

ADOPTION OF IMPROVED RICE PROCESSING TECHNOLOGIES AMONG WOMEN IN  
NIGER STATE, NIGERIA

Tsado, J.H<sup>1</sup>., O. B. Adeniji<sup>1</sup>; O.J. Ajayi<sup>1</sup>; A. O. Ojo<sup>1</sup> and David Y<sup>2</sup>.

<sup>1</sup>Department of Agricultural Economics and Extension Technology  
Federal University of Technology Minna, Minna, Niger State.

<sup>2</sup>National Open University of Nigeria.  
(Email-jacobsado2007@yahoo.com)

**ABSTRACT**

*The study was conducted in Niger State, Nigeria. The study evaluates the adoption of improved rice processing technologies among women rice processors. Data for the study were collected through a structured interview scheduled and analyzed using descriptive statistics such as frequency, percentages and means, the hypothesis was tested using Chi-square ( $\chi^2$ ). The result revealed that majority of the respondent were still in their active age, with the mean age of 42 years and majority (92.5%) had one form education or the other. Large proportion 90% and 77.5% of the respondents were married and had moderate house hold sizes respectively, majority 97.5% were members of various cooperative societies, while 90% had been in rice processing business for over 5 years. 85% and 30% claimed they had access to training and credit facilities respectively. The awareness level of the respondents about various technologies were very high, adoption levels were however, very low. The study revealed that age, marital status, cooperative membership, level of education, access to credit and level of awareness had significant relationship with adoption at 5% level of probability. The study further revealed that high cost of processing machines, inadequate extension visit and nature of local rice were the major constraints faced by the farmers in the study area. The study recommended that processors should be encouraged to participate more actively in cooperative activities so that they could benefit from assistance usually rendered by Non Governmental Organizations, government organization and donor/development agencies.*

**Keywords:** adoption, rice, processing technologies, women.

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**INTRODUCTION**

Rice is one of the oldest, celebrated and primary foods for more than half of the population of the world and the only cereal that is grown across most regions of the world (Issaka, *et al.* , 1997; Tran, 2003), also it is among the world's leading staple food crops and sixth major crop cultivated after sorghum, millet, maize, cowpea and wheat in Nigeria (Singh *et al*1997; Misari *et al.*, 1997) but rice is now ranking first position on a social scale of the staple food that are used in most festivals in urban and rural homes (Langtau, 2003).

Rice processing that has to do mainly with parboiling and milling. Parboiling is the hydrothermal treatment of paddy before milling. During this processing starch is gelatinized in the rice kernel. Gelatinous jelly

form, filling the rice voids and cementing the fissure of the grain. During the process an irreversible swelling and fusion of starch granules occur that changes the starch from a crystalline (a clear transparent form) to an amorphous one (FSNB 2011).

A survey conducted by National Cereal Research Institute (NCRI) (2008) revealed that Nigerian consumers show preference to quality rice. The institute has developed improved technologies for processing rice such as

- i. Rice thresher: it dislodges rice seed from the particle and has the capacity of 3000kg.
- ii. Reciprocator winnower: this equipment performs the function of cleaning the threshed seed.

- iii. Wet cleaners: it is used in separating lighter impurities that float on water from rice.
- iv. Rice parboiled: it is used to heat-treat rice in order to properly gelatinize the starch in the kernels.
- v. Rotary steam dryer: it dries about 1.5 tonnes of parboiled rice per day. It also has provision for condensation discharge and sets of screens that permits exit of moist air from the drying rice.
- vi. Rice mills: it has a capacity to mill 3.5-4.0 tonnes of the paddy to 2.5-2.8 tonnes of paddy. It is made up of a frustum hopper, milling chamber, husk aspiration spout and power unit.
- vii. Pneumatic cleaner: this machine cleans milled rice to ensure that fine sand and bran that still accompanies the rice after the initial winnowing and wet cleaning operations are removed.

Post harvest handling and processing of rice involves operation during when rice is properly prepared for further processing before it can be consumed, studies conducted shows that most Nigerian has preference for imported rice owing to the fact that it is of better grade, better taste, polished, not broken and is free of debris (Bamidele *et al.*, 2010). Rice quality is a major concern for the consumers and for the future of rice sector. The non competitiveness of local rice could be as a result of poor processing resulting in the final product with high percentage of broken rice, stone and debris resulting from traditional methods of processing (FAO, 2002). Nigerian government has not been intervening in rice processing sub-sector as expected; rice processing in Nigeria is predominantly in the hands of unskilled rural Women using traditional methods. According to Akpokoje *et al.*, (2001), 85 % of Nigerian rice is being processed through small rice mills, which normally result into poor quality processed rice, hence there is need to increase the level of training and adoption of improved rice processing technologies.

### Objectives of the study

The general objective of the study is to determine the extent of adoption of improved rice processing technologies.

The specific objective includes:

- i. Examine socio-economic characteristics of women processors
- ii. determine the rice processors access to training
- iii. determine level of awareness and adoption of improved technologies
- iv. describe the problems associated with the adoption of improved rice processing technologies.

### METHODOLOGY

Agricultural Zone 1 of Niger State Agricultural Development project was purposively selected for the study owing to large scale rice production and processing activities taking place in the Zone. Four local Governments Areas were randomly selected. 20 rice processors were also randomly selected from each of the four local Government Areas, giving a total sample size of 80 respondents. Primary data were mainly used for this study. Structured interview schedule consisting of both open and close ended questions was used for eliciting relevant information from the respondents.

Descriptive statistics was used in achieving all the objectives, Likert type of scale was used to determine the level of rice processors adoption of improved technologies. 3 points Likert scale of aware, tried and adopted were used to determine the level of adoption. The cut off mean equals to 2, any technology with a mean score of 2 and above was regarded as high adoption and mean score of less than 2 was regarded as low adoption.

Chi-square ( $\chi^2$ ) analysis was used for hypothesis testing.

$$\chi^2 = \frac{\sum(O - E)^2}{E}$$

## Test of hypothesis

Null Hypothesis (Ho): there is no significant relationship between respondent's level of adoption of improved rice processing technologies and some selected socio-economic characteristics such as; age, marital status, cooperative membership, level of education, access to training, access to credit and awareness level of the respondents.

**RESULT AND DISCUSSIONS**

**Age:** The result in Table 1 revealed that majority of the respondents were still in their active age with mean age of 42 years and only 8.75 were 51 year and above. this implies that majority of the women rice processors in the study area were still strong and energetic to diversified into other income generating activities to supplement their income from rice processing. This finding is in agreement with that of Kau (1994), who stated that young women spend a lot of time in many activities particularly in processing activities.

**Education:** The result in Table 1 also indicated that majority (92.5%) of the respondents had one form of education or the other. This implies that dissemination of new or improved rice processing technology to the women rice processors in the study area will be done with relative ease, since education is positively and significantly related to acceptance and addition of improved rice processing technologies. This finding is in line with those of Tadese (2008), who reported that education facilitate farmers access to information and enhances adoption.

**Marital status:** As evident in Table 1, majority (90%) of the respondents were married and were still with their spouse, the singles and the widows were 7.5% and 2.5% respectively. this implies that majority of the women rice processor in the study area had traditional responsibility of catering for their families, this directly or indirectly will motivate them to accept and adopt improved rice processing technologies to enable them generate more income to cater for their families.

Table 1. Personal characteristics of respondents

Variables	Frequency	Percentage
<b>Age range</b>		
Below 21 years	10	12.5
21 – 30	10	12.5
31 – 40	33	41.25
41 – 50	20	25.00
51 and above	7	8.75
<b>Education status</b>		
Primary school	20	25.00
Secondary school	31	38.75
Tertiary Education	15	18.75
No formal Education	6	7.5
Adult/Mass literacy	8	10.00
<b>Marital status</b>		
Single	6	7.5
Married	72	90
Delivered	0	0.0
Widowed	2	2.5
<b>Household Size</b>		
Less than 6 people	10	12.5
6 – 10 people	62	77.5
11 – 15	8	10.00
Above 15 people	0	0.0
Total	80	100
<b>Primary occupation</b>		
Processing/Trading	70	87.5
Farming	0	0.0
Civil Servants	10	12.5

Source: Field Survey, 2014

**Household size:** The result in Table 1 shows that majority (77.5%) of the respondents had moderate household size of between 6-10 people. 12.5% and 10% had household sizes of less than 6 people and between 11-15 people respectively. It is important to note that none of the respondent had above 15 people in their household. this implies that majority of the rice processors in the study area were saddled with more responsibility of providing for their families, this will however, influence their decision in accepting and adopting rice processing technologies to earn more income to be able to provide for their immediate family.

**Primary occupation:** Table 1 reveals that majority (87.5%) of the respondents had rice processing/trading as their primary occupations and only few (12.5%) were civil servants. None of the respondents however, had farming as their major occupation. This

implies that majority of the women in the study area were mainly involved in post harvest activities like processing and trading of agricultural products. This finding is also in conformity with that of Tedesse (1986), who reported that Women participate actively in post harvest activities.

**Training:** Table 2 shows that majority (85%) had access to training on the use of improved rice processing technologies.. This implies that women rice processor in the study area had access to one form of training or the other. This finding is in line with that of Tsado (2013), who pointed out that training positively and significantly influence adoption.

**Access to credit:** Table 2 shows that majority of the respondents (70%) had no access to credit, it was only 30% who claimed that they had access to credit, access to credit had significant and positive relationship with adoption. This finding is in line with that of Tadese (2008) who stated that access to credit was positively and significantly related to adoption.

**Table 2. Distribution of respondents according to their access to training, Credit and membership of cooperative association.**

Variables	Frequency	Percentage
<b>Received training</b>		
Yes	68	85
No	12	15
<b>Access to credit</b>		
Yes	24	30
No	56	70
<b>Co-operative membership</b>		
Yes	78	97.5
No	2	2.5
Total	80	100

Source: Field Survey, 2014

**Cooperative membership:** As evident in Table 2 over whelming proportion (97.5%) of the respondents belongs to one cooperative society or the other. This implies that majority of the women particularly rice processors in the study area stands a better chance of benefiting from NGOs, donor agencies and other organizations that assist farmers, for the present trends of receiving assistance from any

of these organizations is usually through their cooperative societies or organizations.

Table 3 showed that the respondent's rates of adoption of the following improved rice technologies were high: medium/small millers(2.0) and soaking/steeping (2.0). The adoption of other improved rice processing technologies by the processors in the study area were low. This implies that the processors only adopted those technologies that were compatible with their existing practices. This also implies that despite the high rate of awareness, adoption rate of various improved rice processing technologies were still very low

**Table 3. Distribution of respondents according to adoption level of the various improved rice processing technologies**

Technologies	Mean	Level of Adoption
Medium/small millers machines	2.0	High
Improved paddy drying	1.0	Low
Use of uniform raw rice	1.1	Low
Soaking (Steeping)	2.0	High
Improved fire wood par boiler	1.1	Low
Improved steam firewood par boiler	1.1	Low
Electrical rice par boiler	1.0	Low
Threshing	1.0	Low
Cleaning	1.7	Low

Source: Field Survey, 2014

Table 4: revealed that rice processors were faced with several constraints in adopting improved technologies, such major constraints' includes; High cost of processing machine (95.5%), inadequate extension visit (95%), Nature of local grains (mixed shot and long grains) (73.75%) and insufficient fund to buy paddy's in bulk (72.5%). This implies that rice processors in the study area were faced with multi-dimensional problems which hinder their uptake of the improved rice processing technologies. This finding is in conformity with that of FAO (1990), who reported that Women faced many constraints in trying to adopt new technologies in order to earn extra income.

Table 4. Distribution of respondents based on the constraints hindering their adoption of improved rice processing technologies

Constraints	Frequency	Percentage
Inadequate information/training	46	57.5
Lack of credit facilities	56	70.0
Inadequate extension visit	76	95.0
Low price of locally processed rice	80	100
High cost of processing machines	78	97.5
Nature of local rice grain (short)	75	93.75
Insufficient fund to buy paddy in bulk	58	93.75

Source: Field Survey, 2014  
Multiple responses

### HYPOTHESIS TESTING

Null Hypothesis: there no significant relationship between the socio-economic characteristics of the respondents and their level of adoption of improved rice processing technologies.

Result in Table 5 indicates that all the socio-economic variables under consideration had significant and positive relationship with adoption of improved rice processing technologies at 5% level of probability. This implies that all the socio-economic variables identified significantly and positively affect the levels of adoption. Similar research finding has been conducted and the finding were in agreement with the result of this study, such research works includes: Tedese, (2008), Rahmeto (2007), Leggesse, (1992) Lelissa and Mulet (2002) and Adeniyi (2009), that socio-economic characteristics significantly affect adoption of improved technologies either positively or negatively.

Table 5. Relationship between the socio-economic characteristics of the respondents and their level of adoption of improved rice processing technologies.

Socio-economic variables	$\chi^2$ calculated	$\chi^2$ critical	DF	Remark	Decision
Age	61.953	9.448	4	S	Accepted
Marital status	37.038	7.815	3	S	Accepted
Cooperative membership	59.825	3.841	1	S	Accepted
Level of education	44.604	9.488	4	S	Accepted
Access to training	43.605	3.841	1	S	Accepted
Access to Credit	51.341	3.841	1	S	Accepted
Awareness level	61.287	3.841	1	S	Accepted

\*S – Significant

Source: Computed from survey data, 2014.

### CONCLUSION

The result from this study showed that the adoption rate of the various improved rice processing technologies of the rice processor were very low. The result of the hypothesis tested revealed that there was a significant relationship between the following socio-economic characteristics: age, marital status, co-operative membership, level of education, access to training, access to credit, awareness level and level of adoption of improved rice processing technologies. The processors however, identified the following as major constraints to adoption; high cost of rice processing machines, nature of local rain grains and insufficient fund to buy paddy in bulk for processing.

## RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Credit facilities should be provided to rice processors in the study area, since most of them claimed that they had no access to credit facilities that will enable them buy paddy in bulk.
2. Fabrication of local rice processing machines that could be affordable by the processors should be developed since the available machines are too expensive and out of reach of the small scale processors.

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