ECONOMIC ASSESSMENT OF RICE PROCESSING IN BASSA LOCAL GOVERNMENT AREA OF KOGI STATE, NIGERIA

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ABSTRACT

The study was on assessment of rice processing in Bassa Local Government Area of Kogi State, Nigeria. The study described the socio-economic characteristics of rice processors, identified the methods of rice processing, determined the net return from rice processing, determined the factors affecting the net return, and identified the major problems of rice processing in the study area. A multistage random sampling method was used. First, three districts were selected. Secondly, two major rice processing communities were randomly selected. Finally, fifteen rice processors were randomly selected from each of the communities making a total of 90 respondents. Data were gathered through questionnaire administration. Descriptive statistics, net return model, multiple regression, and mean score were used for data analysis. The result showed that rice processing was profitable and viable with a net return of ₦ 1 061. Income, educational status, household size, distance and sex were significant at 1 percent in influencing the net return on rice processing. The major problems affecting rice processing are inadequate capital, price fluctuation, and high cost of transportation. The study recommends that price regulatory agencies should be strengthen and enlightened on the need to stabilize the price of rice. Also, agencies involved in the construction of roads should extend such to the localities where rice is produced.

Keywords: Processing, Assessment, Net Return.

INTRODUCTION

Rice (*Oriza sativa*) is an integral part of human history. It is an important annual crop in Nigeria and one of the major staples, which can provide a nation's population with the required food security of 2,400 calories per person per day (FAO, 2000). Commercially, it is the most important cereal after wheat. It is widely consumed and there is hardly any country in the world where it is not utilized in one form or the other. In Nigeria rice is one of the few food items whose consumption has no cultural, religious, ethnic or geographical boundary.

On average, rice is the 4th most important crop in terms of calories consumed, following sorghum, millet and cassava (FAO, 2000). Rice is both a food and a cash crop for farmers, contributing to smallholders revenues in the main producing areas. West Africa Rice Development Association (WARDA) estimates that per capita rice consumption in Nigeria has nearly doubled between the 1980s and 2006, growing from 15.4 kg/year to 25.4 kg/year (Cadoni and Agelucci, 2013).

Rice is grown in approximately on 3.7 million hectares of land in Nigeria, covering 10.6 percent of the 35 million hectares of land under cultivation, out of a total arable land area of 70 million hectares (Bayou, 2009). The main actors in the rice value chain in Nigeria are farmers, paddy traders, millers, rice traders and retailers. The main value adding activities include: production, harvesting, storage and paddy aggregation at traders' level, parboiling, milling, wholesaling, and retailing. United State Agency for International Development (USAID (2009) identified five supply channels which they describe as the most prominent:

Channel 1 is supplied by smallholders and serves rural village consumption accounting for the approximately 80 percent of marketed domestic rice;
Channel 2 is also supplied by smallholders and is traded along the value chain. The main value adding activities include parboiling and milling, while the overall actors' investment can be summarized as a low-input low-output approach;
Channel 3 supplies middle-end rural markets, and includes mid-size mills (approximately between 20 and 30 millers in the country). Millers' supply is often augmented by out grower schemes, and it is variable in quantity. Parboiling is mainly artisanal, with a minority of mechanical parboiling schemes. This channel provides an estimated 25 000 tonnes of milled rice per year (1 percent of average total production in milled equivalent);
Channel 4 supplies large scale, industrial millers and aims at import substitution between imported and domestic rice. There are only two large scale millers (Olam and Vetee) involved in this channel, and they rely on contract growers and market the top end domestic product;
Channel 5 supplies high end domestic consumers, mostly urban, and it is supplied by imported rice. There are three main traders involved in this channel (Vetee, Stallion, Olam) and the traded product, includes a range of different qualities marketed at different prices (although of consistently higher quality compared with the local produce). Most of the sales for this channel are located in Lagos. Due to its increasing contribution to the per capita calorie consumption of Nigerians, the demand for rice has been increasing at a much faster rate than domestic production and more than in any other African countries since mid 1970s (FAO, 2001).

Rice processing is a combination of several operations to convert paddy into well milled silky-white rice, which had superior cooking quality attributes. Steps involved in processing include cleaning, hulling, milling, polishing, grading, sorting, and packing. In Nigeria, processed/milled rice in 2008 was approximately 2 million metric tons including the estimated 800,000 metric ton that was suspected to have entered the country illegally on annual basis (USAID, 2009). According to USAID (2008), rice processing and marketing are dictated by economic forces beyond the mere confines of the farmer. Most of the rice processing in Nigeria still occurs at the cottage level by individual small-scale processors and their cooperative societies. Powered paddy processing is still limited in many producing areas in Nigeria. Thus, paddy processing in many rural producing communities still depends mainly on manual options. Many farmers sell their paddy unprocessed, which results in poor quality and low farm gate prices. Where accessibility is an added problem, farmers must accept a further cut in the farm gate price from rural assemblers and/or rural wholesalers (FAO1992). Despite efforts by both Federal and State Government to provide domestic rice for consumption as well as reducing importation of rice, such may not be fully realizable without proper processing, and marketing channels activities.

Hence, this study had a broad objective of assessing rice processing in Bassa Local Government Area of Kogi State, Nigeria. The specific objectives are to: describe the socio-

economic characteristics of rice processors in the study area; describe the methods of rice processing in the study area; determine the net return from rice processing; determine the factors affecting the net return of rice processors; and identify the major constraints affecting rice processing in the study area.

METHODOLOGY

The study was conducted in Bassa Local Government Area (LGA) of Kogi State, Nigeria. The LGA is located on the coordinates 7.54^{o}N and 7.50^{o}N, 7.03^{o}E and 7.05^{o}E. The LGA has three districts: Bassa-Nge, Egubura, and Bassa Komo districts. The LGA has an area of 1 925km and a population of 139 993 people (NPC, 2006). Farming is the major occupation of the people, while fishing, petty trading, and civil service occupy the minor sector. The study was restricted to only rice processors in the area.

A multistage random sampling method was used in the selection of respondents. First all the three districts in the Local Government Area were selected. Secondly, two major rice processing communities were randomly selected making a total of six communities for the study. Finally, fifteen rice processors were randomly selected from each of the communities. A total of 90 rice processors were used for the study.

Data for the study were mainly from primary source. Data were gathered using structured questionnaire which was administered to the sample size.

Model Specification

i. Net Return Model:
NR = TR-TC, where NR = Net Returns, TR = Total Revenue and TC = Total Cost

ii. Multiple regression analysis was used to determine variables that affect rice processors' net return in the study area. The model for the multiple regression is specified thus;

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 e_i)$

Where: Y = Net Returns
X1 = Income (₦)
X2 = Age (years)
X3 = Educational status (years spent schooling)
X4 = Household size (No. of persons)
X5 = No of years in processing (years)
X_6 = Distance to the market (km)
X7 = Marital status (dummy) (married 1; otherwise, 0).
X8 = Sex male = 1; female 0 (dummy)
X_9 = accessibility to extension service (dummy) (1 = contact; 0 = otherwise)
e_i = Stochastic error term
Four functional forms of the above model were tried viz, linear, semi-log, double log and exponential.
The explicit forms of the functional forms were as follows:
Linear function

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5 X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + e_i$$

Semi Log function

$$Y = \beta_0 + \beta_1 \text{Log}X_1 + \beta_2\text{Log}X_2 + \beta_3\text{Log}X_3 + \beta_4\text{Log}X_4 + \beta_5\text{Log}X_5 + \beta_6\text{Log}X_6 + \beta_7\text{Log}X_7 + \beta_8\text{Log}X_8 + \beta_9\text{Log}X_9 + e_i$$

Double Log function

$LogY = \beta_0 + \beta_1 LogX_1 + \beta_2 LogX_2 + \beta_3 LogX_3 + \beta_4 LogX_4 + \beta_5 LogX_5 + \beta_6 LogX_6 + \beta_7 LogX_7 + \beta_8 LogX_8 + \beta_9 LogX_9 + e_i$

Exponential function

$LogY = \beta_0 + \beta_1 LogX_1 + \beta_2 LogX_2 + \beta_3 LogX_3 + \beta_4 LogX_4 + \beta_5 LogX_5 + \beta_6 LogX_6 + \beta_7 LogX_7 + \beta_8 LogX_8 + \beta_9 LogX_9 + e_i$

iii. Mean score was used to identify the major constraints affecting rice processing in the study area. The mean score was calculated after respondents' responses were obtained with a four point Likert type of scale.

$$\bar{X} = \frac{\sum FX}{N}$$

Where: $\bar{X}$ = means response, $\sum$ summation, F = number of respondents choosing a particular scale point, X = numerical value of the scale point and N = total number of respondents to the item

The mean response to each item was interpreted using the concept of real limits of numbers. The numerical value of the scale points (Response modes) and their respective real limits are as follows:

Strongly Disagree (SD) = 1 point with real limits of 0.5 - 1.49
Disagree (D) = 2 points with real limits of 1.50 - 2.49
Agreed (A) = 4 points with real limits of 2.50 - 3.49
Strongly Agreed (SA) = 5 points with real limits of 3.50 - 4.49

RESULTS AND DISCUSSION

Socio-economic characteristics of rice processors

The socio-economic characteristics of rice processors in the study area is presented in Table 1.

Table 1: Distribution of respondents according to socio-economic characteristics

Variables		Frequency	Percentage
Sex	Male	14	15.6
	Female	76	84.4
	Total	**90**	**100**
Age	21-35	20	22.2
	36-45	49	54.4
	46-55	16	17.8
	56 and above	05	5.6
	Total	**90**	**100**
Marital status	Single	17	19
	Married	64	71
	Divorced	06	7
	Widowed	03	3
	Total	**90**	**100**

Educational level	No formal education	44	48.9
	Primary education	19	21.1
	Secondary education	16	17.8
	Tertiary education	11	12.2
	Total	**90**	**100**
Household size	1-5	23	25.6
	6-10	56	62.2
	11-15	09	10.0
	Above 15	02	2.2
	Total	**90**	**100**
Years of Experience	1-5	19	21.1
	6-10	24	26.6
	11-15	32	35.6
	Above 15	15	16.7
	Total	**90**	**100**
Major Occupation	Rice processing and marketing	62	68.9
	Artisan	13	14.4
	Civil service	05	5.6
	Petty trading	10	11.1
	Total	**90**	**100**

Source: Field Survey, 2014.

Table 1 show that females constitute majority of the respondents, having 84.4 percent while males involved in the enterprise were 15.6 percent. This finding agrees with (Morris, 1994 and Ekwumankama, 2000) that women play active roles in the processing of agricultural produce. Usman (2009) and Basorun (2013) in their separate studies also confirm that more females are in rice processing and marketing.

Majority of the respondents (76.6 percent) falls within the age range of 21 – 45 years. This means that the enterprise is dominated by the younger ones who are more active and stronger. This can be attributed to the fact that rice processing in the study area is tedious and laborious. The success or failure of rice processing depends largely upon how labour and other associated resources are efficiently utilized. Agwu (2009) in a study with plantain

marketers in Abia state confirms that young people within the age bracket of 20-45 years dominated the enterprise.

The marital status of the respondents shows that majority (71 percent) of the sampled rice processors were married. This implies the use of family labour for processing activities. The enterprise will also serve as source of income for the various families. This agrees with the findings of Anzanku *et al.*, (2006).

Table 1 also shows that 48.9 percent of the respondents had no formal education while 51.1 percent of rice processors in the study area can read and write with various level of educational attainment. This implies that majority of the respondents are literate.
Table 1 has also indicated that majority (87.8 percent) of the respondents had a household size of 10 members and below. It is expected that members of the household will serve as source of labour in processing activities. Majority (35.6 percent) of the respondents had spent between 11 – 15 years in rice processing. 26.6 percent had stayed between 6 – 10 years, 21.1 percent had spent 1 – 5 years whereas 16.7 percent of the respondents had spent over 15 years in the enterprise. This implies that rice processing seems to be a profitable enterprise in the study area, since there is a traditional believes that nobody will spend several years in an unprofitable venture.

Finally, Table 1 revealed that majority (68.9 percent) of the respondents are full-time rice processors while 14.5 percent, 11.1 percent, and 5.6 percent combine rice processing with artisan, trading and civil service respectively. This implies that the agricultural sector serves as source of employment opportunities to the rural areas. This finding is consistent with Daramola (2004) that the agricultural sector of Nigeria economy contributes significantly to rural employment, food security, provision of industrial and raw materials.

Methods of rice processing

The methods used by sampled rice processors in processing rice is presented in Table 2.
Table 2: Distribution of respondents according to methods of rice processing

Methods	**Frequency**	**Percentage**
Traditional	16	17.8
Milling	55	61.1
Both traditional and milling	19	21.1
Total	**90**	**100**

Source: Field Survey, 2014.

Table 2 indicated that 16 (17.8 percent) respondents used traditional method of processing, 55 (61.1 percent) used the modern milling method while 19 (21.1 percent) of the sampled respondents combined both the traditional and modern milling methods. This implies an increase level of rice output since majority of the respondents have adopted the modern milling method of processing rice.

Net return on rice processing in the study area
The net return generated from rice processing in the study area is presented in Table 3.

Table 3: computation of net return of rice processors per 200kg paddy rice

Items	Value (₦)
Total Revenue	28 596
Variable Cost	
Cost of paddy rice	16 849
Utilities (Firewood and Water)	975
Labour	3 742
Transportation	409
Storage	697
Total Variable Cost (TVC)	22 672
Fixed Cost	
Depreciation on fixed assets	4 863
Total Fixed Cost (TFC)	4 863
Total Cost (TFC + TVC)	27 535
Net Return (TR – TC)	**1 061**

Source: Field Survey Data, 2014.

Table 3 revealed that the net return from rice processing in the study area was ₦1 061. This implies that rice processing in the study area is profitable and viable. Inuwa *et al.*, (2011) also confirmed that rice processing is a worthwhile investment at both processing and marketing level as evident in the net processing/marketing income.

Factors affecting the net return of rice processors in the study area

The multiple regression analysis of factors affecting the net return of rice processors in the study area is presented in Table 4.

Table 4: Multiple regression result on factors affecting net return of rice processors

Variables	Linear	Semi-log	Double-log
Constant	-0.669(-20527.682)	**-4.913(-1.083E6)	*2.161(1.114)
Income	**7.305(7.961)	**5.478(161228.009)	**6.253(0.430)
Age	0.174(60.976)	0.192(6270.871)	0.110(0.008)
Educational status	-0.352(0.015)	-0.528(-9407.135)	**3.316(15596.349)
Household size	*-13.065(-2.555)	-1.5526(1.2024)	**-0.0572(-5.247)
Experience	0.345(0.262)	0.419(20742.017)	1.648(0.191)
Distance	-2.101(3.799)	**3.088(75137.166)	**4.015(-0.229)

Marital status	**13.041(4.140)	2.149(1.065)	0.0919(1.143)
Sex	1.427(47.547)	*2.157(90490.673)	**2.487(-0.244)
Extension contact	2.101(10539.021)	0.994(29944.016)	1.524(0.107)
R^2	0.700	0.731	0.808
Adjusted R^2	0.681	0.715	0.796
F-value	**37.349	**43.553	**67.211

Source: Computed from field survey data, 2014.

Figures in parenthesis are t-ratio. * = significant at 5%; ** = significant at 1%

In respect to some econometric considerations such as number of significant variables, the F – ratio and the R^2 value, the double-log functional form was selected as the lead equation.
The regression result indicated an R^2 value of 0.808 meaning that 80.8 percent of the variability in the model was explained while the remaining 19.2 percent could be attributed to error terms and omitted variables. The F-ratio was 67.211 at 1 percent significance.

As seen in the results on Table 4, income, educational status, household size, distance and sex which was dummied were significant in influencing the net return on rice processing. Income was significant at 1percent level of significance with a positive coefficient. This implies that as the income of processors increases, their net return also increase. This is consistent with Eze (2006). Number of years spent schooling was significant at 1 percent with a positive coefficient. This implies that the higher the level of education, the higher the level of adoption of the modern milling method which will be evident in higher output and the overall net return.
Household size, distance, and sex were also significant at 1 percent but had a negative coefficient. This means that number of persons in a household, and distance are negatively correlated to the processors' net return. Also, sex had a negative sign, it then means that females who are in the enterprise made more profit than their male counterparts. The result on sex is consistent with Agwu and Ibeabuchi (2011).

Problems Affecting Rice Processing

Major constraints affecting rice processing in the study area is presented in Table 5.

Table 5: Distribution of respondents according to problems affecting rice processing

Constraints	SA	A	D	SD	Total	Mean Score
	4	3	2	1		
1. High cost of labour	06	23	45	16	90	2.21
2. Inadequate capital	31	52	07	-	90	3.20
3. High cost of transportation	19	48	21	02	90	3.00
4. Low quantity produced	05	24	49	12	90	2.08
5. Price fluctuation	13	77	-	-	90	3.14
6. Inadequate storage facilities	17	35	32	06	90	2.76
7. Poor communication	08	42	35	15	90	2.58

8. Unavailability of technology	03	18	58	11	90	2.14
9. Inappropriate method of processing	-	16	60	14	90	2.00
10. Poor marketing information	02	08	57	23	90	1.87

Source: Field Survey Data, 2014

Table 5 show the problems faced by rice processors in the study area. The major constraints identified by the respondents include: inadequate capital, price fluctuation, and high cost of transportation with a mean score of 3.31, 3.20, 3.14, and 3.00 respectively. This is consistent with Akarue and Ofoegbu (2012) that the major problems limiting rice processing are inadequate capital, price fluctuation and high transportation cost.

CONCLUSION AND RECOMMENDATION

The study assessed rice processing in Bassa Local Government Area of Kogi State, Nigeria. The study revealed that rice processing is a worthwhile investment as evident in the net return.

Based on the identified problems, the study recommends the following:

1. That soft loan should be made available and accessible to rice processors;
2. Price regulatory agencies should be strengthen and enlightened on the need to stabilize the price of rice;
3. It is also suggested that agencies involved in the construction of roads should extend such to the localities where rice is produced. This will help reduce the transportation cost which translates in reducing the marketing costs.
4. Given that females engaged in the enterprise seem to make more profits than their male counterparts, females should be encouraged to go into the enterprise. This can be achieved by creating awareness through women association and cooperative societies groups.

REFERENCES

Aderibigbe, O. T. (1997). "An Econometric Analysis of Rice Processing and Marketing in Osun and Ogun States of Nigeria" Ph. D Thesis, OAU Ile-Ife, 1997.

Agwu, N. M., and Ibeabuchi, J. O. (2011). Socio-Economic Analysis of Wholesale Rice Marketers in Abia State, Nigeria. *International Journal of Social Science and Humanity*, 1(4). pp. 45-49.

Agwu, N.M. (2009). "Determinants of profitability among plantain marketers in Abia State, Nigeria", *The Nigerian Journal of Development Studies*, *7*(1) 49– 58.

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.

Anzanhu, H., Abinku, O.E., Azgaku, E.O., and Yohana, J.K. (2006). Socio-economic characteristics analysis of small;l-scale oil palm processors in Nassarawa state. Proceedings of 40th Annual Conferecne of Agricultural Society of Nigeria (ASN). Abia. Pp. 141-144.

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). Bayou Farms and Industries Limited, Rice Value Chain Development Plan, Kaduna Rice Industry Supply Chain Development Programme, submitted to MSME Nigeria, April 2009

Cadoni P., Angelucci F., (2013). Analysis of incentives and disincentives for Rice in Nigeria. Technical notes series, MAFAP, FAO, Rome.

Daramola, A.G. (2004). Competitiveness of Nigeria Agriculture in Global Economy: Any Dividends of Democracy? Inaugural Lecture Series 36, Federal University of Technology, Akure, pp. 36.

Ekwumankama, O.O. (2000). "Participation of rural women in livestock marketing in Ikwuano area, Nigeria" , *in proceedings of 12th annual conference of the Nigerian society of animal production,* pp. 375 – 376.

Ezeh, C.I. (2006). "Socio-economic determinants of output and profit levels of small holders rice production systems in Abia State, Nigeria", *Journal of Research in Agriculture,* vol.3, no.3, pp.44 – 50.

Food and Agricultural Organization (FAO), (2000). Agriculture towards 2015/30 Technical Interim Report. April, 2000. Rome

Food and Agricultural Organization (FAO), (2001). FAO Rice Conference 2001. Accessed Online at www.fao.org

Food and Agriculture Organization (FAO) (1992). Nigeria: Rural roads and marketing—Identification report no. 32/92 CP-NIR 48.

Inuwa, M.S. Kyiogwom, U.B., Ala, A.L., Maikasuwa, M.A., Ibrahim, N.D. (2011). Profitability Analysis of Rice Processing and Marketing in Kano State, Nigeria. *Nigerian Journal of Basic and Applied Science (2011), 19(2): 293-298*

Morris H.E. (1994). Gender and economic adjustment in sub-saharan Africa: findings of Africa report, draft, no. 9. Washington, DC World Bank, 1994.

Rahman, S.M., Takade, J., and Mohiuder, M. (2006). "Rice farmers efficiency in south western part of Bangladesh" , *Journal of Applied Science,* 6(9) pp. 2043 – 2050.

USAID (2008). Agricultural Value Chain Financing in Kenya. An Assessment of Potential Opportunities for Growth.

USAID (2009). Agricultural Value Chain Financing in Kenya. An Assessment of Potential Opportunities for Growth.

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

USAID, "*Improved package of practices for rice production*" USAID markets (maximizing agricultural revenue and key enterprises in targeted sites), Abuja, 2008.

USDA Foreign Agricultural Service, Gain report (2006). Nigeria, Grain and Feed, Rice Imports.

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) pp. 55-63.

Taru, V.B., Jonathan, R., and Lawal, H. (2008). Structural Analysis of Paddy Markets in Taraba state, Nigeria. *Journal of Agricultural and Social Science.*6:110-112.