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Assessment of the attitude of women rice processors to adoption of available value addition technologies in Benue and Kogi States, Nigeria

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Abstract:
This study was necessitated by the fact that value addition technology is the thrust of the rice value chain needed by women rice processors to improve their commodities to meet the demand of quality assurance standard by the local and international markets. The aim of this study is to bring to fore the analysis of the attitude of women rice processors towards value addition technologies available and used in the rice value chain in the study area. Data were obtained from 358 women rice processors using the multistage sampling procedure and analysed using descriptive and inferential statistics. The result of this study showed that most of the women rice processors in Benue and Kogi State (94.96%) were in their active and productive ages and most (90.21%) of them had one form of education or the other. The result of the Ordered Probit indicated that age, marital status, year spent in rice processing and extension visit significant and statistically influenced processors adoption of the methods of rice value addition technologies. The challenges faced by women rice processors in adopting value addition technologies include: Lack of processing skill centers (.700), Irregular extension visit (.653), Lack of technical knowledge (.639), Inconsistency and lack of implementation of government policies on value addition (.628), Lack of readily organized market for products (.576). These results imply that women rice processors need technical knowledge and skills to add value to rice through the adoption of improved technologies. The study therefore recommends that extension should ensure that attitudinal changes required of women towards positive improvement in rice processing and value addition is achieved by adoption of technologies friendly to women rice processors.

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1. Introduction

Rice is a staple food in many countries of Africa and constitutes a major part of the diet in many others. During the past three decades the crop has seen consistent increases in demand and its growing importance is evident in the strategic food security planning policies of many countries. With the exception of a few countries that have attained self-sufficiency in rice production, rice demand exceeds production and large quantities of rice are imported to meet demand at a huge cost in hard currency (Oteng and Sant'Anna, 2002)

The problem of how to preserve and add value to the harvested crops by farmers have been worrisome situation and of great concern to past and present governments in Nigeria. According to Okoruwa*et al,*. (2008), Nigeria is losing about 2.4billion tonnes of food yearly to poor post-harvest handling of crops. Farmers, therefore, grow what they can easily sell or store even if it will prevent new production technologies to be left unused. It is a problem that needs to be addressed at both on-farm and industry levels. In order to help address the problem of small-scale agriculture towards development into a modern production sector, strengthening the post-harvest sector or system is essential. Saliu and Adedayo (2010) opined that the agricultural technologies have the potential to develop Nigeria agricultural sector if they are properly adopted.

The paradigm shift from the focus on "quantity" of agricultural commodity production to "quality" which has imperative effects on large-scale industrial agricultural production in developed countries is yet to take its place in Nigeria; meanwhile agriculture remains the integral sector of the nation's economy. The development of an improved value chain on this crop will result in investment on additional processing facilities so that marketable surpluses can be pushed to women processors and farmers can reduce post-harvest losses thereby increasing farm income. Value addition can help farmers to claim part of the unexplored profit going unclaimed in the manufacture of food, fiber and industrial or other product from agricultural produce (Kehinde and Aboaba, 2016). Therefore, value addition in the production and processing of rice implies all the activities, processes or strategies and

distribution of rice which in one way or the other contribute to benefit/ utility maximization (Ugwu, Mgbakor and Chitor, 2014). Under the Agricultural Transformation Agenda (ATA), the Government of Nigeria expressed its determination to end the era of food imports, particularly rice, and develop rice value chains to produce and add value to this product and create domestic and export markets for farmers (Food and Agriculture Organization, 2018).

Nigeria is the continent's leading consumer of rice, one of the largest producers of rice in Africa and simultaneously one of the largest rice importers in the world. As an important food security crop, it is an essential cash crop for it is mainly small-scale producers who commonly sell 80 per cent of total production and consume only 20 per cent (Saba and Ibrahim, 2018). Rice generates more income for Nigerian farmers than any other cash crop in the country. In 2008, Nigeria produced approximately 2 million MT of milled rice and imported roughly 3 million metric tons, including the estimated 800,000 metric tons that was suspected to enter the country illegally on an annual basis (FAO, 2018). However, Nigerian agriculture is characterized by low productivity, low technology and high labour intensity (FAO, 2017). Agricultural economy in Nigeria is still largely based on production and direct sale of agricultural produce in its raw form with very little capacity for transformation of produce from its raw form to other value added products as a result of inadequate capacity of primary producers to add value to their produce due to socio economic, economic, environmental and technological constraints as reported by Olawale (2018). Benue and Kogi are among the states in Nigeria with appreciable level of rice production.

The adoption of rice grains value addition technologies will lead to increase in productivity, improve product quality and create markets for the product thereby improving the livelihood of the women farmers. Technology is considered to be a 'finished product' and farmers are assumed to either adopt or not adopt the technology. However, often farmers experiment with different adaptations of the technology, which tends to be neglected by scientific research institutions (De Wolf, 2010). The process of adopting technologies can be affected by some personal characteristics such as gender, age, income, availability of resources required, expected benefits to be gained.

According to Seline, *et al.* (2014) farmers can have knowledge about the existence of a new technology, how to apply it, and what the outcomes are in terms of products, yield, potential environmental benefits, risks and costs. The information an individual has about a new technology then forms the basis of the perceptions and attitudes this individual develops towards the technology. The attitude of farmers/processors towards a technology therefore enhances or disapproves the adoption of such technology. In recent time, farmers attitudes are not put into consideration, there is need to find out the favourable and unfavourable attitude of rice grain women processors in Benue and Kogi State towards the available and accessible improved processing value addition technologies such as; improved drying, sorting and grading of the products, packaging, and storage.

In order to improve the livelihood of women farmers, ensure competitiveness in the global market, and ultimately contribute to economic growth of the country most especially, women rice processors in Benue and Kogi States, Nigeria, there is need to investigate into the challenges faced by women processors in adopting rice value addition technologies, such as lack of processing skill centers, irregular extension visit, lack of technical knowledge, women restriction complex nature of innovation. On this note, one may need to ask the following research questions.

a. What are the socio- economic characteristics of the respondents in the study area?
b. Do socio- economic characteristics of rice grains women rice processors in the study area have any influence on the value addition technologies adoptions?
c. What are the attitudes of women rice processors to the available value addition technologies?
d. What are the problems faced by women farmers in adopting value addition technologies.

1.1 Objectives of the study

The aim of this study is the assessment of the attitude of women rice processors to adoption of available value addition technologies in Benue and Kogi States, Nigeria. While the specific objectives are to

a. Describe the socio- economic characteristics of the respondents in the study area
b. Determine the influence of the socio- economic characteristics of women rice processors on the adoption of rice value addition technologies in the study areas
c. Describe the attitude of women rice processors to the available value addition technologies
d. Identify the problems faced by women rice processors in adopting value addition technologies.

2. Methodology

2.1 The study area

The research was carried out in Benue and Kogi States of Nigeria. Kogi State was created on August 27th 1991 from Kwara and Benue States with the Capital at Lokoja. Geographically, it is located between latitude $6^{0}30^{1}$N and $8^{0}48^{1}$N and Longitude $5^{0}23^{1}$E and $7^{0}48^{1}$E sharing boundaries with Kwara, Ondo, Ekiti, Niger, Benue, Nassarawa, Anambra, Enugu, Edo States as well as the Federal Capital Territory. Annual rainfall stands between 1016mm and 1524mm. It has a maximum temperature of 33.2°C and average temperature of 22.8°C, with an average humidity of 70%. Kogi State is marked with two distinct seasons in a year; these are wet and dry seasons. The wet season spans between middle of March and October and the dry season is usually experienced between the months of October and March. It has a land area of 283,135,359Km2 (KSPC, 1997). The major tribes in the state are Igala, Ebira and Yoruba while other tribes include BassaKwomo, BassaNge, Egbura Koto, Nupe,

Ogori and Hausa. It has a population of about 3,278,487 people out of which 1,691,737 are males and 1,586,750 are female with an average of 172,000 farm families (FGN, 2007).

The confluence of river Niger and river Benue creates alluvial fertile soil which is very good for crop production. According to Kogi State Economic Empowerment Development Strategy (KOSEED) (2004), Kogi State has about 2 million hectares of cultivated land but only about 0.5 million hectares are under cultivation. About 73.5% of the cultivated land (1,470 ha) can be cultivated in the raining season while 26.5% (530,000ha) is suitable for dry season farming. The agricultural sector provides a very wide opportunity for investment complemented with the services of the Kogi State Agricultural Development Project (KSADP).

Kogi State Agricultural Development Project was established in 1991 under Edit No. 12 following the creation of new states and the harmonization of the parent ADPs of Kwara and Benue States. It is the major implementing organ of the State's Agricultural Development Programmes (KSADP). Apart from its headquarters in Lokoja, Kogi ADP is operational in four zones namely: Zone "A" with AiyetoroGbedde as the zonal headquarters, zone "B" with Anyigba as the zonal headquarters, zone "C" with Koton-Karfe as the zonal headquarters and zone "D" with Alloma as the zonal headquarters. Kogi ADP has the ultimate mission of tapping the abundant agricultural resources of the state to make the state the food basket of the nation. Operating with this determination and within the framework of the broad objectives set out for all ADPs in the country.

Farming is the main economic activity of the people. Kogi State is marked with two distinct seasons in a year; these are wet and dry seasons. The wet season span between middle of March and October and the dry season is usually experienced between the months of October and March. The common crops grown in the area include maize, cassava, yam, rice, guinea corn, cowpea, citrus, oil palm, cocoa, coffee, cashew and kolanut. It was further stated by KOSEEDS that about 1.5 million of the farmers grow cereals. Kogi State registered rice farmers were estimated to be about 9, 708 of which 40% (3, 883 farmers approximately) of them were said to be women (KSADP and FG Anchor Borrowers, 2019). The people of Kogi State also rear animals like cattle, sheep, goats, swine, poultry and fish.

Benue State is one of the North Central States in Nigeria. It is inhabited predominantly by the Tiv, Idoma and Igede peoples, who speak TivIdoma, and Igede languages respectively. Its capital is Makurdi. Benue is a rich agricultural region; popularly grown crops include; sweet potatoes, cassava, soya bean, guinea corn, flax yams, sesame, rice, and groundnuts, Palm Tree.

Benue State is named after the Benue River and was formed from the former Benue-Plateau State in 1976, along with Igala and some part of Kwara State. In 1991 some areas of Benue state (mostly Igala area), along with areas in Kwara State, were carved out to become part of the new Kogi State. Igbo people are found in the boundary areas like the Obi, Oju etc.

The State borders Nasarawa State to the North, Taraba State to the East, Cross River State to the South, Enugu State to the South West and Kogi to the West. It also shares international boundary to the Republic of Cameroon to the South East. It is nicknamed "Food Basket of the Nation" as a result of its competitive advantage in agriculture. The state produces 70% of Nigeria's Soybean and it's the largest producer of fruit concentrate and cassava in Nigeria.

The wet season spans between middle of March and October and the dry season is usually experienced between the months of October and March. Benue State has a land area of about 30,800 Km^2. The area is inhabited by the Tiv (the largest ethnic group in the state), the Idoma, and a number of smaller groups, all are mainly agricultural people. It has a population of about 6,096,869 people out of which 3,109,403 are males and 2,987,466 are female (NIPC, 2019).

Mining is important in several scattered areas: south of the Benue River there are lead deposits near Akwana and limestone deposits near Yandev; north of the river there are saline springs in the Benue valley and major deposits of tin, niobium, and marble.

Benue state population of registered rice farmers is said to be 10,346 farmers of which about 55% (5,690 farmers approximately) of them were said to be women (Anchor Borrowers and Benue Agricultural and Rural Development Authority-BNARDA, 2019).

2.2 Population and sampling techniques

The population for this study comprises all the registered women rice processors with Agricultural Development Projects in Benue (5,690 women rice farmers), and Kogi States (3,883 women rice farmers) of Nigeria. A sample size of 360 women processors were selected using a multi – stage sampling techniques. The first stage was purposive selection of three (3) Agricultural zones from each state of the study area (Benue and Kogi) based on the concentration of rice women processors in these agricultural zones. These sums up to six (6) Agricultural zones. The second stage involved purposive selection of two (2) blocks from each zone to give a total of twelve (12) blocks. In the third stage, two (2) cells were selected randomly from each block of the agricultural zones in the study areas giving a total of twenty-four (24) cells. The fourth stage, fifteen (15) registered women rice processors were selected randomly from each of the selected cell to give a total sample size of three hundred and sixty (360) respondents for the study

2.3 Data Collection

Data were collected through the use of interview schedule and a well-structured questionnaire. The questionnaire was used to collect information on the following areas:

a. Socio-economic characteristics of women rice processors in the study area
b. Influence of their socio economic characteristics on the adoption of value addition technologies.
c. Attitude of women processors to the available value addition technology

d. Problems faced by women processors in adopting value addition technologies

2.4 Method of Data Analysis

Data for this study was analyzed using both descriptive such as frequency count percentages, mean , mode and mean score from Likert type of scale and inferential statistics such as, Ordered Probit and Factor analysis.

The specific objectives were analysed as follows:

a. Objective (i) the socio economic characteristics of women rice processors was achieved using descriptive statistics such as frequency, percentage and mean
b. Objective (ii), Ordered probit model was used to ascertain the influence of socio economic characteristics on the adoption of value addition technologies.
c. Objectives (iii) attitude of women rice processors to the available value addition technology was achieved using mean score from Likert scale.
d. Objective (iv) problems faced by women processors in adopting value addition technologies was achieved with the use of Factor analysis

2.5 Measurement of Variables

The variables measured include:

a. *AGE* = Age of respondents was measured in years
b. *MST* = Marital Status measured as 1 for single, married, divorced and divorced respondents on a nominal scale.
c. *EDU* = Educational level measured as the number of years spent in acquiring formal education by the respondents.
d. *HSS* = Household size was measured as the number of persons living in the house of the respondents at the time of the interview.
e. *EXP* = Farming experience was measured as the total number of years spent in farming
f. *INC* = Income of processors measured as the money in naira the processors realizes from their enterprise at the end of the year.
g. *EXT CONTACT* **=:**measured by the number of times the processors were visited by the extension agents.

2.6 Model specification

The attitude of women rice processors to the available value addition technology was measured on 3-points Likert scale: least disagree (1point), undecided (2points) and agree (3points).

2.6.1 The mean

The mean can be calculated using equation 1[x]:

$$m = \frac{\sum fx}{N} \quad (1)$$

Where m = Mean response, $\sum$ = Summation, f = number of respondents choosing a particular scale point, x = value of each scale, N = total number of respondents

Any mean score greater 2 is high while the mean score is less than 2 is low

2.6.2 Ordered probit regression

This is use to determine the influence of the socio-economic characteristics of women processors on their adoption of value addition technologies in equation 2:

$$Y_i i = \beta_0\ 0 + \beta_1 X_1 + \ldots \beta_n X_{ni} = 1 \ldots N \quad (2)$$

Where: *Yi* is the observed dependent variable i.e.;β_0 is the intercept ,β ...β are coefficient of the independent variables, $X_1 \ldots X_n$ are the independent variables, X_1 = age, X_2= household Size, X_3 =educational level, X_4= extension visit, X_5 = annual income, X_6= years of experience in rice processing and X_7 = farm size).

Age (in number years)

Ordered probit model is based on latent regression just like a *probit model*, as shown in equation 3;

$$Y^* = \beta X_i + \varepsilon \quad (3)$$

Where *Y** is unobserved. What is observed is *Y**= 0 for no value added; *Y**=1 for moderate value added; *Y**=2 for high value added. It will be assumed that the error term has a logistic cumulative distribution function across observations.

The general model is presented as shown in equation 4:

$$Y^* = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon \quad (4)$$

whereX_1 = X_2 =Age; X_3 = level of education; X_4 = years of farming experience; X_5= extension visit; X_6= Government support; X_7= value addition related experience, *Y**= value addition decision, α = constant, β=Coefficient of influence, ε= error term

2.6.3 Factor analysis

This section describes the factor analysis for the problems faced by women processors in adopting rice value addition technologies. According to Udofia (2011), factor analysis like the principal component analysis enables a researcher to replace a large data matrix. In this study the problems faced by women rice processors in adopting value addition technologies were factorized as institutional, socio-cultural and economic factors. The model can be expressed as in equation 4, 5 and 6:

$$Y_1 = b_1 f_1 + b_{12} f_2 + b_{13} f_3 + \mu_1 + \epsilon_i \quad (4)$$

$$Y_2 = b_2 f_1 + b_{22} f_2 + b_{23} f_3 + \mu_2 + \epsilon_i \quad (5)$$

$$X = x + u \quad (6)$$

Where μ_i = the mean of X_i, ϵi = the residual specific to the *i*th test after taking account of the contribution of the factors, f_1, f_2, f_3 = the value of the factors which vary from one subject to another, but have zero mean and unit variance, and are assumed to be uncorrelated with one another and with residuals.f_1 = institutional factors, f_2 = socio – cultural factors, f_3= economic factors

b_{ij} = constants, like regression coefficients, indicating how much each test is affected by each factor. These *bi(s)*are known as factor loadings.

3. Results and discussion

3.1 Socio-economic characteristics

The age distribution of women rice processor in the study area as shown in Table 1 indicates that 47.20% of the respondents fell within the age bracket of 31 and 40 years, while 36.87% of them were found within the age range of 41 and 50 years. Majority of the farmers were therefore between 31 and 50 yearswith the mean age of about 41±8.66years' standard deviation. This implies that rice women processor in Kogi and Benue State were in their active and productive ages which could help them to participate highly in rice value addition activities. This result agrees with Adam et al. (2018) who said that most of the participants in rice processing value chain are within the ages of 31-40years.The distribution of respondents' marital status shows that majority of them (74.58%) were married, while a few were single (17.03%), divorced (5.58%) and widowed (2.79%) as it is indicated in the Table. This implies that majority of the women rice processors in the study area are married. Marital status has being found to influence social organization and economic activities such as agriculture and resource management within a household (Nyunza and Mwakaje, 2012). As indicated in Table 1, majority of the respondents (90.21%) had formal education of which 15.36%, 47.48% and 27.37% of them attained primary, secondary and higher education respectively. Education is important for training and skill enhancement planning and implementation for rice processors by extension service providers since it is easier to train processors who are literate. Education is a factor in the adoption of modern practices. It is generally considered an important variable that could enhance adoption of new technology. This study is in agreement with the finding of Akarue and Ofoegbu (2012) who stated that most rice farmers can read and write. With respect to household size, 96.08% of the respondents had between 1 and 10 persons with the mean household size of 5.74±5.68persons' standard deviation. This implies that respondents in the study areas had large household size. This is of great importance in farm production as rural households rely more on family members than hired workers for labour on their farms

Table1: Socio-Economic Characteristics of Respondents (N= 358)

Parameters	Variable	Frequency	Percentage (%)	Mean (ξ)	S.D
Age (years)	20 – 30	39	10.89		
	31 – 40	169	47.20		
	41 – 50	132	36.87	**40.63**	**8.661**
	51– 60	37	10.28		
	61 and above	18	5.02		
Marital Status	Single	61	17.03		
	Married	267	74.58		
	Divorced	20	5.58		
	Widowed	10	2.79		
Level of Education	No formal education	35	9.77		
	Primary education	55	15.36		
	Secondary education	170	47.48		
	OND/NCE,HND/Degree	98	27.37		
Household size	≤ 5	215	60.05		
	6 – 10	129	36.03	**65**	**.683**
	11 – 15	12	3.35		
	16 and above	2	0.55		
Years in rice processing	≤ 10	237	66.20		
	11 – 20	86	24.02		
	21 – 30	29	8.10	**10.69**	**7.83**
	31 – 40	5	1.39		
	> 40	1	0.28		
Annual income (₦)	≤ 100,000	58	16.20		
	101,000 – 200,000	99	27.65		
	201,000 – 300,000	93	25.97		
	301,000 – 400,000	49	13.68		
	401,000 – 500,000	18	5.02		
	> 500,000	41	11.45		
Extension contacts	0 contact	231	64.53		
	1- 5	122	34.07		
	6 – 10	4	1.11	**0.96**	**1.67**
	> 10	1	0.27		

The distribution of respondents in terms of years spent in rice processing, it was found that 66.20% of the respondents had rice processing experience of between ≤ 10 years, while 24.02% of them had the experience of 11 and 20 years. The higher the years' experience of the rice processor, the more informed and skilled, they become. As experience plays a very important role in the performance of any enterprise. This suggests that the efficiency of rice processors in the study area would be high. The result is in consonance with Olaolu et al. (2013) who stated that Long

period of experience is an important advantage in farm productivity since it encourages faster adoption of farm innovations.

Majority of the respondents (98.60%) had contacts of between 0 - 5 with extension agents in a year, while only 1.38% had contacts of above 5 times with extension agents in a year with the mean number of contact to be about 0.96±1.67years' standard deviation . This shows that the number of contacts is very low compared to a*priori* expectation of about '40 and above' number of contacts with 80 farmers required of an ADP's Training and Visit extension system in Nigeria (Agbarevo and Obinne, 2010).

The income distribution of the respondent as shown in Table 1 indicated that most (69.82%) of the women rice processors in the study area earn between ₦101, 000-₦300,000 per annum. This study agrees with the finding of Abah et al. (2015) who study showed that majority (65.48%) of respondents make 200,000 naira or less in sales income/annum and that most of the farmers are small holder farmers with small market share of the paddy rice market.

3.2 Influence of the socio-economic characteristics

The output of ordered probit analysis used in determining the influence of the socio- economic characteristics of women processors on their adoption of value addition technologies in Table 2. The analytical tool was adopted considering the nature of the dependent variable (rice value addition technologies) which is in categorical form or ordered (high, medium, and low). The Chi square statistics of 64.08 was statistically significant ($p< 0.01$). This implies that, the included socioeconomic characteristics of women rice processors have influence on their adoption of value addition technologies. Furthermore, Pseudo $R^2$of 0.1294 is an indication that the variables included in the model accounted for 12.94% of the factors responsible for the variations in the probability of the women rice processors been adopting value addition technologies which was not high as such.

Estimates of the marginal effects at the various ordered levels of women rice processors on the use of value addition technologies indicate the effects of one unit change in an exogenous variable on the probability that a processor operates at a particular level. The use of marginal effects in this study could be justified by the fact that, coefficients have no direct interpretation since they are just values that maximize the likelihood function. Marginal effects have direct interpretation and hence facilitate discussion of the results. Rice value addition technologies were grouped based on the total number of technologies used by the women rice processors. In essence, processors who used below three (3) of the recommended value addition technologies were considered to have low adoption; processors with 3 – 5 had medium technological adoption, while processors who used above five (5) recommended value addition technologies were adjudged to have high technological adoption

Table 2: Output of the ordered probit analysis

Variables	Coef.	Std. Error	p>/z/
Age	0.0221351	0.0125731	0.078
Marital status	0.2670135	0.126444	0.035
Education	-0.015815	0.0166688	0.343
Household size	0.0259236	0.0362276	0.474
Farm size	0.0931888	0.0327939	0.004
Years in rice processing	0.0363113	0.0130673	0.005
Income from rice processing	-1.39e-07	-1.81e-07	0.442
Extension contact	0.3597615	0.0793981	0.000
Income from other ventures	-2.53e-07	-4.45e-07	0.569

Log likelihood = -215.63096; LR Chi^2 = 64.08; Pseudo R^2 = 0.1294

Table 3: Marginal Effect of the socio-economic characteristics from low, medium and high value addition technologies adopted

Variables	Adoption levels		
	LADL (Low value/Traditional)	MADL (Medium)	HAD (high value/modern)
Age	0.00	0.003	- 0.006
Marital status	-0.025	-0.046	0.072
Education	0.001	0.002	-0.004
Household size	-0.002	-0.004	0.007
Farm size	-0.008	-0.016	0.025
Years in rice processing	-0.003	-0.006	0.009
Income from rice processing	1.34e-08	2.43e-08	-3.78e-08
Extension contact	-0.034	-0.062	0.097
Income from other ventures	-2.44e-08	-4.42e-08	6.87e-08

*indicates significance at 1%

From the result, age, marital status, farm size, years in rice processing and extension visits significantly influenced the number of value addition technologies adopted by women rice processors. By implication, these variables increases or decreases the probability of women rice processors adopting value addition technologies

According to the result on Table 3 Age is positive at level 1 and 2 but negative level 3. An increase in age will increase the likelihood or probability of rice processors (respondents) to be found on the low and medium category of adoption. The negative sign at level 3 is an indication that, as women advance in age, the likelihood of been found in the high adoption category reduces. This indicates that increase in age of respondents will increase their likelihood of having low and medium adoption of value addition technologies by 0.0021 and 0.0038 margins respectively. Also increase in age of respondents will reduce the likelihood of women processors been found in high adoption of value addition technologies by 0.0060. This implies that younger women rice processors in the study area adopt rice value addition technologies than the older women rice processors. The younger the respondents, the more innovative they are. An increase in age of women rice processors reduces the probability of adopting fewer technologies, because as processors advance in age, they tend to minimize activities that demand much of their labour and management skill. This is in line with adoption theory which states that a young age is a good ground for the success of any extension campaigns and programs that aim at dissemination and adoption of any agricultural innovations, as young farmers have been found to be more innovative than their older counterparts (Rogers, 1993)

The result also shows that marital status significantly influenced the adoption of rice value addition technologies by women processors in the study area. The marginal effect was however negative at level 1 and 2 and positively signed at level 3. The result indicates that the likelihood or probability of women rice processors to be low and medium adopters (or to be on the low and medium category) decreases with the married women by 0.026 and 0.047 respectively. Also, married women rice processors in the study area are more likely to be high adopters of value addition technologies by 0.073 margins.

The table also shows farm size significantly influenced the adoption of value addition technologies of women rice processors at 5% level of significance. An increase in farm size will decrease the likelihood of farmers to have low and medium adoption of rice value addition technologies categories by margins of 0.0089 and 0.0163 respectively. The result further indicated that, an increase in farm size will increase the likelihood of rice processors to be found in the high adoption of rice value addition technologies category by margin of 0.0253. This result implies that the larger the farm size of the women rice processors in the study area, the higher their output and this influences their adoption of rice value addition technologies. This finding is in agreement with Onumadu and Osahon (2014) who said that the size of a farm is a strong determinant of the expected output yield

The results in Table 3 further shows that year spent in rice processing influenced the adoption of rice value addition technologies by women processors in the study areas. The marginal effect was negative at level 1 and level 2 and positively signed at level 3. This indicates that an increase in the years spent in rice processing by the respondents will decrease the likelihood of processors having low and medium adoption of rice value addition technologies by 0.0035 and 0.0064 margins respectively. Likewise, an increase in years spent in rice processing by the respondents will increase the likelihood of processors been found in the high adoption of rice value addition technologies category by 0.004. by implication processors with higher years of experience are more likely to adopt new rice value addition technologies as it is a known fact that experience is a great teacher, women rice processors that have spent years in processing rice knows more about the types of processing technologies that will be accurate for adoption. This study is in line with Nasiru (2014) who stated that processing experience have significant relationship in the adoption of improved rice processing technologies

Table 3 also shows that the number of times visited by extension personnel significantly influenced the adoption of rice value addition technologies by women rice processors at 5% level of significance. An increase in the number of extension visit will decrease the likelihood of women rice processors to have low and medium adoption of value addition technologies. The result further shows that, an increase in the number of extension visit will increase the likelihood of the respondent have been found in the high adoption of rice value addition technology category by 0.098 margins. The extension contact is measured in terms of the frequency of visits of the extension agent to women rice processor in the study area. As relationship and contact between the extension agents and the respondents will increase their adoption of rice value addition technologies. Because women processors who are in frequent contact with the extension agents are likely to be relatively more enlightened and aware of the benefits of adopting rice value addition technologies in the study area. This study agreed with Ayoade&Akintunde (2012) who found that inadequate extension visits limits women participation and adoption of agricultural program

3.3 Attitudes of women rice processors

The result of the respondents according to their attitude towards available value addition technologies in Table 4 indicates that 13.97%, 6.70% and 79.33% of them with the mean score of 2.73 rated their satisfaction with their milling product as disagree undecided and agree respectively. Which is above the average mean of 2.0 .This implies that majority of the respondents are satisfied with their rice milling products. This is attributed to women rice processors adoption of rice value addition technologies and the existing support of infrastructure in the study area. This contradicts the findings of Ayoolaet'al. (2012) who said that women rice processors lacked adequate skills and processing facilities for producing good quality milled rice grains.

The result indicated that 20.39%, 41.62% and 37.99% of the women rice processors with the mean score of 2.18 rated the attitudinal statement that they have not been able to package their rice to internationally acceptable standard as disagree, undecided and agree respectively. This implies that the respondent have positive attitude towards the statement as they claimed that

packaging is mostly done with the use of polythene or woolen sack. The result also revealed that 34.64%, 12.84% and 52.51% of the respondents with the mean score of 2.17 showed positive attitudes towards the attitudinal statement of not achieving a very high grade destoning value for rice as disagree, undecided and agree respectively. The result also indicated that 18.16%, 18.16% and 63.69% of the women rice processors with the mean score of 2.12 rated the attitudinal statement that the technology they adopted gives a good storage quality as disagree, undecided and agree respectively.

Table 4: Distribution of the Attitude of Women rice processors towards the available Value Addition Technologies (n= 358)

Attitudinal statements	Disagree (1)	Undecided (2)	Agree (3)	Sum of Responses	Mean
I am satisfy with my milling product	50(13.97)	24(6.70)	284(79.33)	950	2.65**
The technology I adopted for cleaning/polishing is not giving the expected desire	269(75.14)	38(10.62)	50(13.97)	495	1.38*
I have not achieved very high grade destoning value	124(34.64)	46(12.84)	188(52.51)	780	2.17**
I am pleased with my rice drying technology	173(48.33)	71(19.83)	114(31.84)	657	1.84*
1 have achieved a high standard in my sorting, grading and certification	194(54.19)	96(26.82)	68(18.99)	590	1.65*
I have not been able to package my rice to internationally acceptable standard	73(20.39)	149(41.62)	136(37.99)	779	2.18**
I have achieved a high level of product branding and labeling	146(40.78)	113(31.57)	99(27.65)	669	1.87*
The technology I adopted gives a good storage quality	65(18.16)	65(18.16)	228(63.69)	879	2.46**

Note: Figures in Parenthesis represent (%)
Multiple responses, ** = Agree, * = Disagree

3.4 Problems faced by women rice processors

The result on Table 5 shows the factor analysis of the challenges faced by women rice processors in adopting value addition technologies. The KMO index of 0.770 and Bartletts sphericity of 0.000 shows the suitability of the data for factor analysis. Three factors were extracted base on the item loading. Factor 1= institutional factor, Factor 2= socio-cultural factor, Factor 3= economic factor. Factor 1 loads the major challenges that women rice processors faced in adopting value addition technologies. Factor 1 loads the major challenges that women rice processors faced in adopting value addition technologies next is factor 2, 3. The result revealed the challenges that strongly loaded on factor 1 were lack of processing skill centers (.700); it can be said that they are no readily available skill acquisitions centers where women rice processors can be trained on how to carry out the rice processing operation by themselves. irregular extension visit (.653),this means that , the number of visit by extension agent to the women rice processors for knowledge transfer is very low compared to the required ADP's Training and Visit extension system in Nigeria, the number of visits women rice processors received from an extension agent greatly affects their adoption of value addition technologies. This result agrees with that of Aphunu and Otoikhian (2008) who reported low contacts of extension agents with the farmers. Lack of technical knowledge (.639) women rice processors in the study areas claimed that they are faced with the challenge on technical knowledge of rice value addition, reasons is that, though there are readily available technologies but no capable hands to guide and direct them towards its adoption. inconsistency and lack of implementation of government policies on value addition (628) This implies that Governmental factor were rated high as the most challenging factors affecting women rice processors in the study areas , undue political interference by some states government which sometimes resulted in too frequent changes in management; lack of political will and inconsistent policies. Every new administration decides to establish its own programmes and abandoning that of its predecessors. Another big policy problem women rice processors faced is the non- recognition and inclusion of women in the mainstream of technology generation and use. Lack of readily organized market for product (.576), inadequate marketing is one of the major challenges that affect adoption of rice value addition technologies by women rice processors, reasons be that their marketing system is poor which makes it impossible to market their product on reasonable prices to compensate for cost of utilizing new technologies. inadequate rural infrastructure (.547), poor access to information (.545) Women rice processors lack timely access to information on rice value addition technologies, this may be tied to the fact that the processors in the study area claimed they rarely have contact with extension agents for information transfer. And complex nature of the innovation (.509) this is degree which an innovation is perceived as relatively difficult to understand and use. The women processors have problem of adopting any innovation that does not reflect the existing practices. This result is in line with Adam e' tal. (2018) Who carried out research on Gender Participation in Rice value chain in Kebbi and Sokoto states revealed that inadequate funds to procure improved processing machineries, lack of processing skill centres , inadequate capacity building activities on processing and value addition on rice and lack of technical knowledge on rice value addition/fortification were the major factors affecting rice processing activities.

The challenges that loaded high on factor 2 were inadequate land (.833), lack of equipment and facilities (.805), women restriction (.577) and lack of fund (.543). Fund not readily available to the processor in order to

acquire necessary technologies is one of the major challenges faced by women rice processors in Benue and Kogi state. Most of the respondents claimed they could not obtain fund from bank due to stringent measure put in place by banks. They therefore rely on their personal savings, borrowing from friends and relatives as a major source of capital used on their farms. This is in line with Ayoolae'tal (2012) who stated that married women within reproductive age were more likely to be constrained by cultural practices that prevented women from direct field production activities, thus limiting the extent of their participation in rice production and also cultural practice of seclusion of women hinder women's access to productive resources.The challenges that loaded high on factor 3 were fluctuation in price of products (.638), lack of storage space (.575) and high cost of processing (.570). This results agrees with Oyediran, (2016) who revealed that inadequate processing equipment, financial support from commercial banks, poor pricing and standardization, high cost of labour, unavailability of storage facilities, inadequate infrastructure and inadequate extension support and training in the processing of rice by rural women in Ogun state.

Table 5: Factor Analysis of the problems faced by women rice processors in adopting value addition technologies

Challenges	Factor 1	Factor 2	Factor 3
Lack of processing skill centers	.700	.246	-.004
Irregular extension visit	.653	-.145	-.015
Lack of technical knowledge	.639	-.004	.354
Inconsistency and lack of implementation of Government policies on value addition	.628	-.047	.029
Lack of readily organized market for products	.576	.268	.131
Inadequate rural infrastructure	.547	-.171	.038
Poor access to information	.545	.219	.129
Complex nature of the innovation	.509	.108	-.328
Quality assurance due to improper processing, grading and certification	.468	.222	.240
Innovation not compatible with traditional agrarian practices	.464	.456	-.442
Inadequate female extension workers	.404	-.051	-.219
Inadequate land	.158	.833	-.013
Lack of equipment and facilities	.100	.805	.048
Women restriction	-.072	.577	-.391
Lack of fund	.124	.543	.249
Fluctuation in price of products	.066	.067	.638
Lack of storage space	.157	.283	-.575
High cost of processing	-.188	-.004	-.570
Poor pricing and standardization	-.009	.464	.481
Complex procedure in accessing loan	.114	.235	.448

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization (loading at 0.50 and above). Factor 1= Institutional factor, Factor 2= Socio-cultural factor, Factor 3= Economic factor

4. Conclusion

Women rice processors in the study areas have positive attitude towards the adoption rice value addition technologies. However, poor access to credit facilities, inadequate processing and storage skills, inadequate technical information on rice value addition, Extension service/innovative ideas on rice value addition and Packaging equipment may prevent them from maximizing profit in the business. Adoption of value addition technologies for rice processing can therefore said to be profitable but needs financial and extension service support to purchase and receive training in more efficient technologies to realize their potentials.

Recommendations

The following recommendations were made base on the findings;

a. Extension contact and Farm size have been identified to be socioeconomic factors that significantly affect women processors on their adoption of rice value addition technologies. Therefore, efforts should be made by both government to ensure policies aimed at making women access to extension services and farm land or even hold title to land and other complementary productive resources , as this will accelerate the rate of adoption of modern improved technologies
b. Women negative attitude towards using a technology perceived to be alien to their own indigenous setting is identified to be a challenge in terms of the right attitude development. Hence, extension should ensure that attitudinal changes required of women towards positive improvement in rice processing and value addition be achieved by adoption of technologies friendly to women rice processors in order to enhance value addition strategies, and should also be supported to develop more environmentally friendly technologies to further add value to their products.
c. Some of the problems faced by women processors in rice processing and value addition were mostly peculiar to them. However, those constraints that are

gender specific and peculiar to the womenfolk should be addressed by Government at federal, state and local levels by deliberate and prioritized policies aimed at solving their peculiar problems.

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