Choice of processing techniques among rice processors in Nigeria

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Abstract

Purpose – Rice processing, an important feature in rice production involving the transformation of harvested paddy into edible rice, is dependent on the type of rice processing techniques used. The purpose of this paper is to analyze the choice of processing techniques among rice processors in Nigeria.
Design/methodology/approach – The study was carried out in Nigeria using structured questionnaires among 410 rice processors selected from four states (Ebonyi, Ekiti, Ogun and Nasarawa) from three geo-political zones (Southeast, Southwest and North-central) of Nigeria. Information on socio-economic characteristics (age, sex, household size, marital status and education) and processing characteristics (experience, paddy source, processing activities, processing techniques, credit and distance) were obtained. Data were analyzed with the use of descriptive statistics and multinomial logistic regression model at 0.05.
Findings – The mean age of processors was 47.8 ± 9.9 years, mean household size was 6.5 ± 4.2 persons and 88.7 percent were married. In total, 73.6 percent had formal education and mean years of experience was 16.4 ± 9.2 years. Main processing activities were parboiling and drying (50.0 percent); milling (40.0 percent); and de-stoning (10.0 percent). In all, 65.7, 20.4 and 13.9 percent used traditional and modern techniques (TMTs), traditional techniques (TTs) and purely modern techniques (PMTs), respectively. The probability of choice of TT relative to TMT reduced by years of education (4.5 percent), paddy source (1.8 percent) and distance to processing center (4.4 percent), while probability of choice of PMT relative to TMT increased for male processors (7.3 percent), membership of association(18.0 percent) and other income sources (6.2 percent).
Research limitations/implications – Level of education of processors and reduction in the distance taken to paddy source reduced choice of TTs.
Practical implications – Other income sources increased the choice of PMTs of rice processing in Nigeria.
Social implications – Processors with high level of education, who also engage in other income generating activities, were able to choose modern processing techniques.
Originality/value – This research was an original research carried out among rice processors in Nigeria.

Keywords Access to credit, Distance to processing centre, Geo-political zones, Paddy source, Traditional and modern techniques

Paper type Research paper

1. Introduction

Rice processing is an important and distinct feature in rice production. It involves the transformation of harvested paddy into edible rice; it is the value addition stage of rice production before final consumption (USDA, 2016). Rice processing technique is the practical method or art applied in converting paddy into edible rice (www.wordweb.info). Choice which is the selection among alternatives is based on preference and utility maximization (Kroh and Eijk, 2003). Choices are dependent on budget and other major constraints. Thus, the choice of a processing technique is dependent on processors' budget, constraints, preferences and utility maximization (Kroh and Eijk, 2003; Olayide and Heady, 2006). Thereby implying that the choice of techniques and equipment used during processing is major determinants of output and quality of locally processed rice (Okpe and Okpala Steve, 2014; Donkoh and Awuni, 2013).

1.1 Problem statement

In most developing countries, Nigeria inclusive, stakeholders involved in transforming agricultural products (processing) are significantly lower than those involved in actual

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production (Food and Agricultural Organisation (FAO), 2013). Furthermore, when processing is carried out, about one-third of the produce never reach consumers. This is as a result of the choice of equipment and machines used which ultimately leads to in adequate allocation of inputs and resources (www.irri.org/rice-today/adding-value-to-africa-s-rice). Thus suggesting that although farmers produce and processors process; however, quite a sizeable amount is lost during rice processing (Onyekwena, 2016; FAO, 2016; FAO, 2013). Rice processing goes through a number of stages, and at each stage, there are lots of inadequacies resulting from processing facilities used (Dissanayake *et al.*, 2012). This has been attested to be a major impediment to achieving adequate and efficient processed rice in Nigeria. Subsequently, most processing facilities in the country are over-aged and need rehabilitation or outright replacement, which is a direct result of inability to access new technologies by processors (Donkoh and Awuni, 2013). Consequent on these, the following questions will be guiding this research:

RQ1. What are the characteristics of rice processors?

RQ2. What rice processing techniques are available to processors in the study area?

RQ3. What factors determine the choice of processing techniques made by processors in the study area?

1.2 Objectives of the study

The broad objective of this study is to examine the choice of processing techniques among rice processors in Nigeria. While the specific objectives are to: describe rice processors' characteristics in the study area; profile rice processing techniques in the study area; and analyze the determinants of choice of rice processing techniques in the study area.

1.3 Justification for the study

Although the cost of loss reduction needs to be evaluated, it is likely that promoting food security through choice and use of proper processing techniques will be more cost effective (USDA, 2016). This invariably will be more environmentally sustainable, than a corresponding increase in production (National Rice Development Strategy (NRDS), 2009). The United State Department of Agriculture in 2016 attributed large amount of losses occurring during paddy transformation (value addition stage) to improper processing (techniques and management), further buttressing the improper management of paddy witnessed during processing as corroborated by FMARD[1]. They also asserted that all efforts will become futile with improper processing, handling and management (Maculey, 2015; USAID, 2009). In the analysis of choice, methodologies like probit and the binary logit have been used (Javier, 2013). They are, however, limited to dichotomous variables and they do not give room for variability in more than two categorical dependent variables. Hence, this study used the multinomial logit (MNL) regression model in the analysis of choice. MNL allows for the choice probability of more than two alternatives or categorical dependent variables (Bamidele *et al.*, 2010; Viton, 2014). It allows for the choice probability of more than two alternatives which could be compared relative to other categories (Hahn and Soyer, 2008; Ojo *et al.*, 2013).

2. Theoretical reviews

In contrast to the individual choice theory where decision makers are faced with bundles of commodities and decisions are made based on rationality and utility satisfaction or maximization, Kroh and Eijk (2003) showed that rationality and satisfaction are not the only determinants of decisions made. They further suggested that preferences and decision makers' decision rule as well as other constraints are also important.

For instance, utility function can be maximized as follows:

$$\text{Max}_{q1 \geqslant 0, q2 \geqslant 0} U_1 = f(q_1 q_2). \tag{1}$$

This according to Kroh and Eijk must be subject to some constraints:

$$q_1 x + q_2 y \leqslant \Phi, \tag{2}$$

where Φ could be income, price and other socio and demographic characteristics. This means the equation based on Φ can be estimated as follows:

$$U_1 = f(\text{Income, price and other socio and demographic characteristics}). \tag{3}$$

Not forgetting rationality and preferences of decision makers.

Therefore, the overriding equation for decision makers' choice(s) made will now be written as follows:

$$U_1 = f(\text{Preference, rationality of decision makers, income price, and other socio and demographic characteristics}), \tag{4}$$

i.e.:

$$(q_1 q_2) = f(\text{Preference, rationality of decision makers, income, price, and other socio and demographic characteristics}). \tag{5}$$

However, since majority of these factors are non-quantifiable, they can be represented in a model by some variable of expressions in order to assume a deterministic component; therefore, the safest application of the above equation is for it to be represented in an equation as follows:

$$U_1 = f(\text{Prices, income and } \varepsilon), \tag{6}$$

where ε is the preference, rationality of decision makers and other socio and demographic characteristics. Hence, this can be used to model the deterministic component of the variables of expression and the choice based on utility and preferences of processors. In order to achieve this in this study, the multinomial logistic regression was used (www.unc.edu/~normanp/unc410week3.pdf).

3. Methodological review

3.1 Choice models

Choice model explains the behavior of respondents when they are faced with diverse options/choices having common consumption objectives (McFadden *et al.*, 1977; Javier, 2013). Some choice models have been used to represent the selection of one among a set of mutually exclusive alternatives (Carson, 1994). In an adoption decision involving choices, analytical tools normally used include: binary logit model, binary probit model, MNL model, multinomial probit model, the nested logit model, etc. (Javier, 2013).

4. Empirical reviews

4.1 Multinomial logistic regression

Bhatta and Larsen (2011) used the MNL regression analysis to determine the level of service attributes representing the performance of transportation system and characteristics of travelers and traveling demand. Louviere (1988) and Louviere *et al.* (2000) reviewed designs

that satisfy the statistical properties of the mother logit or its nested form called the MNL. They discovered that it allows for a wide range of utility specification and estimation. Bunch *et al.* (1993) also performed an exercise for MNL models using D-Optimality criteria.

A review of Uwaoma (2015) on economics of small scale soybean processing firms in Anambra State, Nigeria showed the socio-economic and influential factors affecting the choice of technologies used, technical efficiency and the value added by soybean processors. The profitability, factors affecting profitability, constraints to small scale and the level of gender participation in small scale soybean industries were examined. The study made use of descriptive and inferential statistics like the MNL model, stochastic frontier production model, gross margin and the profit analysis. The results of the multinomial logistic regression on 150 soymilk processing firms and 100 soy-flour processing firms showed that age, income, level of education, household size of processors, cost of processing technology, age of processing firm, availability of spare-parts, technicians, household employees and paid employees were the significant factors affecting the choice of processing technology at $p < 0.05$. This research therefore made some policy recommendation that there should be provision of credit facilities, granting of tax incentives and provision of adequate power and water to soybean processors in the study area. Hence, although this study was on soybean processing in Nigeria, it has a tremendous significance to this study on choice of rice processing techniques in Nigeria.

Assessing the use of post-harvest loss prevention technologies for cassava in Nigeria, Adejumo *et al.* (2015) made use of the multinomial logistic regression model to examine the factors influencing the choice of post-harvest technologies used by cassava processors in Kwara State using the data collected from 150 cassava processors. The outcome of the study showed that factors like years of education, post-harvest technology capacity, processing experience, motives for processing were found to influence the choice of post-harvest technologies. The study therefore concluded that policy should be directed toward investment in improved post-harvest technologies by both private and public sector.

5. Research methodology

5.1 The study area

This study was carried out in Nigeria; because of its importance in the country, rice is produced in all the six geo-political zones, all the agro-ecological zones and in virtually all the states of the federation (National Rice Development Strategy (NRDS), 2013). Therefore, as a result of their long and standing contribution to rice processing and rice value addition in Nigeria (Ezedinma, 2008/2013; ATA, 2011-2014), the four states used in this study were purposively selected from three geo-political zones in the country. The four states were part of the staple crops processing zones according to agricultural transformation agenda (ATA, 2011-2014; Federal Ministry of Agriculture and Rural Development (FMARD), 2016). The four states Ebonyi, Ekiti, Ogun and Nassarawa States are located in the Southeast, Southwest, Southwest and North-central regions of Nigeria, respectively.

5.2 Data source

Primary data from a cross-section of rice processors were used for this study. Data were collected on their socio-economic characteristics, processing activities and processing techniques used.

5.3 Sampling procedure and sample size

A multistage sampling technique was used; the first stage was the purposive selection of four states: Ebonyi, Ekiti, Ogun and Nassarawa, based on their contribution to rice

processing in the country (Ezedinma, 2008, 2013). The second stage was the selection of local governments proportionate to size. The third stage was the purposive election of rice processing centers from the designated LGAs based on the proportionate factor; the fourth stage was the random selection of rice processors 25 (4), 20 (5), 15 (7), 15 (7) from selected processing centers to give a total of 410 respondents. However, 382 respondents were used in the study, while 18 questionnaires (from rice processors) were unsuitable for use.

5.4 Analytical techniques

Different analytical tools were used in analyzing the variables gotten from rice processors and processing techniques used in the study area. These include: descriptive statistics and multinomial logitic regression model.

5.4.1 Multinomial logistic regression. In describing the MNL as used in this study, the dependent variable Y representing the processing techniques used was categorized into traditional, traditional and modern (tradmodern) and purely modern techniques (PMTs) of processing rice.

This can be specified as follows:

$$Y = \begin{bmatrix} \text{Traditional processing technique} = 0 \\ \text{Traditional and modern processing technique} = 1 \\ \text{Purely modern processing technique} = 2 \end{bmatrix}.$$

The MNL model is represented as follows:

$$\Pr(Y_i = K)\frac{1}{1+\sum_{k=1}^{K-1} e^{\beta k \cdot Xi}}. \tag{7}$$

While the regression equation can be explicitly specified as follows:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots + \beta_m X_m + e, \tag{8}$$

$$f(k,i) = \beta_{0,k} + \beta_{1,k} x_{1,i} + \beta_{2,k} x_{2,i} + \cdots + \beta_{M,k} x_{M,i}, \tag{9}$$

β_k is the regression coefficient associated with outcome k, for K possible outcomes, running $K-1$ independent regression models, one outcome is chosen as a "pivot" and then the other $K-1$ outcomes are separately regressed against the pivot outcome. This would proceed as follows, if outcome $K = 2$ is chosen as the pivot:

$$\Pr(Y_i = 0) = \Pr(Y_i = K)e^{\beta_1 \cdot X_i}, \tag{10}$$

$$\Pr(Y_i = 1) = \Pr(Y_i = K)e^{\beta_2 \cdot X_i},$$

is the pivot regression, regressed against others:

$$\Pr(Y_i = 2) = \Pr(Y_i)e^{\beta_3 \cdot X_i}, \tag{11}$$

$$\Pr(Y_i = k) = \Pr(Y_i = K)e^{\beta_{k-1} \cdot X_i}, \tag{12}$$

K_1 is the traditional; K_2 the traditional and modern; and K_3 the purely modern. The explanatory variables $X_{i(s)}$ associated with observation (i) are as follows:

- Household characteristics: X_1 is the sex of processors (1 if male, 0 = female); X_2 the age of processors (years); X_3 the marital status of processors (1 if married; 0 = otherwise); X_4 the household size (number); and X_5 the educational level of processors (years of schooling).
- Processing characteristics: X_6 is the paddy source (own farm = 0, other sources = 1); X_7 the membership of processing association (1 = yes, 0 = no); X_8 the experience as processor (years); X_9 the labor (man days); X_{10} the main income source (1 if processing, 0 = otherwise); X_{11} the other income sources (1 if yes; 0 = otherwise); X_{12} the access to credit (1 = access, 0 = otherwise); and X_{13} the distance paddy source to processing unit (km). Explanatory variables were selected based on previous studies of: Ijoku (2016); Ogundele (2014); Ojo *et al.* (2013); Nazaki *et al.* 2013; Oguntade (2011); Koprulu (2011).

6. Results and discussion

6.1 Profile of rice processors by socio-economic

The mean age of processors as shown in Table I was ≈48 years (47.84 ± 9.87). The result showed that more females (54.97 percent) were involved in rice processing activities than males (45.03 percent) and majority were married (88.74 percent). This is similar to the outcome obtained from Attah where majority of the respondents (88.6 percent) were married, suggesting that they were stable, dutiful and had responsibilities. The mean household size was 6.63 ± 4.18 with processors having between 6 and 10 household members (highest within this category with 57.33 percent). These implies that respondents will have more hands as family labor, which is similar to the research outcome of Asogwa *et al.* (2012) where large family size increased the rice plots cultivated. The distribution of processors by level of education showed that 21.99 percent had no formal education; 27.49 percent had primary education; 4.71 percent had Quranic education; 32.46 percent had secondary education, while 13.35 percent had tertiary education.

6.2 Profile of rice processors by processing characteristics

The distribution in Table II showed that 20.68 percent processors obtained paddy from their own farms, while 79.32 percent obtained paddy from other sources. In all, 52.36 percent of processors had main income coming from processing alone, while 47.64 percent were found involved in other activities apart from processing. In total, 52.88 percent of processors were involved in rice processing associations, while 47.12 percent were not involved. The mean years of processing experience was 16.40 (±9.21); 65.71 percent used the traditional and modern technique (TMT) to process; 20.42 percent used the traditional techniques (TTs), while 13.87 used the PMTs; on the other hand, the mean distance from source of paddy to processing center was 112.26 ± 245.

6.3 Distribution of rice processors by processing activities

Rice processors involved in parboiling were 17.9 percent using the TTs, 31.3 percent used TMTs, while 3.8 percent used the PMTs in parboiling rice. Milling of rice was done with TTs by 2.6 percent processors, 22.5 percent used both TMTs, while 37.7 percent used purely modern machines. Traditional de-stoning was carried out by 1.3 percent processors, 2.6 percent used TMTs, while 9.4 percent used PMTs for de-stoning, as shown in Tables I–III.

Variables	Frequency	%	Pooled ($n = 382$)
Sex of processors			
Male	172	45.03	
Female	210	54.97	
Age of processors (years)			
0–20	3	0.79	
20–40	94	24.61	
41–60	249	65.18	
61–80	36	9.42	
> 80	0	0.00	
Mean age in years			47.84
SD			9.87
Marital status			
Single	16	4.19	
Married	339	88.74	
Divorced/Separated	11	2.88	
Widowed	16	4.19	
Educational level			
No formal education	84	21.99	
Primary education	105	27.49	
Quranic education	18	4.71	
Secondary education	124	32.46	
Tertiary education	51	13.35	
Experience in processing (years)			
0–5	37	9.69	
6–10	95	24.87	
11–15	63	16.49	
16–20	99	25.92	
21–25	37	9.69	
26–30	33	8.64	
> 30	18	4.71	
Mean			16.41
SD			9.21

Source: Field Survey (2016)

Table I. Distribution of respondents by socio-demographic characteristics

6.4 The determinants of choice of processing techniques

6.4.1 Multinomial logit estimates of determinants of choice of processing techniques. The MNL regression was used to estimate the correlates of the determinant of choice of processing techniques used by processors in this study. The result as shown in Table IV has a maximum likelihood of −334.01, LR χ^2 of 188.36, Prob. > χ^2 (0.0000), which is significant at 1 percent ($p < 0.01$). This implies that the model is significant as a whole in explaining the explanatory variables when compared to a null model without predictors. The base category was the TMT. Male processors were more likely to make use of PMTs of processing rice (coefficient 1.44). The RRR of sex of respondent reduced the probability of choice of TTs (outcome category) of processing by 72.96 percent, while the RRR > 1 for the PMTs (reference category) signified that the probability that a male respondent will choose the modern technique of processing increased by 42.30 percent compared to the base category (tradmodern techniques). The result of the marginal effect estimates explains that a male processor increased the probability of use of PMTs by 0.073. The probability of using the TTs to process rice was found to increase significantly by 0.69 if a processor was married.

Variables	Frequency	%	Pooled ($n = 382$)
Paddy source			
Own farm	79	20.68	
Purchased	303	79.32	
Main income source (processing)			
No	182	47.64	
Yes	200	52.36	
Other income sources			
No	109	28.53	
Yes	273	71.47	
Membership of processing association			
No	180	47.12	
Yes	202	52.88	
Access to credit			
No	244	63.87	
Yes	138	36.13	
Distance paddy source to processing center			
0–10	122	31.94	
11–20	14	3.66	
21–30	16	4.19	
31–40	3	0.79	
> 41	227	59.42	
Mean			112.26
SD			245.18
Processing techniques used			
Traditional	78	20.42	
Traditional and modern	251	65.71	
Purely modern	53	13.87	

Source: Field Survey (2016)

Table II. Distribution of processors by processing characteristics

Processing activity	Processing techniques used (%) Traditional	Traditional and modern	Purely modern	Total
Parboiling	18 (17.90)	40 (31.30)	2 (3.80)	60 (15.71)
Milling	2 (2.60)	52 (22.50)	20 (37.70)	74 (19.37)
De-stoning	1 (1.33)	6 (2.60)	5 (9.40)	12 (3.14)
Parboiling and drying	45 (57.70)	60 (26.00)	2 (3.80)	107 (28.01)
Milling and parboiling	3 (3.80)	49 (21.20)	18 (35.80)	71 (18.60)
Harvesting drying and milling	–	7 (3.0)	–	7 (0.18)
Drying and milling	–	4 (1.70)	–	4 (1.05)
Threshing, Parboiling, drying and milling	3 (3.80)	14 (6.10)	2 (3.80)	19 (4.97)
All the above	10 (12.80)	13 (5.60)	3 (5.70)	26 (6.81)
Total	78 (20.41)	251 (65.71)	53 (13.87)	382

Note: Figures in parenthesis are in percentages
Source: Field Survey (2016)

Table III. Distribution by processing activity and technique used

Table IV.
Estimates of determinants of choice of rice processing techniques in Nigeria

Characteristics of processors	Traditional techniques				Purely modern techniques			
Variables	Coefficient	SE	RRR	Marginal effect	Coefficient	RRR	SE	Marginal effect
Sex (base: female)	−0.3152	0.3408	0.7296	1.4421***	1.4421***	4.2297***	0.3908	0.0727***
Age of respondent	0.0006	0.0176	1.0006	−0.0259	−0.0259	0.9744	0.0196	−0.0012
Marital status	0.6880**	0.3291	1.9896**	0.6979	0.6979	2.0094*	0.4287	0.0258
Educational level (base: no formal education)	−0.3990***	0.1302	0.6710***	−0.2976**	−0.2976**	0.7426**	0.1352	−0.0103
Household size	−0.0718	0.0652	0.9307	−0.0877	−0.0877	0.9161	0.0745	−0.0033
Respondents category (base: small scale)	0.1783	0.3190	0.5984*	0.3968	0.3968	0.5970	0.3310	−0.0192
Other income sources	−0.5135	0.3512	1.3308	−0.5158	−0.5158	6.6136***	0.3952	0.0616***
Main income sources	0.2859	0.3506	0.8952	1.8891***	1.8891***	0.8993	0.60509	−0.0039
Experience in processing	−0.1106	0.1205	0.8664*	−0.1061	−0.1061	1.2063***	0.1167	−0.0015
Credit access (base: no)	0.3309	0.3589	1.084	0.0134**	0.0134	0.7170***	0.3768	0.0090***
Paddy Source (base: own farm)	−0.1434**	0.0639	1.3922	0.1876***	0.1876***	1.0135	0.0684	−0.0148
Labor used (man days)	0.0807	0.2302	0.0966***	−0.3326	−0.3326	2.5747	0.2661	0.1813
Membership of association	−2.3371***	0.4496	1.0572**	3.1602***	3.1602***	1.0326***	0.7280	0.0010***
Distance to processing center	0.0556**	0.0217	0.7896***	0.0321	0.0321	0.0024***	0.0421	0.0727***
Constant	−0.2362	1.2823		−6.0531***	−6.0531***		1.70751	−0.0012
Number of observations: 382	LR χ^2 (28) 188.36			Pseudo R^2 0.4089			Log likely hood −334.01	

Notes: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$
Source: Author's compilation from Field Survey (2016)

The RRR estimates showed a significant and positive outcome for being married. This implied that a processor who is married increases the probability of choice of TTs by 1.99. However, the RRR of 2.00, significant at 10 percent showed that a processor who is married increased the probability of choice of PMT.

The marginal effect that a processor will choose the traditional and modern processing techniques reduces by 0.103 if a processor was married. This result is similar to the outcome of Kagbu *et al.* (2016) whose research report showed the married as having more responsibilities; thereby looking for ways of providing for family needs, this means reducing the use and purchase of productive assets. The probability of choosing a TT reduces by 0.4 for a unit increase in years of education of processors. This is, however, not similar to the outcome of the research of Tiamiyu *et al.* (2014) where respondents opted for the normal methods of processing rice due to the cost implication of the best option.

The outcome of the RRR (0.67) at the 1 percent level of significance confirmed that education reduced the probability of choosing the TTs (outcome category) of rice processing by 0.67 compared to the base category (traditional and modern) and the reference category (PMTs). A unit increase in years of education reduced the choice of TT by 0.045. Sources of income other than processing are significant ($p < 0.01$) and positive favoring the choice of PMTs (reference category) against the base category (traditional and modern) and the outcome category (TTs). This implies that the probability that a processor will make use of PMT increased by 1.89 for an additional income that comes from other sources.

The source from which paddy is gotten is significant ($p < 0.01$) and positive in favor of the choice of PMT (reference category) as against the base category (traditional and modern) and the outcome category (TTs). It is, however, negative but significant ($p < 0.05$) with the choice of traditional processing techniques. The result showed that processors were less likely to make use of the TTs of processing when they are members of rice processing associations. The RRR estimates also showed that the probability of choosing the TT relative to the base category (TMT) reduced by 0.09 ($p < 0.01$) when processors were in an association.

The distance processors go before paddy gets to the processing unit is positive and significant ($p < 0.05$) favoring the traditional method (outcome category) of rice processing, as against the base category (traditional and modern) and the reference category (PMTs). The RRR estimate showed that the increase in the distance to the processing unit increased the probability of the choice of the traditional method (outcome category) of processing by 1.0006 relative to the base category and the reference category. The result of the marginal effect estimates showed a positive and significant coefficient (0.040) with the choice of traditional processing techniques for a unit increase in distance to rice processing unit.

7. Summary

This choice of rice processors and the determinants of choice of processing techniques among rice processors were examined in this study. It was found out in the study that marital status, educational level, paddy source, membership of association and distance to processing center were significant determinants of choice of traditional processing techniques, while the main determinants of choice of purely modern processing techniques were sex, educational level, membership of association, experience in processing, main income source (processing), paddy source, distance from paddy source to processing unit and access to credit.

7.1 Conclusion

The outcome of this study based on the empirical evidence from the descriptive and inferential statistics used established the following that the mean age of respondents was ≈48 years, while the mean household size of was 6 persons. The minimum number of years of experience of a rice processor was 16, and there were more female respondents in the study than males.

The study outcome also showed that there were more processors within the output range/processing category of small and medium scale, while the main determinants of choice of traditional and pure modern processing techniques were age, sex of respondent, membership of association, experience in processing, main income source (processing), paddy source, distance from paddy source to processing unit and access to credit.

7.2 Recommendations

(1) there rice processors' association should be enhanced and supported with input supply and credit since the study was able to find out that processing association was a positive determinant of choice of techniques used by rice processors in the study area;

(2) the female respondent should be empowered with input supply, access to credit and proper monitoring, since it was discovered based on the outcome of this study that they were more likely to use to TTs of processing rice than the males; and

(3) based on the outcome of this study, the further away the processing center was the less likely to use the PMTs of processing, hence stakeholders in the rice processing industry are advised to invest in processing equipment and situate them close to rice processors with good access roads.

Note

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