SOCIAL SCIENCES & HUMANITIES

Adoption of Innovation through Joint Asset Acquisition: The Case of Women Rice Processor Groups in Nigeria

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ABSTRACT

Small-scale rice processors in Nigeria cannot afford to individually own rice destoners and have therefore not adopted its use. As a result, locally produced rice has failed to satisfy both the local and foreign markets in terms of quality. This study determined the willingness of the women rice processors to own and manage destoners in groups. The survey also determined the factors that influenced their willingness and the constraints to the joint acquisition of destoners. Following a two-stage random sampling technique, 195 respondents were selected on whom a structured interview schedule was administered. Descriptive statistics and the Probit Regression Analysis were used to present and analyse collected data. Findings reveal a high level of willingness (62.6%) influenced by the age of the respondents (-0.0341), their total annual income (0.3864), educational level (0.0757), rice farming experience (-0.7927), access to extension (-0.0089), and credit (0.0079) at P<.05. The burden of joint management (Mean score = 2.56), poor accountability (Mean score = 2.55), and poor organisation of the groups (Mean score = 2.47) were the most severe constraints to the joint acquisition of destoners among the women processors. The study concluded that the willingness of the women was high and influenced by some socio-economic characteristics. Strengthening of the processor groups through training in group dynamics and models of joint acquisition and ownership are some of the recommendations from the study.

Keywords: Adoption, group dynamics, joint acquisition, rice destoner, rice processing, willingness

INTRODUCTION

With a population of over 186 million and a population growth rate of 2.7% per annum, Nigeria has the 3rd largest number of malnourished children in the world (World Food Programme, 2016). An estimated 48.5% of women in the reproductive age in the country are anaemic, and about 250 children are predicted to die daily from hunger-related issues (YeniŞafak, 2017). These statistics substantiate the reports that the worse hit by poverty is women and children. Interestingly, 70% of Nigeria's hungry people are farming families who reside in rural communities and depend almost entirely on agriculture for their sustenance. This group, which dominates the agricultural production activities, is made up of millions of small-scale resource-poor farmers, who are characterised by the low level of use of agricultural research, technology, and innovation. They are economically restricted by poor farm gate prices and access to developed markets, among other challenges.

In spite of the constraints highlighted above, agriculture still contributes over 40% to the annual GDP, and over 85% to the non-oil earning with over 85% of the contribution, attributable to crop farming (Central Bank of Nigeria, 2012). The fact that less than half (33million out of 68 million hectares) of cultivable land and less than 7% of the 3,14million hectares of irrigable land is currently in use suggests huge opportunities in this sector (Food and Agriculture Organization [FAO], 2005). It has also been documented in the literature that the potentials of the youth and women in agriculture in Nigeria have not been optimised. While it has been difficult sustaining the interest of the youth in agriculture due to the unattractive nature in which it is practised, women, on the other hand, have a low level of access to opportunities and production resources (Omotesho et al., 2017b).

Women contribute between 50 to 90 percent of agricultural labour in Nigeria (Ogunlela & Muktar, 2009). They also dominate the processing and marketing of agricultural produce. Women have continued to suffer discrimination in terms of the distribution of resources. Less than 2% of agricultural land is owned by women, and only 10% of women have access to farm credit. About 15% of the total number of extension agents in the country are women, and only 5% of extension services are targeted at women farmers (Anaglo et al., 2014; FAO, 2011; Fon, 2015).

Furthermore, particularly in rural communities, women have little or no input to family decisions and a poor level of control over family resources, expenses, and investments. While acknowledging the fact that all farmers (male and female) in Nigeria are challenged severally in their production activities, the challenges of the women are more severe. There is the need to harness the potentials of all stakeholders, including women if the food security challenge of the nation will be surmounted. This can only be achieved by ensuring their adequate access to production resources and appropriate technology and innovation in agriculture.

One of the severe constraints to the adoption of technological innovations among farmers in the country is the high cost of acquisition of most technologies. In many cases, farmers appreciate the effect and benefits of technological innovations but lack the financial power to adopt these innovations. For example, in Nigeria, the use of technology to remove tiny stones, and other foreign materials from rice during processing by electronically or manually operated rice destoners. Failure of rice farmers/processors to adopt the use of rice destoners in processing rice is the bane in the acceptance of rice processed in Nigeria for both local and international markets despite the fact that farmers now produce the improved (long-grain) rice varieties. Rice is a staple in the Nigerian diet. Although Nigeria is a major producer of rice in Africa, it remains one of the largest importers of the crop in the world with an annual deficit of about 4 million metric tons. About $2.41b was spent on rice importation between 2012 and 2015 (Premium Times, 2015). The effort has been put into improving rice production in the country by driving yield as opposed to the expansion of area cultivated, and this has drawn more farmers into rice production. However, there has not been a commensurate improvement in quality due to the presence of foreign materials (mostly stones) in the locally processed rice (Adegun et al., 2012). The result is that the imported rice has not only continued to receive preference over the locally processed rice; it is also priced higher than the local rice. Rice processing is dominated by women who do not have access to resources. The main sources of funds for the adoption of technologies among farmers and processors in Nigeria have been government intervention programmes and other donor initiatives, and these are fast dwindling (Olomola & Nwafor, 2018). The joint acquisition has been explored as a veritable option for the adoption of technologies among small-scale farmers with some success stories. A good example is the case of smallholder tea farmer associations in Kenya who collectively own and manage processing factories, employ experts, and fund research (Mwaura et al., 2010a).

Extension experts of the Department of Agricultural Extension and Rural Development of the University of Ilorin, Nigeria, embarked on a community development exercise directed at improving rice processing in Nigeria. The project which was funded by the African Forum for Agricultural Advisory Services (AFAAS) involved training of women rice processors in the project area on high hygiene levels during processing. Donation of destoner machines was made to rice processor groups in the Edu, and Patigi Local Government Areas of Kwara State as a component of the project to assist women processors improve the quality of their output. Members of the groups were sensitised on the joint acquisition of destoner machines as processor groups to facilitate their processing activities.

Statement of Problem

The quality of Nigeria's locally processed rice has failed to satisfied local and international markets. The major reason for this is the presence of impurities, mainly tiny stones in the processed rice. The technological innovation required to remove impurities such as stones in rice processing (destoner machines) has been disseminated to rice processors in Nigeria, but majority cannot afford to purchase the machines. Rice processing is dominated by women who have poor access to credit and production resources. Though there are many rice-producing and processing groups scattered across the major rice-producing areas in the country, many of these organisations have not taken advantage of joint acquisition in enhancing the adoption of appropriate processing technologies that will guarantee that their products are suitable for the local and international markets. Farmers, therefore, continue to receive lower prices for their produce at the detriment of their livelihood. This study was carried out to analyse joint asset acquisition in enhancing the adoption of innovation among rice processors in Nigeria. The specific objectives were to:

1. determine their willingness to be part of a joint asset acquisition of group;
2. identify the determinants of their willingness or otherwise; and
3. identify the constraints to joint asset acquisition among the processors

LITERATURE REVIEW

Farmer-groups have been described as a collection of farmers who share common experiences and interests (Asante et al., 2011). Farmers join such socio-economic groups to use their membership of the groups to accomplish some social and economic objectives often related to their farming businesses (Ofuoku & Chukwuji, 2012). Several factors underscore the need for farmer-groups in Nigeria. Chief among these factors is the small-scale nature of the millions of resource-poor farmers that characterise the agricultural sector of the country. This is also true of agricultural processors who are mostly women (wives of farmers in the majority of cases). The abysmally high farmer-to-extension worker ratio makes it practically compulsory that extension workers relate to farmers/processors in groups. International donor agencies also consider these socio-economic groups as the most efficient means of reaching farmers and processors. More important, however, is the fact that farmers and processors are able to achieve as groups, what they would ordinarily not be able to accomplish as individuals. For instance, many farmer groups engage in joint cultivation, buy inputs together at reduced prices and negotiate excellent prices for their farm output as a group (Effiom, 2014). The role of farmer-groups in pulling farmers' resources together for the collective advantage of widening their industrial base and management techniques has been enunciated (Anigbogu et al., 2016). Often, improved technologies come at a

price, some of which may be out of the reach of individual farmers. Farmers can easily acquire such technologies in groups.

It is important to note, however, that the possibility of farmers maximising this advantage depends primarily on the strength of the group as defined by their group dynamics. Group dynamics is a system of behaviours and psychological processes happening in a social group (intragroup dynamics) or between social groups (intergroup dynamics) (Gencer, 2019). These processes influence and explain decision-making as well as reactions of members of groups to changing circumstances. It is theorised that all groups go through the forming, storming, norming, performing, and adjourning stages with the performing stage involving working in a group, at a common goal, on a highly efficient and cooperative basis (Tuckman, 1965). This is possible when individuals in a group who are identified by the 'self-concept' can adequately reconcile their personal and social (collective self) identities (Hogg & William, 2000). The effective synchronisation of the two identities defines the level of participation and hence the success of group activities. The study is premised on the theory of planned behaviour (Ajzen, 1991). The theory states that the best predictor of a behaviour is the intention to adopt it, and this, in turn, depends on subjective norms, attitude towards the behaviour, and perceived behavioural control. All of the above has however been proven to be influenced by socio-economic characteristics (Wejnert, 2002). Several studies confirm the influence of socio-economic characteristics of individuals and some characteristics of groups on the participation of members in groups. Members' age, educational status, household size, marital status, income, farming experience, farm size, membership size, age of group are some of the variables that have been investigated as factors that could influence the participation of members in groups (Abegunde, 2009; Agbonlahor et al., 2012; Ofuoku, 2013; Omotesho et al., 2019).

METHODS

Study Area

The project was carried out in Kwara State, Nigeria. The country is located between latitude 4°N and 14°N, and longitude 3°E and 15°E. It has a total land area of 923,800KM² and occupies about 14% of the land area in West Africa. Kwara State is one of the 36 states of Nigeria and lies between latitude 7° N and 9° N and longitudes 2°E and 6° E covering a land area of about 32,500 KM². The state which has a population of about 3.1 million people (Kwara State Government, 2021), is located in the middle belt region of the country and shares an international boundary with the Republic of Benin. It. The annual rainfall ranges from 1000-1500mm, while the maximum average temperature ranges between 30°C and 35°C. Kwara State is largely agrarian and a significant hub for the production of rice in Nigeria. However, the quality of rice produced in the state has not met the standard demanded by consumers; hence imported rice is preferred to the detriment of

farmers' livelihood as well as the country's foreign earnings.

Sampling Procedure and Sample Size

Two Local Government Areas (Edu and Patigi LGAs) were purposively selected for the project because they are the hub of rice production in the state. The sampling frame for the survey was the list of members of all the women rice farmer groups that were trained under the project. A two-stage random sampling technique was adopted in selecting the respondents for the survey. The first stage involved the random selection of 50% of the 133 women farmer groups trained under the project. The second stage was the selection of three (3) respondents each from the 67 selected groups through the dip hat method. The names of members of each of the selected groups were written and rolled up in tiny papers and placed in containers "hats". Three of the rolled-up papers were then picked from the hats. The procedure produced a sample size of 201. One hundred and ninety-five (195) copies of the interview schedule were found analysable at the end of the survey, therefore, giving a response rate of 97%.

Data Collection and Analysis

The instrument for data collection was an interview schedule which was drawn by the researchers and subjected to validation by extension experts in the Department of Agricultural Extension and Rural Development of the University of Ilorin, Nigeria. The test-re-test method was also employed to ensure its reliability. The schedule was used to collect information on respondents' socio-economic characteristics, their willingness to partake in the joint acquisition of destoner machines, and their challenges in so doing. Data were collected between October and December 2017 with the aid of trained enumerators who were staff of the state Agricultural Development Project Descriptive statistics involving frequency counts, percentages, and means were used to present the results of the survey. A three-point Likert-type scale was used to assess the severity of constraints to the joint acquisition of rice destoners. This was achieved by drawing a list of possible constraints to the joint acquisition of destoners. Respondents were requested to state the level of severity of the constraints on a scale of one to three. The scale was graduated as follows;

> Not a constraint=1, Not severe=2, Severe=3

The scores were aggregated and converted to means which were used to rank the constraints in order of severity. The Probit Regression Analysis was fitted to identify the determinants of rice farmers' willingness to jointly acquire rice destoners. The choice of the probit regression analysis is borne out of its ability to model dichotomous or binary outcome variables. The model effectively measures the relationship between categorical dependent variables and usually continuous independent variables (or several) by converting the dependent

variable to probability scores (Hosmer & Lemeshow, 2000). The Probit equation for the study is presented as:

$$Z = \beta_{0+} \beta X_1 + \beta X_2 + ... \beta X_{12} + \mu \ (1)$$

Where

Z = willingness to jointly acquire rice destoners

$X_1, X_2, ... X_{12}$ = socio-economic characteristics of respondents as follows;

X_1=Age of respondents measured in years

X_2=Respondent's Household size measured as the number of persons living under the same roof and eating from the same pot

X_3=Marital Status measured as a dummy variable, 1 if married, 0 otherwise

X_4=Total income measured in Naira

X_5=Educational Level measured as the number of years of schooling

X_6=Primary occupation measured as a dummy variable, 1 if rice processing, 0 otherwise

X_7=Rice processing experience measured of number of years in rice processing

X_8=Length of farmer-group membership measured in years

X_9=Number of extension contacts in the immediate past six month period

X_{10}=Group membership strength measured as the number of members

X_{11}=Access to credit facilities measured as a dummy variable, 1 if yes and 0 if no

X_{12}= Age of farmer-group to which respondents belong was measured in years

β=are the coefficients to be estimated

μ=the error term

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

This section presents the result of the socio-economic characteristics of rice farmers in the study area. The results are summarised in Table 1. The importance of age distribution to rural developmental studies stems from its influence on years of experience, decision making, attitude, productivity, and perception (Omotesho et al., 2016). The mean age of 52.2 shown in Table 1 is an indication of the low level of the youth in participating in rice farming/processing and also in membership of rice farmer-groups. Majority of the women rice farmers in the study area were married (94.9%). This could imply a high level of social and financial stability. According to Table 1, most (66.8%) of the rice farmers had no formal education. Education has been linked to the adoption of innovation, and these statistics may present a constraint to the willingness to acquire assets jointly. The means number of years of rice processing experience was 21.3, which shows that the respondents were well experienced in rice processing. Table 1 reveals a poor level of contact with agricultural extension with an average of seven contacts per annum, and several had no contacts at all. The fact that about 80% of the respondents had rice processing as their primary operation should enhance their commitment to its improvement. The mean length of membership (4.7 years) and mean age of the farmer-groups (5.3 years) suggest that the formation of rice farmer groups was a relatively new idea in the study area. It is

Table 1

Distribution of respondents by selected socio-economic characteristics

Socio-economic Variables	Frequency Count	Percentages	Mean (SD)
Age of Respondents			
≤30	1	0.5	
31-50	111	56.9	52.2 (9.18)
>50	83	42.6	
Marital Status			
Single	185	94.9	
Married	10	5.1	
Household Size			
≤5	62	31.8	
6-10	109	55.9	6.8 (2.21)
>10	24	12.3	
Educational Level			
No Formal Education	129	66.8	
Primary Level	41	21.0	
Post Primary	25	12.2	
Rice Processing Experience			
≤10	50	25.6	
11-20	63	32.3	21.3 (10.30)
21-30	52	26.7	
>30	30	15.4	
No of Extension Contact			
0	33	16.9	
1-12	90	46.2	7.0 (4.10)
>12	72	36.9	
Access to Credit			
No	141	72.3	
Yes	54	27.7	
Primary Occupation			
Rice farming	155	79.5	
Others	40	20.5	
Income (N)			
≤200,000	83	42.6	
200,000-400,000	75	38.5	260,366.2 (96,256.25)
>400,000	37	18.9	
Length of membership of group			
≤5	163	83.6	4.7 (2.06)
>5	32	16.4	
Age of Group			
≤5	150	76.9	
6-10	33	16.9	5.3 (3.81)
>10	12	6.2	

Source: Field survey
Note: n=195; N360=$1   SD (Standard Deviation)

possible that this may have implications for group organisation and strength.

The Willingness of Rice Farmers to Jointly Acquire Rice Destoners

This section presents the result of investigations into the willingness of rice farmers to partake in the joint acquisition of rice destoners. The results are presented in Table 2. As shown in the table, more of the women rice farmers were willing to jointly acquire rice destoners in the study area. The high level of willingness could be as a result of the benefits derived from the rice destoner donated to the groups under the AFAAS/ University of Ilorin Rice Processing Project carried out in the study area. Through the use of the destoner, the processors were able to produce high quality, even, and stone-free rice which commanded high market value. This resulted in higher income for the women.

Determinants of Rice farmers' Willingness to Jointly Acquire Rice Destoners

This section presents the result of Probit analysis to determine socio-economic

characteristics of the rice farmers, which affect their willingness to jointly acquire rice destoners. The results are presented in Table 3. The significance of the chi-square value at one percent shown in Table 3 affirms the goodness of fit of the model. Six of the twelve regressor variables in the model predicted the willingness of rice farmers to jointly acquire destoners. The factors that predicted processors' willingness were the age of the respondents, their total annual income, educational level, rice processing experience, access to extension, and credit.

As revealed in Table 3, the inverse relationship shown between age and willingness reveals that willingness declined with an increase in age. In other words, the younger the farmers, the more likely their willingness to jointly acquire rice destoners. This finding supports those of (Zakaria et al., 2014). The fact that older people have been known to be risk-averse while younger people tend to be more open to new ideas may explain this finding.

Table 3 also reveals a significant and direct relationship between total income and the willingness of rice farmers to jointly acquire destoners at a one percent level of significance. This means that the higher the total income, the higher the Willingness. This finding agrees with the reports by Ahuja and Sen (2006), Mwaura et al. (2010b), and Oladele (2008). Higher income may connote the availability of more funds from which to pay.

According to Table 3, the respondents' number of years of experience in rice processing and their level of access to

Table 2
Willingness of respondents to jointly acquire destoners

Willingness to Acquire Destoners	Frequency	Percentage
Willing	122	62.6
Not Willing	73	37.4
Total	195	100.0

Source: Field survey
Note: n=195

extension negatively influenced their willingness to jointly acquire rice destoners. The fact that experienced processors were already used to manual processing methods and were therefore not willing to embrace a change in practice may be responsible for the inverse relationship. However, Chandio and Yuansheng (2018) reported that years of experience positively influenced farmer's disposition to the new ideas in rice production in Pakistan. The collective participation nature of joint acquisition may be the reason for the divergent reports.

Access to credit was also found to be a determinant of processors' willingness to jointly acquire rice destoners. The direct relationship between access to credit and willingness shown in Table 3 connotes that the more access a farmer had to credit, the higher their willingness. This can be directly traced to increased financial resources which are enhanced by access to credit.

The level of education of the farmers was positively related to their willingness to jointly acquire destoners at a 5% level of significance. This implies that willingness increased with the level of education. This relationship may be connected to the effect of education on the levels of adoption, reasoning, and ability to comprehend new ideas by the farmers. This is similar to some reports in the literature (Abu et al., 2011; Abraham et al., 2012).

The respondents' household size, length of membership of farmer-groups, and primary occupation were not significant in

Table 3
Parameter estimates from probit regression model to investigate determinants of the willingness of rice farmers to jointly acquire rice destoners

Variable	Regression Coeff.	Standard Error	t-value
Constant	-4.07914	0.45968	-8.87378
Age	-0.03413***	0.00706	-4.83147
Household Size	0.24107	0.16238	1.48455
Marital Status	0.08226	0.26197	0.31398
Total Income	0.03864***	0.01138	3.3954
Educational Level	0.07571**	0.03483	2.17382
Primary Occupation	-0.03553	0.15402	-0.23068
Rice Processing Experience	-0.07927**	0.04143	1.91327
Length of membership of group	-0.00365	0.00658	-0.55446
Number of Extension Contact	-0.00887**	0.00387	-2.29049
Membership strength	0.03888	0.11097	0.35035
Access to Credit	0.02782**	0.01185	2.3476
Age of Group	0.00792	0.01767	0.44791
Pearson Goodness of fit (chi square value)	**556.436**		
D.F.	**181**		
P	**.000**		

Source: Field survey
Note: n=195; *** 1%, **5%

predicting their willingness to subscribe for joint ownership of destoners. This is in spite of contrary reports on the influence of these variables on the participation of women in self-help programmes (Anyiro et al., 2014).

Constraints to the Joint Acquisition of Rice Destoners among Rice Farmers

This section discusses the constraints to the joint acquisition of destoners among rice farmers in the study area. The results are summarised in Table 4 As shown in the table, the major constraints to the joint acquisition of rice destoners among the farmers can be summarised into four categories. The first category bothered on the capability of the leadership of the various farmer groups to manage the joint use of the destoners. The second category of concerns had to do with corrupt practices and favouritism in the

management of the destoners. The fact that many of the organisations were weak with low-level participation by the members was also a concern. The final group of challenges was the quest to pursue individual interests which often resulted in difficulties in decision making.

However, the most severe of the identified constraints was the burden of management (Mean score = 2.56). Poor accountability in management ranked 2nd (Mean score= 2.55) while poor group organisation ranked 3rd (Mean score = 2.47). The least severe of the constraints were restrictions imposed by socio-cultural and religious beliefs. In a similar study among beekeepers, poor management resulting in trust issues was identified as the major challenge to group cohesion (Omotesho et al., 2017a).

Table 4
Constraints to the joint acquisition of rice destoners among rice processors

Constraints	Frequency (Percentages)			M	R
	Not Severe 1	Moderately Severe 2	Very Severe 3		
Corrupt practices by some leaders	85(43.6)	72(37.0)	38(19.4)	1.76	11th
Restricted access	55(28.2)	96(49.2)	44(22.6)	1.94	8th
Socio-cultural/Religious beliefs	77(39.5)	89(45.6)	29(14.9)	1.75	12th
Undue external influence	60(30.8)	91(46.7)	44(22.5)	1.92	10th
Poor group organization	22(11.3)	59(3.2)	114(58.5)	2.47	3rd
Poor accountability	23(11.8)	41(21.0)	131(67.2)	2.55	2nd
Burden of joint Management	18(9.2)	49(25.1)	128(65.7)	2.56	1st
Financial constraints	52(26.7)	106(54.3)	37(19.0)	1.92	9th
Difficulty in making personal decisions	47(24.1)	88(45.1)	60(30.8)	2.07	5th
Frequent conflict among members	47(24.1)	91(46.7)	57(29.2)	2.05	6th
Large size of membership	42(21.5)	103(52.8)	50(25.7)	2.04	7th
Weak group leadership	40(20.5)	45(23.1)	110(56.4)	2.36	4th

Source: Field survey
Note: n=195; M (Mean); R (Rank)

CONCLUSIONS AND RECOMMENDATIONS

The findings lead to the conclusion that the willingness of women rice farmers to jointly acquire rice destoners was high and influenced by some socio-economic characteristics of the farmers. The weak leadership and poor organisation of the groups were the roots of most of the challenges encountered in the joint acquisition of destoners among the farmers. The recommendations from the study are as follows;

1. Extension organisations and farmer/processor groups should embrace joint acquisition as an option to the poor technology uptake due to unaffordability among farmers/processors

2. Extension officers should strengthen the farmer groups through training in group dynamics as a solution to the observed challenge of poor management and organisation of the groups.

3. Leaders of the farmer groups should be trained on models of joint asset management to ameliorate the burden of management of the destoners.

4. There is a need to create awareness among farmers on joint acquisition in enhancing the adoption of innovation. Older and more experienced farmers/processors should receive more focus in these campaigns. This is because the willingness to co-own destoners was negatively influenced by the age and number of years of rice processing experience of the processors.

5. A multidimensional approach to the provision of credit facilities to rice farmers/processors should be explored as willingness was positively influenced by the access of the women processors to the credit facility.

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