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Utilization Of Improved Rice Production Technologies Among Rice Farmers' Cooperative Societies In Ohaukwu L.G.A Of Ebonyi State

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Abstract
This study analyzed the utilization of improved rice technologies among rice farmers' cooperative societies in Ohaukwu L.G.A of Ebonyi State. Multi-stage sampling technique was used to select 96 cooperative rice farmers for the study. Data collection was done with both questionnaire and interview schedule. The data collected were analyzed using both descriptive and inferential statistics. Result showed that majority of the cooperative rice farmers (77%) and were males and married(67%) respectively. The cooperative rice farmers had a mean age of 44 years, a mean household size of 7 persons, a mean farm size of 0.8 hectares in scattered plots which resulted to a mean annual income of ₦134,580, have stayed an average of 9 years in cooperative farming and a mean output of 2.7tons/ha while most of them (49%) had spent between 13 – 18 years in acquiring formal education. The most available rice production technologies in the area were; use of fertilizer (98%), use of herbicide (95%), use of improved seeds (82%), adoption of nursery preparation (81%), appropriate planting distance (64%), adoption of appropriate seed rate (59%) and pesticide application (58%). It was also revealed that there was a combined influence of about 79.72% which culminated from the socio-economic characteristics identified in the model. The constraints that limited utilization of improved rice production technologies among cooperative rice farmers were; high cost of technologies (0.908), poor access to extension agents (0.904), unavailability of technologies (0.848), poor extension services delivery (0.879), complexity of technology (0.808), poor market availability (0.739), insufficiency of information on technologies (0.429), poor government subsidization (0.992), poor policy formulation (0.775) and poor policy implementation (0.668), poor technical knowhow (0.907), poor annual income (0.883),lack of credit facilities (0.850), disease infestation (0.843) and lack of education (0.707). In conclusion, two null hypothesis tested were both rejected at 5% level of significance. The following were recommended that; credit institutions are encouraged to give soft loans to cooperative rice farmers to enable them utilize improved rice production technologies, cooperative societies are encouraged to link up with research institutions in order to continuously have access to improved rice production technologies, there is need for government to design programmes that will assist farmers in utilization of improved rice production technologies and Government should subsidize the cost of technology utilization as this will encourage farmers in utilizing improved technologies for rice production.

Keyword: *Utilization, improved, rice, technologies, rice, technologies*

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I. Introduction

Rice (*Oryza sativa*) is among the most important food grain crops in the world. It has been able to meet the food demand of over 2 billion people in the world daily (Food and Agricultural Organization, FAO, 2013). Similarly, Ogundele and Okoruwa (2012), noted that rice has become a national commodity in Nigeria because of its contribution to the diets of majority of Nigerian citizens who live and depend on the products for their livelihoods on daily basis.

In Nigeria, rice production has increased from 2.4 million metric tons in 1994 to 3.1 million metric tons in 2002 representing 29.2% rise in domestic production, making it one of the most important cereals and staple food for many households in Nigeria (Mbam, 2015). Meanwhile, according to Rice Farmers' Association of Nigeria, RIFAN, 2017, rice production in Nigeria increased to 5.8 million metric tonnes in 2017 from 5.5 million metric tonnes in 2015 and global rice production increased from 705.1 million metric tons in 2015 to 7237.3 million metric tons in 2017. Umeh and Chukwu (2016), noted that rice production can grow beyond 10 million metric tonnes by 2030 because Nigeria has a potential land area of about 4.6- 4.9 million hectares for rice

production, out of which only 1.7 million hectares representing 35% of the total land-mass of Nigeria is grown with rice. Corroboratively, Nwaobila (2014) opined that Nigeria is the largest producer of rice in West Africa, producing over 40% of the regions' total production. It was further noted that in the past 30 years, its production has increased in six folds with Nigeria producing 3.3 and 3.6 million tons of paddy rice in 2000 and 2005 respectively while Rice Farmers' Association of Nigeria, RIFAN (2017) reported that rice consumption rate presently is at 7.9 million tones with production increasing from 5.5 million tons in 2015 to 5.8 million tonnes in 2017, further noting that Africa accounts for only about 2% of the worlds output of rice. This increase in production was possible as a result of introduction of programmes like; CBN anchor borrowers' scheme, FADAMA programmes and IFAD rice processing value chain which mostly is done through farmers' cooperative societies.

The importance of agricultural cooperatives in the global economy cannot be overestimated since the needs of cooperative members are ever increasing and to meet such needs are sacrosanct (Inya; Solomon and Otu, 2014). Agricultural cooperatives play the role of drastic structural change in agriculture towards achieving food security as well as the socio-economic upliftment of the famers through unity. Echezona (2016) noted that cooperatives in Nigeria originated from the need to export products from agriculture at a moderate rate whereas according to Federal Ministry of Agriculture and Rural Development (FMARD, 2001), 96% of cooperative societies in Nigeria are designed basically to serve the needs of agriculture.

To ensure improved agricultural output, it is pertinent to inculcate the principle of effective utilization of agricultural technologie to farmers. In view of this, Ibrahim (2012), defined utilization of agricultural production technologies as the action of making practical and effective use of the available agricultural technologies in agricultural production. There are basically two major drivers of successful agricultural technology adoption and utilization in developing countries; the availability and affordability of technologies; and farmer expectations that adoption will remain profitable. Thee expectation are driven by availability and size of land, family labour, prices and profitability of agricultural enterprises, and peer effects (Ibrahim, 2012).

Meanwhile, Okonkwo (2012) posited that improved agricultural production technologies may come in the forms of tools, equipment, agro-chemicals, management skills, storage facilities, value addition, and other processes that can increase and improve the shelf life, taste and quality of rice produced in the field. According to World Bank (2008), use of improved agricultural processing technologies can lead to significant increase in general agricultural productivity in Africa. It is also important to note that without improved processing technologies, sustainable development is impossible to be achieved in agriculture (Awotide, Diagne, Omonona, 2012).

Several factors have been shown as constraints to the use of agricultural technology for production among cooperative farmers in Nigeria. Akinnagbe (2010) argued that some of the constraints to the use of agricultural technologies for efficient production include; lack of finance, scarcity of planting materials, difficulty in obtaining credit facilities, lack of technical knowledge in the use of improved technology, high cost of improved varieties, high interest rate on loan, unavailability of agro-chemicals and other equipment, high cost of agro-chemicals, high cost of agricultural inputs and services, high risk of uncertainty in agriculture, non existence/inadequate farmers co-operative organization, lack of political consensus to commitment and policies by government, poor government commitment to implementation of policies in agriculture, general reluctance on part of the farmers to pay for services, poor economic status of farmers, lack of ready market to sell increased output as a result of improved extension services and high level of illiteracy among farmers.

It has been noted that despite the fact that a lot of works and studies have been done on rice technologies, processing, storage; there seems to be a dearth of empirical knowledge on the utilization of improved rice technologies among rice farmers' cooperative societies in Ohaukwu L.G.A. To address thi problem, the study specifically,

(i) Described and analyzed the effects of socio-economic characteristics of rice farmers' cooperators on the utilization of improved rice production technologies in Ohaukwu L.G.A of Ebonyi state;
(ii) characterized the available improved rice technologies in relation to their utilization among cooperative societies in the study area and;
(iii) analysed the constraints to effective utilization of improved rice production technologies among rice farmers' cooperative societies in the study area.

II. Methodology

Study Area

The study area is Ohaukwu Local Government Area of Ebonyi State. Its geographical location is between latitude 0.06^0North and longitude 0.85^0 degree South, with its headquarter at Ezzamgbo along Enugu-Abakaliki express way. Ohaukwu is bounded by Benue State in the North, Ezza-North Local Government Area in the South, Ebonyi Local Government Area in the East, while Ishielu Local Government Area in the West. The communities in the area include; Izghia, Ngbo and Effium; Umuogara, Amechi, Amike, Ishielu, Nsulakpa are

under Izhia, while Ngbo is made up of Ekwashi, Umuogudu Akpu, Umuogudu Oshia, Okposhi Eheku, Okposhi Eshi, Amofia, Umuezeaka and Ukwuagba while Umuezekoha a dn Effium are the make-up of Effium (NPC, 2006). According to NPC (2006), Ohaukwu L.G.A has a population of about 196,337; with a total population of male as 92, 848 while the female has a total population of 103,489 and a land area of about 5068.9km^2.

The amount of rainfall in the study area ranges from 1,500mm – 2000mm per annum. And the temperature range is between 22.9^{0}c to 32.5^{0}c. It has a lowland forest with tall trees and scattered arrangement of palm trees (*Elais guineensis*). The soil type is composed of well – drained sandy-loam soil and some scattered swampy fields.

The study adopted a two-stage sampling technique in the selection of respondents. The first stage involved a purposive selection of twenty-four (24) most active rice producing cooperatives in the L.G.A. The second stage was a purpoive selection of four (4) cooperators from the twenty-four active cooperative societies. This selection gave rise to a total of ninety-six (96) cooperative rice farmers who formed the respondents for the study.

Data for the study were collected using structured questionnaire administered as interview schedule. Data collected were mainly primary data from the rice farmers who are members of cooperative societies. The study employed both descriptive and inferential statistics to realize the objectives of the study. Specifically, objectives i and ii were achieved using descriptive statistics such as mean, frequency, distribution table and percentage and then objective i was further subjected to ordinary least square multiple regression analysis a to determine the effect of ocio-economic attributes of the cooperative farmer on the utilization of rice production technologies. Objective iii was analyzed using principle component factor (PCF).

Model Specification

Multiple Regression Models

The multiple regression was employed to analyze the effects of socio-economic characteristics of rice farmers cooperative members on utilization of improved rice production technologies in the study area. The model is stated in the implicit form thus;

$Y = f(X_1, X_2, X_3, X_4, X_5)$ .....(1)

The explicit form of the model is stated thus;

$B = a_0+d_1X_1 + d_2X_2 + d_3X_3 + d_4X_4 + d_5X_5 + d_6X_6 + d_7X_7 + d_8X_8 + et$ … (2)

Where;

B = number of improved rice production technologies utilized by rice farmers

a_0 = Constant

$d_1 – d_9$ = Parameters to be estimated

X_1 = age (years)

X_2 = marital status (married = 1, not married = 2)

X_3 = household size (number)

X_4 = access to loan (yes = 1, no = 2)

X_5 = gender

et = Stochastic term.

Factor Analysis Model

Factor analysis was used to identify the constraints to effective utilization of improved rice production technologies among respondents. The basic rule of thumb is that any identified variable that loads 0.40 and above is regarded as a strong constraint whereas any variable that does not load 0.40 and above is not regarded as a constraint. this method has been employed different researches.

In order to obtain the factor loadings of each of the variables necessary for achieving aspects of objective v, factor analysis presented below was used.

$Xij = \varphi_{i1}F_{i1} + \varphi_{i2}F_{i2} + \varphi_{i3}F_{i3} + \ldots \varphi jmF_iK + \epsilon ij$

Where;

Xij = Observation on variable Xj for the ith sample number

F_iK = Score on factor Fk (k =1,2,3,……..,m)

F1-Fm = Common factors

ϵij = The value on the residual variable Ej for the ith sample member

φji…… φjm = Factor loadings (regression weights).

The associated assumptions were applied accordingly while the suitable number of factors were subjectively selected based on Varimax rotated factor matrix obtained using SPSS analytical software. The exploratory factor analysis techniques using the principal factor model with interactions and Varimax rotation was adopted. The factor loading under each constraint (beta weight) represented a correlation of the variables (constraint areas) to the identified constraint factors and has the same interpretation as any correlation coefficient.

Kaiser's criterion using factor loading of 0.40 and above in naming and interpreting the factors and constraint variable was adopted (Alimba and Akubuilo, 2002).

III. Results And Discussion

Effects of Socio-economic Characteristics of Cooperative Rice Farmers on Improved Rice Production Technologies Adopted

This section described the socio-economic characteristics of the cooperative rice farmers as well a determine the influence of seleceted socio-economic characteristics on improved rice production technologies adopted in the area. This was done by subjecting the data collected to frequency, percentage and mean analysis and furthermore toOrdinary least square multiple regression analysis. The result obtained was presented in Table 1.

Table 1: Effect of socio-economic characteristics on utilization of improved rice production technologies in the area

Socio-economic characteristics	Frequency (%)	Mean	Coefficient	Standard error	T-cal	Significance level
Age		44	0.069	0.015	4.600	***
Below 30						
30 – 45	19 (19.79%)					
46 – 60	64 (66.67%)					
Above 60	09 (9.30%)					
	04 (4.16%)					
Marital status			-0.185	0.049	-	NS
Married					3.774	
Single	64 (66.67%)					
Widowed	11 (11.45%)					
Divorced	03 (3.13%)					
	18 (18.75%)					
Household size		7	0.096	0.033	2.909	**
Below 4	04 (4.16%)					
4 – 8	65 (67.70%)					
9 – 12	14 (14.58%)					
Above 12	08 (8.33%)					
Access to loan			0.180	0.067	2.680	**
Yes	59 (61.66%)					
No	37 (38.34%)					
Gender			-0.122	0.036	-3.33	NS
Male	74 (77.08%)					
Female	22 (22.91%)					
Rice farm size						
Below 1.0	59 (61.45%)	0.8				
1– 2.5	31 (32.29%)					
Above 2.5	06 (6.25%)					
Annual income						
Below 100,000	34 (35.41%)	134,580				
100,000 – 200, 000	49 (51.04%)					
200,001 – 400,000	10 (10.41%)					
Above 400,000	03 (3.13%)					
Education status						
Below 6	13 (13.54%)	16				
6 – 12	34 (35.41%)					
13 – 18	47 (48.95%)					
Above 18	02 (2.08%)					
Years of Experience						
Below 7	18 (18.75%)					
7 – 15	52 (54.17%)	9				
Above 15	26 (27.08%)					
Yield/ha						
Below 1.5	38 (39.58%)					
1.5 – 3.0	53 (55.20%)	2.7				
Above 3.0	05 (5.20%)					
R		0.8929				
R^2	Cooefficient of Multiple determination	0.7972				
AdjR^2	Adjusted R^2	0.7836				
S.E	Standard error	0.429				
Key: Significant at 1% (***), Significant at 5% (**), Significant at 10% (*), Not significant (NS)						

Source: Field Survey, 2018

The result of the multiple regression analysis on the influence of socio-economic characteristics on utilization of improved rice production technologies by the farmers in the area as presented in Table 1 showed that there was a combined influence of about 79.72% which culminated from the socio-economic characteristics identified in the model. Also, there was low value of standard error (0.429) which means that there was low error occurence signifying that the result is statistically sound. Furthermore, there was a close range between the R^2 and AdjR^2 given the fact that only about 20.28% of the utilization of improved rice technologies was not explained by the socio-economic characteristics. This result has proven to be good for econometric forecating.

The predominant population (67%) were between 30 – 45 years while the least (4%) were below 30 years. This implied that most of the cooperative rice farmers were within the active farming age. This concurs with the finding of FAO (2013) which reported that the age of agricultural productivity is between 30 – 45 years. The result further showed a mean age of 44 years for the cooperative rice farmers. This is the age bracket where the farmer is most dedicated and as well very active to carry out all the agricutural activities. Furthermore, this supports the finding of Okereke and Echezona (2016) in evaluation of the performance of agro-based cooperative societies in Ohaukwu Local Government Area of Ebonyi State Nigeria which reported that most of the cooperative members were between 30 – 40 years. Conversely, this does not agree with the finding of Onyeneke (2017) in determinants of adoption of improved technologies in rice production in Imo State, Nigeria where it was revealed that the mean age of rice farmers in Imo State was 46 years. Further analysis showed that it was positively signed and statiscally significant at 1%. The coefficient of 0.096 showed that any increase in the age of the respondents will result to about 6.9% increase in the utilization of improved technologies in the area. This does not align with the a priori expectation since increase in age leads to decrease in ability and agility needed to engage in agricultural activities. Furthermore, this does not align with Alimba (2014) who opined that old farmers are more risk averse and may not adopt improved technologies. Similarly, Umeh *et al.,* (2015) reported that increase in age leads to decrease in adoption of improved rice production technogies in Ebonyi State.

Result of marital status (X_2) showed that a huge population (67%) of the respondents were married while others were either single (11%), widowed (19%) or divorced (3%). This implied that most of the cooperative rice farmers were married persons who had household responsibilities to meet. This corroborates Ibrahim, Mustapha and Nuhu (2012) who reported that majority of the rice farmers in the area were married. Furthermore, it was negatively signed and not statistically significant. The coeffiecient of 0.185 showed that marital status has 18.5% influence on utilization of improved technologies among the rice farmers. This means that a married person will lose utilization of improvement by 18.5%. This aligns with Onyeneke (2017) who reported that marital status negatively influences adoption of improved rice production technologies in Imo state.

According to the result of analysis on household size (X_3), it was indicated that a good number of the respondents (68%) had between 4 – 8 persons in their household while an insignificant population (4%) had below 4 persons in their household. Furthermore, the result disclosed a mean household size of 7 persons. The low percentage gained by those who had below 4 persons in their household may be directly linked to the high birth rate recorded in the area as a result of increased polygamy in the area. It could also mean that the majority may not have adopted family planning technique in household planning. This concedes to the finding of Umar, Ndanitsa, and Olaleye (2009) in adoption of improved rice production technologies among youth cooperative farmers in Gbako Local Government Area, Niger State which reported that the mean household size of the cooperative rice farmers in the area was 8 persons. The result also showed that household size (X_3) was positively signed and statistically significant at 5%. The coefficient of 0.096 showed that any increase in the household size of the respondents will lead to about 9.6% increase in the utilization of improved rice production technologies in the area. This holds same opinion with the finding of Umar *et al.,* (2009) in adoption of improved rice production technologies among youth cooperative farmers in Gbako Local Government Area, Niger State which reported that farmers who had higher household size adopted improved technologies given the high opportunity of getting information improved technology.

Again, result showed that 61.66% of the rice cooperators had access to credit while 38.34% did not have access to credit. Furhter analysis showed that access to credit (X_4) was positively signed and statistically significant at 5%. The coeffienct of 0.180 showed that there is an increase inutilization of improved rice production technology by about 18% when an increase in credit access occured. This goes with same perception with the a priori expectation since increase in credit access will increase the farmers' willingness and ability to completely pay for the cost of utilizing technology in the area. This work agrees with Otunaiya *et al.,* (2008) adoption of improved maize production technologies in Yewa North LGA of Ogun state, Nigeria which reported that access to credit increased adoption of improved maize production activities in the area.

It was also observed that majority of the cooperative rice farmers (77%) were males while about 33% were females. This means that most of the cooperative rice farmers in the area were males. This is because males are mostly engaged in cooperative farming than females given the fact that it is easier to gather males in an organization than females. This corroborates Adejoh, Madugu and Shaibu (2017) who reported that majority of rice processors in the area were males but ran contrary to Okwoche, Obinne and Onugba (2011) who reported

that most of the rural farmers in the area were females. Also, gender (X_5) showed that there was negative relationship between gender and utilization of improved rice production technologies in the area given the fact that it was negatively igned and not statistically significant. This does not agree with the apriori expectation since males and females are expected to have equal oppotunities to adopt or utilize improved rice production technologies in the area. Furthermore, this agrees with Umeh *et al.,* (2015) who reported that gender negatively infuences adoption of improved rice production technologies in ebonyi state. conversely, this does not agree with okwoche *et al.,* (2011) in adoption of herbicides and fertilizers among rural farmers of Zone B area of Kogi State Agricultural Development Project, Kogi State, Nigeria who argued that both males and females have equal adoption to herbicides and fertilizers in the area.

The result on farm size as shown overtones that an overriding population (62%) had farm size below 1 hectare in scattered plots whereas few of the cooperators (6%) had farm size above 2.5 hectares in scattered plots. The mean farm size of the respondents was 0.8 hectares in scattered plots. The innuendo was that most of the cooperative rice farmers in the area were small scale rice farmers who mostly produced for household consumption and sold a little that remained. This upholds Alarima, Kolawole, Fabusoro, Ajulo, Masunaga and Wakatsuki (2011) in knowledge and training needs of farmers adopting Sawah rice production technology in Nigeria who reported that most of the rice farmers who adopted Sawah rice production technology in the area were small scale rice farmers. Again, this concurs with the result of Saka, Bosede, Victor and Ajijola (2005) in adoption of improved rice varieties among small-holder farmers in South-Western Nigeria which reported that most rice farmers in South-Western Nigeria were small scale farmers who did not produce for commercial purpose.

The result on annual income was clear that 51% of the respondents had earned between ₦100,000 – ₦200,000 while a few (3%) had earned above ₦400,000 annually. The result as well showed a mean annual income of ₦134,580. This corroborated the finding of Otunaiya and Akinleye (2008) who found that most of the rural farmers did not earn high given an annual income of ₦102,000. Conversely, Gidado, Tenebe and Abdullahi (2014) in assessment of rice production technology package among FADAMA farmers of Jama area River Valley, Bauchi State, Nigeria reported that most of the FADAMA rice farmers earned above ₦300,000 annually.

The result on educational status showed that majority of the cooperative rice farmers (49%) had spent between 13 – 18 years in acquiring formal education while the least (2%) had spent above 18 years in acquiring formal education. This showed that most of them had acquired secondary school education as their highest educational qualification. This goes along with the report of Adejoh *et al.,* (2017) who reported that most of the cooperative rice farmers in Abuja, Nigeria had obtained secondary school certificate. Conversely, this does not uphold the finding of Raju, Huang and Rudra (2015) in factors affecting adoption of improved rice varieties among rural farm households in Central Nepal which showed that most of the rice farmers in the area were those who acquired primary school education.

Research finding overtones that a notable population (54%) had spent between 7 – 15 years in rice farming while the least (19%) had spent below 7 years in rice farming. This connotes that most of the cooperative rice farmers in the area have been experienced in rice production and so may find it easy to adopt improved rice production technologies in order to improve their yield in the area. This agrees with Arimi and Olajide (2016) in comparative analysis of male and female adopters of improved rice production technology in Ogun and Ekiti States, Nigeria which reported that most of the rice farmers in Ekiti and Osun States have been into rice production for over 10 years.

The result of rice yield showed that a significant population (55%) had obtained between 1.5 – 3.0 tons of rice per hectare while the least (5%) had obtained above 3.0 tonnes per hectare. This means that the output of rice per hectare did not meet the standard output/yield of 4.5 tons/ha. This corroborates the finding of Naheed, Nadeem, Sobia and Nusrat (2015) in trend analysis of rice area and yield in Punjab, India which reported that most of rice farmers obtained a yield of between 1 – 2 tons in the year 2012 but the yield increased to at least 2.5 tons in 2015. This notwithstanding, this research result goes against Odoemenem and Inakwu (2011) in economic analysis of rice production in Cross River State, Nigeria which reported that most of the rice farmers in the area obtained above 2.5 tons of rice per hectare. Furthermore, in another dissimilar finding, Alarima *et al.,* (2011) reported that the averagee yield of rice per hectare in Nigeria was 4.65 tons.

The result summary was thus presented;

$$Y = 0.981 + 0.0697X1 - 0.185X2 + 0.096X3 + 0.180X4 - 0.122X5 + 0.429$$

$$(0.401)^{**}\ (0.015)^{***}\ \ (0.049)^{ns}\ \ (0.033)^{**}\ \ (0.067)^{**}\ \ (0.036)^{ns}$$

From the result obtained, since F-cal (70.75) > F-tab (2.32), the null hypothesis which stated that socio-economic characteristics of cooperative rice farmers do not significantly influence utilization of improved rice production technologies in Ohaukwu L.G.A of Ebonyi State was rejected while the alternative which stated that socio-economic characteristics of cooperative rice farmers do significantly influence utilization of improved rice production technologies in Ohaukwu L.G.A of Ebonyi State was accepted.

Improved Rice Production Technologies Utilization

The improved rice production technologies available in the area were identifiedd by the cooperative rice farmers. The essence was to know the improved rice production technologies that were available and utilized in their rice production. The identified improved rice production technologies were; fertilizer application, pesticide application, irrigation, modern scare crow, herbicide application, improved rice seeds, use of modern transplanter, appropriate planting distance, nursery preparation, seed rate application as well as use of tractor. The data obtained were analyzed and result presented in Table 2.

Table 2: Improved Rice production Technologies in the area.

Improved technologies	Frequency (N= 96)*	Percentage (100%)
Pesticide application	56	58.33
Fertilizer application	94	97.91
Herbicide application	91	94.79
Use of modern scare crow	34	35.41
Use of improved rice seeds	79	82.29
Use of modern transplanter	04	4.16
Use of tractor	08	8.33
Adoption of seed rate application	57	59.38
Adoption of nursery preparation	78	81.25
Adoption of appropriate planting distance	61	63.54
Irrigation use	03	3.12

Source: Field Survey, 2018. Multiple resonses recorded

The result of the multiple responses frequency and percentage analysis on the available improved rice technologies in the area showed that the most available rice production technologies in the area were; use of fertilizer (98%), use of herbicide (95%), use of improved seeds (82%), adoption of nursery preparation (81%), appropriate planting distance (64%), adoption of appropriate seed rate (59%) and pesticide application (58%). It was also observed that the least available technologies were; tractor use (8%), use of modern transplanter (4%) and irrigation (3%). This connotes that the cooperative rice farmers had observed that the most predominat rice production technologies in the area were; fertilizer application, herbicide application, use of improved seeds and adoption of nursery preparation. This aligns with the finding of Umeh and Chukwu (2015) in adoption differentials and benefits of improved rice production technologies among farmers in Ebonyi State of Nigeria who reported that among the most available and utilized rice production technologies among rice farmers in the area were soil improving technologies which include; fertilizer application and use of agro-chemicals. They went further to posit that among the rice production technologies available and adopted by rice farmers were; improved varieties (91.67%), use of agrochemicals (87.50%), zero tillage (85.42%) and fertilizer application (83.33%). Furthermore, in a similar finding, Alarima *et al.*, (2011) reported that abot 86% of the farmers adopted improved rice varieties, fertilizer application, and optimum seed rate in planting respectively while about 67% adopted agrochemicals in rice production in Nigeria.

Constraints to Effective Utilization of Improved Rice Production Technologies Among Rice Farmers' Cooperative Societies

The cosntraints which limited cooperative rice farmers from utilizing improved rice production technologies were identified using factor analysis. The rule here was that any variable which loads 0.40 and above was accepted as a constraint while any variable which did not load 0.40 was rejected. The result obtained was presented in Table 3.

Table 3: Constraints to your utilization of improved rice technologies in the area

Constraints	Institutional	Political	Socio-cultural
Lack of credit facilities	0.005	- 0.709	**0.850**
Poor market availability	**0.739**	0.072	0.030
Poor access to extension agents	**0.904**	0.091	0.219
Poor extension services delivery	**0.879**	0.098	0.005
Poor technical knowhow	- 0.310	0.063	**0.907**
Poor government subsidization	0.011	**0.992**	0.087
Lack of education	0.110	0.043	**0.707**
High cost of technologies	**0.908**	-0.419	0.224
Insufficiency of information on technologies	**0.429**	0.006	0.126
Unavailability of technologies	**0.848**	0.031	0.004
Disease infestation	0.018	0.004	**0.766**
Poor annual income	0.007	0.003	**0.883**
Complexity of technology	**0.808**	0.019	0.224
Poor policy formulation	0.058	**0.775**	0.099
Poor policy implementation	-0.885	**0.668**	0.271

Source: Field Survey, 2018

The result classified the constraints into institutional, political and socio-cultural constraints based on close resemblance of variables attached to them. The institutional constraints included; high cost of technologies (0.908), poor access to extension agents (0.904), unavailability of technologies (0.848), poor extension services delivery (0.879), complexity of technology (0.808), poor market availability (0.739) and insufficiency of information on technologies (0.429). The political were; poor government subsidization (0.992), poor policy formulation (0.775) and poor policy implementation (0.668). Among the socio-cultural constraints include; poor technical knowhow (0.907), poor annual income (0.883),lack of credit facilities (0.850), disease infestation (0.843) and lack of education (0.707). This means that high cost of technologies was among the strong constraints that limited the cooperative rice farmers from utilizing improved cassava production technologies in the area. This is because increase in cost of utilizing improved production technologies resulted to decrease in ability to pay for technology in the area. Umeh *et al.,* (2015) reported that among the constraints that limited rice farmers from adoption of improved rice production technologies in Ebonyi State were; high cost of agrochemicals, poor market availability and poor extension access.

Similarly poor government subsidization of cost of improved technology strongly limited the cooperative rice farmers from adoption/utilization of improved rice production technologies since when the government did not subsidize the cost, it led to high cost of agrochemicals, fertilizer, etc which decreased the ability of the farmers to pay for such improved technologies in the area. Onyeneke (2017) reported that government support was a facilitating factor in adoption of improved technology such that when government withdraws support through subsidization policies, there is reduced adoption of rice production technologies.

The result further showed that poor technical know-how militated against the use of improved rice production technologies among cooperative rice farmers in the area. This was because farmers who did not know how to use improved rice production technologies preferred using the old methods which they had accepted rather than using new technologies which they found difficult to understand. Ibrahim *et al.,* (2012). In effects of adoption of rice production technologies on farmers' income in Borno State, Nigeria reported that among the constraints to adoption of improved rice production technologies in the area was poor technical know-how. Similarly, Akinagbe (2010) identified lack of funds as an important constraint to continuous adoption of innovation especially in the case of fertilizer acquisition.

IV. Conclusion And Recommendations

Conclusion

It was observed that the cooperative rice farmers had utilized some improved rice production technologies in the area. This was strongly influenced by the selected socio-economic characteristics of the cooperators. It was also seen that the cooperative rice farmers further faced some challenges in adoption and utilization of improved production technologies which need to be mitigated.

Recommendations

The following were recommended;

(i) Cooperative societies are encouraged to link up with research institutions in order to continuously have access to improved rice production technologies,

(ii) Government should subsidize the cost of technology utilization as this will encourage farmers in utilizing improved technologies for rice production.