Assessment of Paddy Rice (*Ofada*) Processing in ensuring Rural Women livelihood sustainability in Ogun State, Nigeria

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Abstract

Processing of paddy rice is one of the most promising sources of additional income to rural household earnings and increase household food intake and quick return from micro level investment in rural Nigeria. Since consumption of rice is fast growing in developing countries including Nigeria, its promotion is essential. This study assessed Paddy Rice (Ofada) Processing in ensuring Rural Women livelihood sustainability in Ogun State, Nigeria. Simple random sampling technique was used in the selection of 75 small-scale rice processors for this study. Descriptive statistics were used for the objectives while chi-square was used to test the hypotheses. Results of the findings revealed that the mean age of the respondents was 37 years. Majority (61.70%) of the respondents was married and had acceptable levels of formal education (81.70%). The mean household size was 7 people. Most (85%) of the respondents belonged to Rice Processing Association and more than half (53.30%) of the respondents had spent more than 10 years in rice processing activities. The predominant labour used on their farms was family and hired labour (50%). Traditional methods were the prevailing rice processing techniques (100%) used in threshing, winnowing, parboiling, drying and bagging while milling was mechanically carried out (96.40%). However, inadequate processing facilities ($\bar{x} = 2.81$), lack of financial support from commercial banks($\bar{x} = 2.80$), and poor extension support ($\bar{x} = 2.56$) were among the myriads of problems limiting the productivity and effectiveness of rice processors in the study area. There was significant relationship between sources of credit ($\chi^2 = 21.87$, df = 3, p = 0.00), constraints ($\chi^2 = 27.89$, df = 2, p = 0.00) and rice processing methods at p < 0.05 level of significance. The study recommends that soft loans should be made available by financial institutions to the rice processors as this will go a long way in boosting local paddy rice (ofada) processing as means of livelihood sustainability among women in the study area.

Keywords: *paddy rice, processing, livelihood, sustainability, rural women*

Introduction

Globally, rice is an important carbohydrate food source. It is the second most important cereal in the world after wheat in terms of production. In Africa, Nigeria is the largest net importer of rice and the second largest importer in the world (Sowunmi *et al*., 2014). The country is ranked as the highest producer and consumer of rice in the West Africa sub region. Rice consumption in

Nigeria has vastly increased in recent years. An average Nigerian now consumes 24.8 kg of rice per year, which represents 9% of total caloric intake (International Rice Research Institute (IRRI), 2001). Local rice demand is growing quickly due to population growth and urbanization. Rice thus constitutes an important staple food in Nigeria. Annual milled rice demand in the country is put at 5 million metric tonnes while domestic production on the average, was about 2.21 million tonnes, with a deficit of 2.79 million tones which is bridged by importation (National Rice Development Strategy (NRDS), 2009). However, Osareti *et al.,* (2007) found that most Nigerians prefer to consume imported rice brands as compared to local rice varieties like *Ofada*. According to the Federal Ministry of Agriculture and Rural Development (2012), US $2billion is being spent annually on rice importation which translates to US$6million daily; this is an attendant to the fact that its continual importation is not sustainable fiscally, economically and politically. Rice importation is seen as a waste of foreign exchange based on the comparative advantage of the country in rice production. Excessive imports put high pressure on the naira and hurting the economy and the Nigerian farmers in particular by displacing local production and creating rising unemployment (FMA&RD, 2012). The cost of these rice imports represents a significant amount of lost earnings for the country in terms of jobs and income (Bamba *et al*., 2010). The high demand for imported rice in the country purportedly stems from the average Nigerian consumer's desire for white polished rice unlike most African countries like Ghana where there is a preference for brown rice which is cheaper in cost than polished rice and richer in nutrients (Aondoakaa, 2013).

In spite of huge potentials of Nigeria local processed rice to rural women livelihood security in terms of nutritional value, household food security, source of income and empowerment its rejection is not unconnected with its low quality, poor value addition and packaging due to crude processing techniques being used by the rural women. Generally, processing is the removal of glumes from the harvested grains by hulling, followed by polishing, using modern or traditional methods prior to consumption (Baksh, 2003). Traditionally, rice is processed by parboiling, drying and milling. The fact is that, most of the processing activities in the country are carried out on a small scale, usually without huge investment and complex processing techniques. Meanwhile, investing in rice production and processing by government and private sector is capable of reducing rural-urban drift, unemployment, food insecurity and poverty. Similarly, rural women livelihood could be enhanced through adoption improved processing practices. Processing of paddy rice is one of the most promising sources of addition income to rural household earnings and increase household food intake and quick return from micro level investment in rural Nigeria. Since consumption of rice is fast growing in developing countries including Nigeria, its promotion is essential. Studies examining specifically, rice processing and management practices of Nigerian rural women are rare. Therefore studies of local paddy rice processing should be appraised and the shortcoming as well as challenges in the processing operations where scientists and extension agents could provide vital suggestions to assist rural women especially now that the present administration is well disposed to change and enhancing the commercialization of the agricultural sector including the rice sub-sector in Nigeria. The need for this study can therefore be seen in the desire to increase the level of productivity in local rice production and processing and also to throw more light on the problems associated with rice processing activities in the study area. Hence this study is aimed at serving as a useful guide to rice processors, policy makers and as basis on which rice production program can be built. The

broad objective of this study is therefore to assess Local Paddy Rice (*Ofada*) Processing among Rural Women in Ogun State, Nigeria, while the specific objectives are to:

    a. describe the personal characteristics of the rural women in rice processing in the study area

    b. identify the different processing techniques utilized by respondents in the study area

    c. examine respondents' sources of capital in the study area

    d. identify the constraints militating against the rice processors in the study area

Hypotheses of the study are state in null form as follow:

H_{01}: There is no significant relationship between respondents' sources of credit and rice processing methods in the study area.

H_{02}: There is no significant relationship between constraints militating against the rice processing and rice processing methods in the study area.

Methodology

Description of the study area

Ewekoro is one of the twenty Local Government Areas in Ogun State. Its headquarters is in the town of Itori. It has an area of 594 km² and a population of 55,156 at the 2006 census (NPC, 2006). It is bounded in the north by Abeokuta North and Abeokuta South Local Governments, in the south by Ifo Local Government, in the east by Yewa North and Yewa South Local Governments, and in the west by Obafemi Owode Local Government. The Local Government Area lies between Latitude 6.2 and 7.8°N and Longitude 3.0 and 5.0°E. Ewekoro Local Government is characterized by tropical climate with distinct wet and dry seasons. Between March and October (wet season), the climate is dominated by the tropical maritime air mass from the Atlantic Ocean while November and February (dry season), is under the influence of the dry continental air mass from Sahara desert. The little dry season in the mid-wet season of July/August months is dominant in the area (Adejuwon and Odekunle, 2006). The study area has a mean annual temperature of 27^0C, relative humidity of 71.09% and means annual rainfall of 1194.33 mm (Emielu, 2000).

Sampling procedure and sample size

A simple random sampling technique was used in the selection of communities and processors for this study. Ewekoro Local Government Area (LGA) was purposively selected based on the apriori information that rice are produced and processed in the area. Also, rice processing plant (VeeTee plant) is located in the area but not functioning. Three communities namely Ajipatutu, Elere-Adubi and Onigbedu were purposively selected from the LGA. Twenty five (25) Local rice processors were randomly selected from each of the communities to make up 75 respondents as the sample size for this study.

Measurement of variables

Age, household size, rice processing experience were measured at ratio level while sex, educational status, membership of association, marital status, sources of capital, labour, and constraints were measured at nominal level. Similarly, the processing techniques are measured as Traditional and Modern methods at nominal level.

Data collection and analysis

The instrument used for the data collection was subjected to face validity by consulting experts in the field of Agricultural Extension and Rural Development. Items found ambiguous were removed. Test re-test was carried out with twenty rice processors who were not part of this study to ascertain the reliability of the instrument. A reliability coefficient of 0.83 was obtained. It is adduced that the instrument used for this study was reliable. Simple descriptive statistics such as percentage, mean and frequency were used to analyze the objectives while chi-square analysis was used to test the hypothesis of the study.

Results and Discussion

Personal characteristics of the respondents

The results of the analysis in Table 1 showed that the mean age of the respondents was 37.0 years. Majority (60%) of the respondents was between 31 - 40 years old while16.70% of the respondents were less than 30 years old. But, only few (8.30%) of the respondents were above 50 years showing that there were few adults n rice processing. This may be addressed to the tedious nature of the rice processing that are high energy demanding and require active and able women. Many (61.70%) of the respondents were married and 25.0% of the respondents were single while 13.30% of the respondents were widowed/separated. Furthermore, the results of this study revealed that half (50.0%) of the respondents had secondary school education while 26.70% attended primary school, and 5.0% had tertiary education. However,18.30% of the respondents did not have any form of formal education. This shows that the respondents have some level of formal education, that is, they are literate, and this will in turn influence the rate of adoption of innovations by the rice processors. This result is in agreement with Asiabaka (2002) that educational level is a very important determinant in adoption of innovation. Also, the findings showed that average household size was 6 people. The household size of over half (57.50%) of the respondents was 5 - 10 people while 28.30% of the respondents had less than 5 people. This indicates that the household size of respondents was relatively large. This finding agrees with Adegbite *et al*. (2007), who explained that household size is an important factor in any rural development intervention, besides the children assist on the farm and in other household activities. The result also indicated that 20.80% of the respondents had just spent less than 5 years in the rice processing activities, while 34.20% of the respondents had spent between 5 - 10 years and 53.30% had been in rice processing for over 10 years. The mean year of experience was 9.75 years. This further shows that rice processing is an important off-farm enterprise and it is not a new agro-processing activity among the rural women in the study area. Half (50.0%) of the respondents used both family and hired labour while 30.80% utilized the family labour alone

and 19.20% hired labour for rice processing activities. Most (85.0%) of the respondents belonged to rice processors association while 15.0% of the respondents were yet to join the association.

Table 1: Distribution according to personal characteristics of the respondents (120)

Variables	Frequency	Percentage	Mean
Age (years)			
Less than 30	20	16.70	
31 – 40	72	60.00	37.0
41 – 50	18	15.00	
Above 50	10	8.30	
Marital status			
Single	30	25.00	
Married	74	61.70	
widowed/ separated	16	13.30	
Educational status			
No formal education	22	18.30	
Primary education	32	26.70	
Secondary education	60	50.00	
Tertiary education	06	5.00	
Household size			
Less than 5	34	28.30	
5-10	69	57.50	6
Above 10	17	14.20	
Membership of association			
Yes	102	85.00	
No	18	15.00	
Processing(years) experience			
Less than 5	25	20.80	
5-10	41	34.20	9.75
Above 10	64	53.30	
Source of labour			
Family labour	37	30.80	
Hired/paid labour	23	19.20	
Family and hired labour	60	50.0	

Source: Field survey 2015

Respondents' sources of credit for rice processing

The capital used in the farming enterprise is sourced from Cooperative, Personal savings, Banks and borrowing from Friends and Family (Ajagbe *et al*. 2014). Result in figure 1 revealed that above half (51.70%) of the respondents used their personal savings, and 15.0% of the respondents obtained credit from their friends and relatives while 23.30% of the respondents got their credit from cooperatives societies. Loans from commercial banks and other financial institutions are not readily available and easily accessible to the respondents as it constituted just

about 10.0%. The result showed that banks and financial institutions have not made significant impact as their credit facilities are difficult to obtain by the rice processors in the study area. The result is in line with Oyediran, 2013 that rural dwellers do not have access to credit from financial institution but rather relied on cooperatives, friends and families and their personal savings which has limited their production activities to a subsistence level.
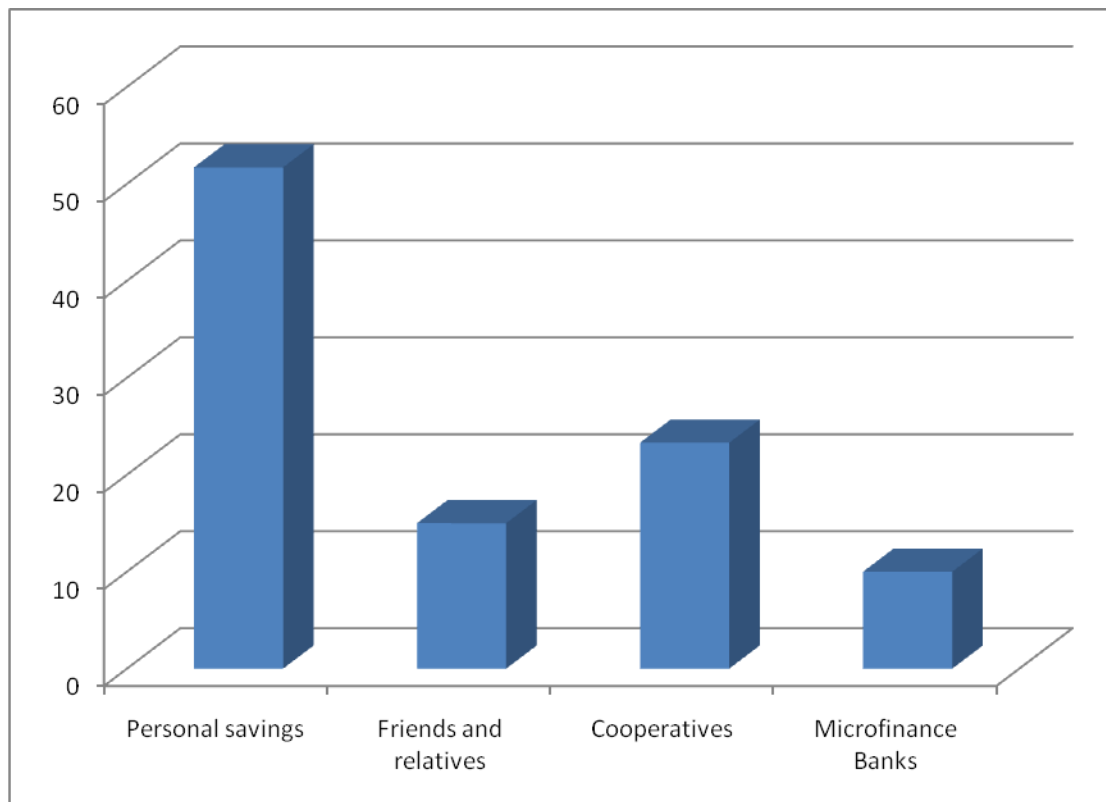

Figure 1: Respondents' source of credit
Source: Field Survey, 2015

Rice processing methods
Processing reduces food losses and stabilizes seasonal fluctuations in the supply of the crop (Ofoh, 2009). Rice processing according to NCRI, 2007 involves four (4) main operations, threshing, winnowing, parboiling and milling. But in its simplest term, rice processing refers to all processes from harvesting rice to consumption and /or marketing. The processes consist of two inter-related phases: primary processing and secondary processing. The main processes in the primary processing are harvesting, threshing, cleaning, drying and milling. In some cases, where parboiling is practiced, parboiling becomes part of the main processes. The traditional domestic techniques involve soaking the paddy in cold water for two days, and then heating in drums until the grains show signs of splitting whereupon the rice is removed for drying (NISER, 2002).

The results of this study revealed that manual methods were predominantly used by the rice processors (100%) in rice threshing, winnowing, and parboiling by the respondents. Manual methods of rice processing do not require sophisticated equipment. Most of the steps in rice processing are carried out manually using simple and inexpensive tools and equipment that are available to small-scale rice processors. Manual processing is labour intensive and productivity is usually very low. For instance, the traditional threshing methods employed in Nigeria introduce impurities into the rice and are inefficient and labour intensive. Manual threshing involve beating the panicle with a stick or flail device. The method contaminates grains with sand and stones because it is normally done on bare ground while all threshed grain are swept with the sand and other contaminants into bags. The amount of impurities in the paddy reflects to some extent the care applied during harvesting, threshing and handling (Halos, 2007). In developing countries, farmers clean the paddy straight after manual threshing, first, they use hand-raking and sifting to remove straw, chaff and other large and dense materials, then winnowing. The effectiveness of the method depends on the wind speed and is very slow. The absences of effective cleaning devices often result in poor quality milled rice in term of contaminants. Stones and other hard object and mixtures in the paddy also shorten the life of the milling machinery. NCRI, 2007 explained that parboiling is a heat treatment given to paddy rice before drying and milling. Results of this study further showed that rice were dried manually (100%) by the rice processors. Small-scale rice processors used tarpaulins, bare ground, or polythene for paddy sun-drying. None of the respondents however carried out polishing of the rice. In the same vein, destoning and bagging were carried out manually. The traditional means of storing rice at the farmer level is in bags within a room in the farmers dwelling. This however, results in quality degradation due to inadequate storage temperature control and rodents invasive activity. But, almost all (96.40%) of the respondents did milling of rice with machine. However, small mills have the disadvantage of a high level of broken rice rate and poorer milled quality (Halos, 2007).

Table 2: Distribution based on rice processing methods (n=120)

Rice processing methods	Manual	Mechanical
Threshing	100.0	0.00
Winnowing	100.0	0.00
Parboiling	100.0	0.00
Drying	100.0	0.00
Milling	5.60	96.40
Destoning	100.0	0.00
Polishing	0.00	0.00
Bagging	100.0	0.00

Source: Field survey 2015

Constraints affecting the respondents in rice processing
The problem of demand-supply gap in rice production in Nigeria and the attendant heavy import bill, make it a necessity that Nigeria should improve its rice production on sustainable basis.

Akande and Akpokodje (2003) opined that, since the mid-1970s, rice consumption in Nigeria has risen tremendously, at about 10% per annum while domestic production has never been able to meet the demand leading to considerable imports which today stands at about 1,000,000 metric tonnes yearly. However, the production was insufficient to match the consumption with rice imports making up the short fall (Akande and Akpokodje, 2003). The results in Table 3 showed that inadequate processing equipment ($\bar{x} = 2.81$) was the highest constraint confronting rice processing in the study area. This was followed by lack of financial support from commercial banks ($\bar{x} = 2.80$), poor pricing and standardization ($\bar{x} = 2.68$), and high cost of labour ($\bar{x} = 2.67$). Similarly, rice processing was highly affected by unavailability of storage facilities ($\bar{x} = 2.60$), inadequate rural infrastructure ($\bar{x} = 2.56$) and inadequate extension support and training ($\bar{x} = 2.35$).

Table 3: Distribution based on challenges facing rice processing (n=120)

Constraints	High constraints	Moderate constraints	Low constraints	Mean	Rank
Inadequate processing facilities	83.30	14.20	2.50	2.81	1st
Inadequate rural infrastructure	66.70	22.50	10.80	2.56	6th
Lack of financial support from commercial banks	80.0	20.0	0.00	2.80	2nd
Inadequate extension support and training	68.40	23.30	8.30	2.35	7th
Poor pricing and standardization	75.0	17.50	7.50	2.68	3rd
Unavailability of storage facilities	71.70	16.70	11.60	2.60	5th
High Cost of labour	75.80	15.0	9.20	2.67	4th

Source: Field survey, 2015

Hypotheses testing

Relationship between respondents' sources of credit and rice processing methods

$H_{01:}$ There is no significant relationship between respondents' sources of credit and rice processing methods in the study area.

Chi-square results in Table 4 showed significant relationship between sources of credit (χ^2 = 21.87, df = 3, p = 0.00) and rice processing methods at p < 0.05 level of significance. That is, sources of credit have bearing on rice processing methods. Therefore, the null hypothesis that *"there is no significant relationship between respondents' sources of credit and rice processing methods"* is rejected.

Table 4: Relationship between respondents' sources of credit and rice processing methods

Variables	df	χ^2	p-value	Decision
Sources of credit	3	21.87	0.00	S

Source: Field survey, 2015
S - Significant at p < 0.05 level of significance

Relationship between constraints militating against the rice processing and rice processing methods

H_{02}: There is no significant relationship between constraints militating against the rice processing and rice processing methods in the study area.

Chi-square results in Table 5 showed that inadequate rural infrastructure (χ^2 = 27.89, df = 2, p = 0.00), lack of financial support from commercial banks (χ^2 = 12.50, df = 2, p = 0.02), inadequate extension support and training (χ^2 = 13.19, df = 2, p = 0.01), poor pricing and standardization (χ^2 = 27.88, df = 2, p = 0.00), unavailability of storage facilities (χ^2 = 28.00, df = 2, p = 0.00), high cost of labour and (χ^2 = 14.77, df = 2, p = 0.01) were significant to rice processing methods at p < 0.05 level of significance. This implies that there is a significant relationship between constraints militating against the rice processing and rice processing methods. It means that constraints limit the respondents' processing techniques to traditional methods. Therefore, rice technologies for the future should improve on traditional methods and develop low cost equipment with low energy demands. Thus, the null hypothesis that "*there is no significant relationship between constraints militating against the rice processing and rice processing methods in the study area*" is rejected.

Table 5: Relationship between constraints militating against the processors and *rice* processing methods

Variables	df	χ^2	p-value	Decision
Inadequate rural infrastructure	2	27.89	0.00	S
Lack of financial support from commercial banks	2	12.50	0.02	S
Inadequate extension support and training	2	13.19	0.01	S
Poor pricing and standardization	2	27.88	0.00	S
Unavailability of storage facilities	2	28.00	0.00	S
High Cost of labour	2	14.77	0.01	S

Source: Field survey, 2015

S - Significant at $p < 0.05$ level of significance

NS - Not Significant at $p < 0.05$ level of significance

Conclusion

It can be concluded that the respondents are within economically active age bracket. The credit used is mainly from Personal savings, Cooperative societies, and Friends and Family. Traditional methods are the prevailing rice processing techniques. Sources of credit and constraints had significant relationship with rice processing methods. Inadequate processing facilities and rural infrastructure, lack of financial support from commercial banks, and poor extension support were among the myriads of problems limiting the productivity and effectiveness of rice processors in the study area.

Recommendations

It is hereby recommended that:

i.   rice processors should be given financial assistance, subsidized processing equipment and storage facilities

ii.   extension service should provide regular training support to enable them overcome some of the constraints militating against rice processing in the study area

iii. government should provide functional rural infrastructure in the study area

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