

ASSESSMENT OF ECONOMIC VIABILITY OF RICE PROCESSING AND MARKETING IN MAYO BELWA LOCAL GOVERNMENT AREA OF ADAMAWA STATE-NIGERIA

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ABSTRACT

The study examined the economic viability of local paddy rice processing and marketing in Mayo-Belwa Local Government Area of Adamawa State, Nigeria. Data used for the analysis were obtained from 120 respondents through a multistage sampling procedure. Tools used for the analysis were descriptive statistics (tables, means, frequencies and percentages), budgetary technique and multiple regression analysis. The result of the study revealed that more than half (51.67%) of the respondents were females while 48.33% were males. About 51.67% of the respondents were married, their literacy level was as high as 97% which had attended one form of formal education or the other, moreso, majority (60.84%) of them belong to at least one cooperative society. Further, 60.84% were between 25 – 45 years of age which is considered active and capable of doing rigorous work involved in rice processing and marketing. The result of the gross margin analysis showed ₦3190.08 and ₦3016.34 per bag of paddy per month as gross margin and net profit respectively, which indicate that the transaction was profitable venture. Other economic indices such as return on naira invested revealed a gain of 30k for every naira invested in the business. From results of the regression Cobb-Douglas was chosen as the led function following economic, econometrics and statistics criteria. The R^2 which gave 0.97 which indicate that 97% of the margin obtained from local rice processing and marketing was being explained by the independent variables captured in the analysis. All the variable factors were significant at varying levels and were important in determining margin obtain from the transaction. The challenges faced by respondents include poor price which was attributed to combination of factors such as presence of small stones, broken kernels as a result of

lack of certified seed and traditional method of processing. Others are inadequate credit facilities, high cost of transport as a result of poor feeder roads that has made it difficult for the marketers to convey the commodity freely. The study recommended marketers to use modern milling machines that are capable of de-stoning their local rice to attract better price, also Non-Governmental Organizations (NGOs) and the government should endeavor to educate the farmers on where source for certified seeds to overcome challenges of mixed seed varieties that breaks during processing leading to poor quality of processed local rice.

Keywords: *Low Demand, Paddy Rice, Processing, De-Stoning, Profitable Margin*

INTRODUCTION

Recent studies on rice have shown that it has become one of the most acceptable staple food crops after wheat and maize for more than one third of the world population (FAO, 2003). The richness of the crop in carbohydrate and protein have accorded the remarkable global acceptability with the mean annual intake per person estimated at 100240kg (Akinyosoye, 1991; FAO, 2003). To this effect there has been steady global annual increase in output in the recent past. It has been reported that in 2015 alone the world output was estimated at 749.1 million metric tons (Anonymous, 2019) against 580 million tons produced in 2003 (Ajala and Gana, 2015). The results which showed an average annual mean increase in output of 15.37 million tons within the period. According to Akande (2000) the continuous increase in rice output and its acceptability have been triggered by combination of several factors, among which was urbanization, which has shifted consumers' preferences towards rice especially in the West Africa sub-region. Another factor is the rapid increase in population, developing countries like Nigeria for instance, whose population growth rate has been estimated at 2.6% per annum is indeed high, (World Bank, 2018).

Asia is said to be the lead producer continent of the globe with the first ten top nations from the region, the first three lead nations are China India and Bangladesh with their annual mean output at 208million tons 168 million tons and 74.5 million tons respectively (Shahbande,

2019). The African continent is said to play a vital role in international rice market as it account for 20-30% of the global imports, the demand for rice in the continent is said to grow faster than any continent of the world (WARDA, 2005). In West African sub region, the increasing domestic production to satisfy the ever increasing domestic demand to satisfy the increasing consumption and minimize importation has been emphases of some of the member nations. In Nigeria, the presidential initiative on increased rice production, the agricultural transformation agenda (ATA) and imposition of 70% tax on rice importation were among other policies directed towards encouraging local production to reduce importation(Okwe,2016).

To an average Nigerian, rice is no longer a luxury food, but patronized by both the poor and the rich. Studies have shown that the estimated demand for rice in Nigeria has been put at 5million metric tons of milled rice while the annual output has also been estimated at 2.21 million metric tons of milled rice, thus a large demand and supply gap of 2.79 million tons (WARDA 2003). This short fall of supply has been supplemented through importation using our meagre foreign reserve that supposed to be used for capital projects within the nation. Akinwunmi (2013) asserted that Nigeria spent about ₦356 billion annually on rice importation, an average of ₦1billion daily on rice alone.

The processing and marketing of rice in Nigeria is still having some challenges that need to be addressed so that the consumption of the local rice can be encouraged. The procedure involved in the local rice processing has been one of the major challenges directly responsible for the poor quality and low price due to low demand for the commodity. The traditional methods of paddy processing involve soaking in water for about 2-3 days followed by 5 -10 minutes steaming after which it is sundried (Ajala and Gana 2015). The husk then removed through pounding with pestle and mortar or using simple milling machine after which the grains are cleans through manual winnowing. The challenges associated with traditional processing is the presence of small stones in the grains, broken kernels and incomplete removal of some husks which makes it less attractive. The introduction of modern machines capable of removing small stones in the local rice processing industry has given improvement in the market and demand

for the local rice in Nigeria. A typical mechanical modern rice processing plant can process up to 3000kg of rice and remove 50% of moisture in about 6 hours is an improvement that need to be encouraged (Ajala and Gana, 2015).

Marketing of local rice like any other crop in Nigeria is all about economic activities which are concerned with the flow of the commodity from the point of production until it is in the hands of end users or consumers. Aderibigbe (1997) classified the rice marketing stages in Nigeria into four categories, these include production through harvesting, movement from farm to processing centers, processing centers to urban centers and to whole selling and retailing in urban centers. All the stages are attempt to create form, place, time and possession utilities to the end users. According to Olukosiet *al.* (2007) so many intermediaries/agencies are involved in the chain to earn their living. In Adamawa State, Mayo Belwa Local Government Area is one of the noted areas in rice production. Iliyasu (2016) as cited by Uziel (2019) asserted that the local government produces about 60,000 tons out of the estimated 56,000 tons produced annually in the state. The farmers and other marketers have been found to be involved in the processing and marketing of the crop in order to earn their living. As it has been discussed earlier on the traditional system of rice processing which is common in the area is associated with problems of presence of stones, broken kernels which was attributed to mixed varieties that may differ in sizes with low shelf life that attract low price. These reasons among other factors have made the locally produced rice to have low market value less demand. It is against these background that these study seek to:

- Describe the socio-economic characteristics of the respondents in the study area;
- Determine the profitability of rice processing in the study area;
- Determine the influence of marketing operations on the marketing margin in the study area;
- Determine the marketing efficiency of local rice in the study area and
- Describe the factors militating against local rice processing and marketing in the study area.

Research Methodology

The study was carried out between April and May 2019 in Mayo-Belwa Local Government Area (LGA) of Adamawa state Nigeria. The place lies between latitude 9° 45' and 9° 43' North and Longitude 13°05' and 14° 12' east of the Greenwich meridian (Adebay and Tukur, 1999). The vegetation of the area is guinea savannah type, with luxuriant tall grasses and short scattered species. Common crops grown in the area are: rice, yam, maize, sorghum and green vegetables, produced in large quantities. Dry season farming and vegetable gardening as well as production of orchard fruits from the famous Sebore Farms are also prominent. The vast fertile agricultural land provided the area with suitable pasture for livestock (Nuhu , 2009) such as Cattle, Sheep and goats are common domestic animals in the area. The settlement is scattered (Dispersed settlement) and most of the people living there are farmers, with few civil servants. The LGA has a population of 278,407 (NPC 2006). Temperature is normally warm to hot throughout the year (wet or dry seasons). The minimum temperature can be as low as 28° and can be as high as 40°c. Rainfall normally commences in the month of May, or sometimes in June and ends in September or early October. It ranges from 900mm to 1050mm per annum (Adebayo and Tukur , 1999).

Sampling Procedure

A multi-stage sampling procedure was adopted, following Purposive and simple random sample techniques for the selection of the respondents. In the first place three districts (Binyere, Dikkon and Mayo- belwa) were purposively selected because of their involvement in local rice business. List of the rice marketers were then collected from their association leaders in each of the districts, in the final stage, simple random sampling was employed to select 120 respondents according to their proportion in each district where the economic data were collected for the analysis.

Data Analysis

The data generated from the field survey were subjected to various analyses in order to achieve the objectives of the study. Descriptive statistics was used to achieve objectives i and v, objective ii was determined using budgetary technique, regression analysis was used to achieve objective iii and marketing efficiency was used to justify objective IV.

Model Specification

Profitability of local rice processing and marketing was determined following Habib (2015) as follows:

$$NMM = GS - T VC \dots\dots\dots (1)$$

Where:

NMM = Net marketing margin

GS = Gross sales

TVC = Total variable cost

Return on investment (ROI)

$$ROI = R/T C \dots\dots\dots(2)$$

Where:

ROI = Return on investment

R = Revenue generated

TC = Total cost

Marketing efficiency (ME)

$$ME = Vam/CM \dots\dots\dots(3)$$

Where :

ME = Marketing efficiency

Vam = Value added by marketing

CM = Cost of marketing

Regression Analysis

Four functional forms were used to ascertain the influence of marketing operations on the marketing margin. The functions were linear, semi-log, exponential and Cobb and Douglas. The best led equation was selected based on the economic, econometric and statistical criteria. The general form of the equation thus expressed as:

$$Mm = f(C_1, C_2, C_3, C_4, C_5, C_6, U) \dots\dots\dots(4)$$

The explicit forms of the equations are as below:

$$Y = b_0 + b_1C_1 + b_2C_2 + \dots\dots\dots + b_6C_6 + Ui \dots\dots\dots (5)$$

Linear function

$$Ln Y = b_0 + b_1C_1 + b_2C_2 + \dots\dots\dots + b_6C_6 + Ui \dots\dots\dots (6)$$

Exponential function

$$Y = Ln b_0 + b_1 Ln C_1 + b_2 Ln C_2 + \dots\dots\dots + b_6 Ln C_6 + Ui \dots\dots\dots (7)$$

Semi-log function

$$Ln Y = Ln b_0 + b_1 Ln C_1 + b_2 Ln C_2 + \dots\dots\dots + b_6 Ln C_6 + Ui \dots\dots\dots (8)$$

Double log

Where:

Mm = Marketing margin (₦)

C₁ = Transportation (₦)

C₂ = Processing (₦)

C₃ = Storage (₦)

C₄ = Commission

C₅ = Water (₦)

C₆ = Handling charges (₦)

C₇ = Error term

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

Analysis of the age of the respondents in Table 1 showed that 65.5% were between 20 – 40 years. Majority of the rice marketers were in their youthful age and capable doing rigorous work involved in the processing and marketing of rice. This findings is in consonant with the report of Omoare and Oyeleke (2017) who observed that the mean age of rice farmers in Ogun and Niger States in Nigeria, was 42years, which is considered to be active and highly productive. About 27.5% were between 41 – 50 years and some 7.5% were above 50years of age. Majority of the respondents (51.7%) were females while 48.3% were males, the report is contrary to the findings of Nze and Ugwu (2017) who opined that majority (92%) of rice marketers in Uzouwani Local Government Area of Enugu State were males. The marital status revealed 51.7% were married which may be associated with their commitment to the business to meet up with the demand of the family. Similar report was given by Tashkalma *et al.* (2015) who found out a high proportion of married folks exist among business women in Yola South Local Area of Adamawa State. About 96.67% of the respondents had one form of formal education or the other which showed that majority of the respondents were literate. This findings is similar to the findings of Abah (2015) who observed that about 68.1% of paddy rice marketers in Benue State were educated. According Dogondaji and Baba (2010), education influences adoption of agricultural technologies which is a key factor in the successful marketing of agricultural products. The experience in the business by the respondents showed that 55% had 6 – 10 years in the business, 29% have spent about 11 years and above in the business.

Gabdo (2016) affirmed that experienced marketers might have been acquainted with market situations for the crops they handle. Rahma *et al.* (2002) opined that having more experience enhances adoption of innovations and new technology whose combine effect has high output. The distribution of the respondents according to membership of cooperative societies revealed that majority (66.7%) of them belong to one cooperative society or the other. Membership of cooperative society gives opportunity to the respondents to have access to credit facilities that may enhance their business and also gives them collective power to bargain for better price. According to Phillip *et al.* (2018) being member of an association or a group gives opportunities to benefit more from business through sharing of risk, access to credit facilities and inputs. The frequency distribution of the respondents according processing method showed that 71.2% parboil their paddy before milling while 24.8% process white paddy rice, 4% engaged in processing both white and parboiled paddy rice, Nzeh and Ugwu (2015) opined that parboiled rice retain higher percentage of nutrients.

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Age		
≥ 20	11	09.17
21 – 30	35	29.17
31 – 40	32	26.66
41 – 50	33	27.50
Above 50	09	07.50
Total	120	100.0
Gender		
Males	58	48.33
Females	62	51.67
Total	120	100
Marital status		
Single	48	40.0
Married	62	51.67
Divorced	07	05.83
Widowed	03	02.50
Total	120	100.0
Educational level		
Primary	30	25.0
Secondary	52	43.33
Tertiary	34	28.33
Non fund	04	03.33
Total	120	100.0
Experience		
1 – 5	19	15.8
6 – 10	66	55.0
11 – 15	31	25.8
Above 15	04	03.4
Total	120	100
Membership of cooperative society		
Yes	80	66.67
No	40	33.33
Total	100	
Rice processing method		
Parboiled paddy	89	71.2
White paddy rice	31	24.8
Both parboiled and white	05	04.0
Total	125*	100
Field survey, 2019		
125* multiple response occurred		

Profitability Analysis of Rice Processing and Marketing in the Study Area

Table 2 presents profitability analysis of the local rice processing and marketing in the study area. The results revealed that 87.18% of the total cost was for variable cost. Analysis of the gross margin and net profit obtained by the marketers per 100kg bag of processed paddy rice was ₦3190.09 and N3016.34/month respectively which showed that the business is profitable. This is similar to the study of Akpokodje *et al*,(2001) who found out that the rice processors in Ofada Osun State of Nigeria made a profit of N3811/month. Other economic indices such as returns on every naira invested shows that in every one naira invested for rice processing 26 kobo was made as profit.

Table 2 Gross Margin and Net Returns in Rice Processing and Marketing in the Study Area

Items	Cost(₦)	USD (\$)equivalent
Variable		
Transportation	159,224.04	4096.77
Storage	10,450.94	26.830.44
Commission	30,600.00	78.561.30
Handling cost	41,044.00	105.371.75
Firewood	18,360.00	47.140.78
Water charges	10,000.00	25.670.43
Polythene	11,245.35	28.870.48
Produce revenue	20,400.0	52.370.87
Quantity of paddy (100 kg bag)204		
Price per/bag	10,500.00	26.76
Cost of paddy rice	2,050,200.00	5,263.54
Total cost variable (T VC)	2,351,525.11	6,037.1387.18
Revenue		
Estimated quantity of milled rice9007kg		
Unit price	333.33/kg	
Total revenue	3,002,303.317	7,707.89
GM	650,778.201	670.76
Depreciation on fixed assets		
Wheel barrow	12,000.00	30.81
Rake	6,103.73	15.67
Drum	11,924.96	30.62
Shovel	5,414.19	13.90
Total	35,442.00	90.99
Net Profit	615,334.2	1579.76
ROI 0.26		
Operating ratio (OR)0.78		
Fixed ratio (FR)0.22		
Marketing efficiency (ME)	127.67%	

Field survey,2019 \$1 = ₦389.51

Analysis of Factors Influencing Rice Processing and marketing Margin in the Study Area

Analysis of Table 3 showed results of the regression analysis. Following the selection procedures of economic, econometric and statistical criteria, Double log was chosen as the best led function. The R^2 (0.97) shows that 97% of the margin from rice processing and marketing was being accounted for by the independent variables captured in the analysis. The transportation cost was negative and statistically significant at 1% level which implies that increase in transport cost reduced margin of the respondents. The result is contrary to that of Ehirimet *al.* (2007) who reiterated that transportation add place utility and has a positive relation with yam marketing in Abia State. The processing charges (X2) is significant at 1% and positive. The result which implies that increase in processing cost result to increase in marketing margin perhaps it could be that as more marketers are using modern machines in processing rice that may remove stones which make the product more attractive to customers at better price. Analysis of storage cost (X3) revealed also that it was significant at 5% level. The positive coefficient may not be unconnected with the action of the speculative marketers who may pay extra money for longer period of storage until when it is scarce and the price has gone high so that profit is maximized that may compensate the increase in the storage cost. The findings is also is at par with Ehirimet *al.* (2007) who reported inverse relationship of marketing margin with processing and storage costs.

Furthermore, the coefficient of commission (X 4) was negative and statistically significant at 1% level. This confirm to a prior expectation that increase in commission paid to intermediaries by marketers result to decrease in margin received by the respondents. Analysis of income (X5) of the marketers confirm to a prior expectation. The result was significant at 5% level and positively related to the marketing margin of the marketers. This could be that as marketers' income increases there is tendency for the extra income to be injected into the business to increase the volume of the commodity that may invariably increase the volume of the profit. The handling charges (X6) was significant at 5% and negative which implies that it is a vital variable in determining

margin obtained from processed rice. This could be that as the handling charges increases the margin received by the marketer become lesser. It is therefore important to reduce the unnecessary handling charges where possible.

Table 3: Results of Multiple Regression Analysis for Factors Affecting Margin Obtained From Processing and Marketing of Local Rice in the study Area.

Variable		Parameter	Linear	Double log	Semi-log
Exponential					
Constant	X ₀	558.801 (7.61)	1902.642 (9.93)	6.06830 (66.51)	310.4022 (17.18)
Transport	X ₁	-.114256 (-1.10)**	-.166.8234 (-3.39)***	-.0005114 (-0.46)	-.075554 (-3.05)**
Processing	X ₂	-.0241118 (-1.84)***	19.03204 (2.87)***	-.0001993 (-1.28)***	9.110745 (0.29)**
Storage	X ₃	-.1083269 (0.70)	17.19845 (0.36)**	-.0004627 (-1.42)**	.007757 (1.66)
Commission	X ₄	-.8856521 (-5.18)***	-197.1234 (-10.42)***	-.0017419 (-6.74)***	-.244714 (-8.77)*
Income	X ₅	.1346852 (4.59)	-47.86589 (-1.19)***	.0002506 (4.99)**	.1402671 (2.12)**
Handling cost	X ₆	-.3088652 (-3.09)***	-129.0312 (-13.27)***	-.0005161 (-3.27)***	-.0824997 (-6.28)*
R ²	0.917	0.971	0.960	0.973	
Adjusted R ²		0.912	0.970	0.958	0.971
F-Ratio		208.4	643.3	453.8***	80.1

** Significant at 5% level *** significant at 1% level *significant at 10%

Constraints Militating Against Local Rice Processing and Marketing in the Study Area

The challenges faced by the respondents were presented in Table 4. These constraints are linked to one another and they affect the price or demand for the local commodity. The major (17.55%) problem identified was the presence of stones in the local rice. Ajala and Gana (2015) observed that the main problem of Nigerian rice is the presence of stone in the grains which is responsible for the low demand and poor market price. It is the presence of stones and other impurities that have made the customers to go for the foreign rice rather the local rice. About 14% also asserted that traditional method of processing is a

problem because some grain may still carry husk that will make customers to shun away from the local rice in favour of the foreign supplied rice. Similarly Phillip *et al.* (2018) opined that one of the reasons for low price for our farm products is our inability to process it very well. Some problems identified also were mixed varieties that are not uniform and may be associated with breakage during milling. Philip *et al.* (2018) stressed that access to improved seed varieties have been a major constraints to rice production in Nigeria. Inadequate Finance (11.83%), the survey has discovered that most of the respondents have little access to credit facilities to run the business in the same vein Dauna *et al.* (2018) reported 40.68% of paddy rice marketers in Adamawa State are handicapped by inadequate capital. poor storage conditions (06.11%) and road networks all combined together to create poor market price for the local rice with foreign rice taking advantage over the local rice.

Table 4: Frequency Distribution of Respondents According Constraints Militating Against

Variable	frequency	percentage
Transportation	45	8.88%
In-adequate finance	60	11.83
Traditional method of processing	71	14.0
Poor market price	88	17.35
In-adequate storage facilities	31	06.11
Use of mixed seed varieties	63	12.42
Presences of small stones	89	17.55
Poor feeder roads	50	09.86
Total	507*	100

Field survey, 2019 507 *multiple response occurred

CONCLUSION AND RECOMMENDATIONS

The study has shown that more than half of the respondents were females which were in their active age and most them have attended one form of formal education or the other. The business is profitable amidst challenges of presence of stones in the locally milled rice, broken kernels, traditional method of processing which combine effect on the low demand and hence low prices received has compared to the imported rice. Transportation, processing, storage commission, water and handling charges are all significant factors in determining margin

obtained from rice in the study area. The study recommended Non-Governmental Organizations(NGOs) to collaborate with the government to make available modern milling machines at an affordable prices for processing which is capable of de-stoning the local rice so that it will be attractive to consumers, the extension workers also need to encourage/educate the farmers to source for seed at certified places like the ADP offices or certified seed stores such premier seed and WACOT which are accredited for supply of farm inputs in the country. Credit facilities should be made available to the marketers through their cooperative groups.

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