firewood	142.00	1.59
Water	104.00	1.16
Pot	166.00	1.86
Milling charges	790.00	8.84
Marketing cost	1,332.00	
Total variable cost	8,938.40	
Gross income	11,394.42	
Net income	2,456.02	
Return per naira invested	0.27	
Marketing margin (%)	33.24	
Marketing Efficiency (%)	284.39	
Total		100.00

Currency Exchange Rate as of 2019
$1.00 = ₦ 360.00
Source: Field Survey, 2019

Volume of Paddy Rice Processed

Table 4 shows that majority (52.0%) of the respondents milled about 51 – 100 bags of paddy per week. Followed by 21.3% of the respondents who milled about 101 – 150 bags of paddy per week. Only 2.7% of them processed 251 – 300 bags per week. The average quantity of paddy milled was 97.5 bags per week. This implies that processors were operating on small scale in the study area. A similar result was reported by Abdurrahman et al. (2018) that average paddy rice milled was 13.5 bags and 94.5 bags per day and week, respectively in the study area.

Table 4: Volume of Paddy Rice Processed per Week

Bags of paddy	Frequency*	Percentage*	Mean
1 – 50	10	13.3	97.5 bags
51 – 100	39	52.0	
101 – 150	16	21.3	
151 – 200	05	6.7	
201 – 250	03	4.0	
251 – 300	02	2.7	

Source: Field survey, 2019

The result in Table 5 shows that R^2 was estimated at 0.947 which implies that about 95% of the variation in the gross income is explained by the explanatory variables included in the model. The F-value was 165.038 and found significant at $P<0.001$ implying that all factors considered had influence on gross income of rice milling enterprise. Furthermore, the result reveal that price had a positive coefficient and significant at $P<0.05$, which implies that increase in selling price might lead to increase in gross income. Cost of milling had negative coefficient and significant at $P<0.001$, which implies that decrease in milling charges might lead to increase gross income in paddy milling enterprise all things been equal. This result is conformity with Igbitoye et al., (2014) that cost of rice milling had significant effect on the gross income at one percent. Quantity of milled rice had positive coefficient and significant at $P<0.001$, implying that the more the quantity of milled rice obtained, the more the gross income. This result is in agreement with Usman (2009) who reported that the more quantity of milled rice, the more the gross income.

Table 5: Factors Influencing Gross Income on Rice Milling

Variables	Coefficients	Std. Error	T-values	Prob. Level
Constant	269.086	2873.780	0.94	0.926
Age (X_1)	-0.958	42.829	-0.022^{NS}	0.982
Sex (X_2)	119.181	790.982	0.151	0.881
Education (X_3)	-150.452	123.072	-1.222	0.226
Quantity of milled rice (X_4)	252.332	9.687	26.049***	0.000
Price (X_5)	4.408	1.895	2.326**	0.023

Cost of milling (X_6)	-2.238	0.732	-3.057**	0.003
Transportation(X_7)	0.560	0.996	0.562^{NS}	0.575
Experience (X_8)	-2.749	3.769	-0.729^{NS}	0.468
R^2	0.976			
R adjusted	0.952			
F-value	165.038***			

*** = $P<0.001$; ** = $P<0.05$

Source: Field survey, 2019

Constraints Affecting Paddy Millers in the Study Area

Table 6 shows that inadequate marketing information ranked first among constraints mentioned by 81.7% of the respondents The respondents opined that inadequate information on source of paddy and market outlets for the milled rice affected the gross income. This was followed by 74.2% of the respondents who complained on inadequate credit facilities. This constraint forced the respondents to rely on hired milling machines. That is they do not own milling machines. Also, 69.9% of the respondents pointed out that high cost of milling machines and variability in price of both paddy and milled rice affect the gross income in the enterprise. This result is in agreement with Okpe et al. (2014) that majority of the respondents complained on inadequate capital for rice milling business. Similarly, 60.2% of the respondents complained on competition from imported rice because it was attract good price due to cleanness and absence of impurities. It is important to note that milling machines used by the respondents do not have de-stoners thereby affecting the quality and price of the rice. The result is in the line with the findings of Okpe et al. (2014) who reported that majority of the rice millers disclosed poor pricing of locally milled rice as a constraint affecting their gross income.

Table 6: Constraints Affecting Paddy Millers in the Study Area

Constraints	Frequency*	Percentage*	Rank
Variability in price of rice	65	69.9	3rd
High cost of diesel	55	59.1	5th
Inadequate storage facilities	45	48.4	8th
Inadequate market information	76	81.7	1st
Competition from imported rice	56	60.2	4th
High cost of milling machines	65	69.9	3rd
High cost of processing facilities	35	37.6	10th
Inadequate credit facilities	69	74.2	2nd
High cost of maintainance	55	59.1	5th
High cost of labour	48	51.6	7th
High cost of transpotation	52	55.9	6th

*Multiple responses were obtained

Source: Field Survey, 2019

CONCLUSION

The study assessed small scale paddy rice milling and marketing and it was concluded that the enterprise was profitable in the study area, as the miller recorded total variable cost and gross income of ₦8,938.40 and ₦11,394.42 per bag, respectively. However, inadequate market information; inadequate credit facilities; variability in price of rice and high cost of milling machines were some of the constraints affecting smooth running of the business in the study area.

RECOMMENDATIONS

The following recommendations were made:

i. Rice processors/marketers should be encouraged to form associations so as to be able to access credit in order to procure modern processing facilities and to market their products collectively.

ii. Indigenous industries should be encouraged to fabricate small/medium capacity milling machines with par-boiler, de-stoner and polishers that will improve the quality of locally milled rice.

iii. Training on management and processing techniques on paddy should be provided by extension workers and/or milling associations in order to boost rice milling in the study area.

REFERENCES

Akarue, O. B., and Ofoegbu, S. (2012). Marketing Analysis of Rice in Udu Local Government Area of Delta State, Nigeria. *Continental Journal of Agricultural Economics* 6(2): 21-31.

Basorun, D. (2013). Assessing the significant factors influencing the location of rice marketers in Igbemo region, Nigeria. A Ph.D thesis submitted to Federal University of Technology, Akure, Nigeria.

Bayou (2009). Rice Value Chain Development Plan, Kaduna Rice Industry Supply Chain Development Programme, Bayou Farms and Industries Limited, Nigeria.

Benjamin, T. A. and Richard, W. N. Y. (2019) Determinants of Off-Farm Income among Smallholder Rice Farmers in Northern Ghana: Application of a Double-Hurdle Model. *Hindawi Advances in Agriculture.* Available online at https://doi.org/10.1155/2019/ 7246176 Accessed on 16 April, 2020.

Food and Agricultural Organization (FAO) (2014). Agricultural Development in Nigeria: Overview

Igboji, C., Anozie, R. O. and Nneji, C.P. (2015). Analysis of socio-economic factors and profitability of rice production among small scale farmers in Ebonyi State. *IOSR journal of Agriculture, and Veterinary Science (IOSR-JAVS).* 8(2): 20 – 27. Available online at DOI: 10.9790/2380-081212027. Accessed on 17 April, 2020.

Inuwa, I. M. S., Kyiogwom, U. B., Ala, A. L., Maikasuwa, M. A. and. Ibrahim, N. D. (2011). Profitability Analysis of Rice Processing and Marketing in Kano State, Nigeria.

Nigerian   Journal of Basic and Applied Science. 19(2): 293-298. Available online at http://www.ajol.info/index.php/njbas/index. Accessed on 16 April, 2020

Jonathan, U. (2014). Marketing of Agricultural Products (3ᵈ edition), MacMillan, Co. New York, Pp. 650.

Olukosi, J. O, Isitor, S. U. and Ode, M. O. (2005). **Introduction to Agricultural Marketing and Prices: Principles and Application**: Living Book Series G. U Publication, Abuja, Nigeria,   116 pp.

Okpe, I. J., Uji, T. and Okpachu, S. A. (2014). The Impact of Rice Milling on Poverty Reduction in the Three Geo-Political Zones of Benue State, Nigeria. IOSR Journal of Economics   and Finance (IOSR-JEF), 3(2):1 – 8. Available online at www.iosrjournals.org Accessed   on 16 April, 2020

USAID (2009). Nigeria, Overview of Nigerian Rice, Market –Investment Opportunities, May 2009

Usman, R. K. (2009). Problems Associated with Marketing of some selected grains in Bosso Local Government Area of Niger State. Journal of Agricultural Extension, 13(2): 55-63.