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Assessment of Farmers Perception on Adoption of Improved Rice (Nerica) Technology in Kwami Local Government Area of Gombe State, Nigeria

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ABSTRACT

The study was conducted in Kwami Local Government Area of Gombe State, Nigeria to investigate Adoption of Rice Technology. The specific objectives were to describe the socio-economic variables of the respondents, determine the adoption levels of rice farmers and find out any relationship between the farmers socio-economic characteristics and their adoption constraints. Data were collected from 120 respondents drawn from the study area using multi-stage sampling techniques. The data were analyzed using descriptive and inferential statistics such as frequencies, percentages and regression analysis. The major findings on socio-economic characteristics revealed that 34.7% of the respondents were between 31-40 years of age, 60.2 percent were males, 66.3% had attended at least primary to tertiary education, in which most of them operates farm size of 6-10 hectares. Production and on-farm constraints affecting rice development were water management and flood. Major economic constraints faced by rice farmers were lack of viable financial agencies to support production, poor capital base and non-availability of loan. Regression analysis showed that the yield of rice was negatively related to land acquisition constraints (β=-0.34, $p<0.05$) and Technological constraints (β= -0.43, $p < 0.01$). This study concluded that problems faced by farmers were interwoven in which existence of one relates with the other. Addressing these problems will lead to increase in the rate of adoption of improved rice production technology and ultimately rice productivity in Nigeria.

Keywords: Assessment, Farmers Perception, Adoption, Rice (Nerica) Technology

Introduction

Rice belongs to the family "*Gramineae*" and the genus "*Oryza*". Rice is the most important staple food for about half of the human race in the world (Hawks Morth, 1985). There more than 40,000 different varieties of rice, species name Oryza sativa. Major categories of rice worldwide include: Indica, Japonica, Aromatic and Glutinous (USDA, 2000) Worldwide it is the grain with the second highest worldwide production after maize (corn), (FAO, 2006) Rice (Oryza

glaberrima stend) is indigenous to Nigeria and has been cultivated for the past 3500 years (Madebox, Gregory *et al*, 2006). The earliest cultivation of improved rice varieties (Oryza satrica linus) started in about 1890 with the introduction of upland verities to the high forest zone in western Nigeria (NRC, 1996). Consequently, by 1960 oryza sativa had taken over from oryza glaberrima, which is now limited to some deep-flooded plains of the Sokoto-Rims river basin and other isolated pockets of deep swamps all over country of Nigeria (Lineres, 2002). Rice (*Oryza sativa linus*) is one of the main staple foods for about 70% of the population of the world Africa produces an average of 14.6 million tones of rough rice in the year 1989 – 1996 on 7.3 million hectares of land equivalent to 2.6 and 4.6 percent of the world total production and area respectively Africa also consumes a total of 11.6 million tons (33.6%) is imported (FAO, 1996). Rice is among the important cereal crops grown in deferent part of Nigeria as food crop the country has immense potential for growing the crop. It is reported that the potential rice production area in Nigeria is estimated to be about 6.4 million hectares, according to national research and document strategy (2009). The trend in the number of rice production shows the number of farmers engaged in rice production has increase from about 53 thousand in 2006 to about 260 thousand in 2008 similarly, the area allocated has increased from about 18 thousand and in 2006 to about 90 thousand in 2008 (NRDS, 2009). In recognition of the value of the crop (Rice) viz-visa constraints to the production government in collaboration with research institutes, have develop new and high yielding varieties of rice such as FARO 1-50, FARO X, NERICA varieties etc. alongside the provision and recommendation of improved technological packages for enhancing its production (Fujji, Michihiko *et al*, 2004) Thirty six percent (36%) of Nigerian population is involved in agriculture FAO 1996). While united state of America and Israel have less than 4% of their population involved in agriculture, yet they have abundance and improved agriculture production for both domestic consumption and export (Emmanuel, 1995). In Nigeria, the government is still involved in the view of the importance of the rice, government over the years making efforts to boost and increase rice production through the development of new and high yielding varieties and provision of improved technology of farming and packages or rice.

In spite of this laudable intervention by the government, rice production/output in the Kwami Local Government area still remains low and characterized by law returns .Also, farmers in the study area are poor which makes the adoption process difficult for some of the improved rice production technologies to be implemented. In view of the above, this study seeks to investigate and assess farmer's levels of adoption of improved technologies in rice production in the

area. The broad objective of this study was to assess farmers' levels of adoption of improved technologies in rice production in Kwami Local Government area, while the specific objectives were to:-

i. Describe the socio-economic characteristic of rice farmers in the study area.
ii. Examine the relationship between yield and constraints of rice production
iii. Determine the farmer's perception on the adoption rice technology in the study area.
iv. Identify constraints to adoption of improved technologies in rice production in the study area

The study focused on the assessment of farmer's adoption of improved technologies in rice production; more focus was made on the level of adoption and the constraints adoption in Kwami Local Government Area of Gombe state with view to recommending measure for enhancing it. The study covered six (6) out of the ten (10) wards in the study area.

The Study Area

Kwami local government area is among the eleven (11) local government areas, caved out of Gomber local government on 17th November 1996 with its administrative legislative headquarters at malam sidi. Kwami local government area is located between longitude 10^0E and 10^0 30' East latitude 10^0 30'N and 11^0 15'N Kwami local government area is bounded by Dukku local government area to the North, Funakaye local government to the North East, Akko local government to the South West, Yamaltu/Deba local government to the South East, Gombe local government to the South, Kirfi local government in Bauchi state to the West and Bayo local government in Borno state to the East. The local government area has an estimated land area of 1787 square kilometers with an estimated population of 195,298 peoples as per 2006 census figures. The indigenous tribes of the area include Fulani, Bolewa, Kanuri, Tera, Hausa and Kare-kare. The study area is a home of diverse cultures with different socio-cultural backgrounds and practices. These include Dunu, Ngorda, Babu-nare and Garaya, with a costume of wearing big gowns, jumpers, trousers, wrappers and caps. The most distinctive feature of the study area and its environment are presence of river Ngaji flow into the Dadin-kowa dam to the estern part of the local government. The study area is characterized by two distinct seasons dry season and rainy season. The climate condition of the area is characterized by high temperature and low relative humidity. The average annual rainfall is between 850mm – 1200mm and temperature range is between 25^0c – 30^0c during

the hottest months (March to May). The major agricultural activities involved production of crops such as maize, millet, rice, beans groundnut, sugar-cane, corn and vegetables, livestock production is also widely practiced in the area with cattle sheep, goat, and poultry dominating. Aquaculture (fish farming) is gradually picking up in the study area.

$$Y = a + BX1 + BX2 + BX3 + BX4 + BX5 + BX6 + BX7 + U$$

Where:

Y	=	Yield
X1	=	Land acquisition and tenure
X2	=	Production on farm constraint
X3	=	Market price constraint
X4	=	Input availability
X5	=	Information and training
X6	=	Technology and scientific constraint
X7	=	Attitude and perception constraint
U	=	Error term

Data Collection and Sampling Technique

The data for the study was mainly obtained through primary sources. The data were collected using a well structured questionnaire and interview schedule administered to a sample of rice farmers in the study area. For this study, multi-stage sampling technique was used to draw respondents. Six wards were purposively selected based on the predominance of rice production as the first stage. In the second stage, 12 villages were randomly selected from the selected wards, in which proportionate random selection of 110 respondents were obtained from the sampling frame of 520 farmers in the study area and 98 questionnaires were used for the analysis.

Data Analysis

The analytical tools used for the study include simple descriptive statistics and regression analysis. The descriptive statistics that were employed include the frequency distribution, and percentages to describe the socio-economic characteristics of the respondents, farmers' perception and the constraints (objectives I, III and IV). The regression statistics was used to determine the relationships between the yield and constraints as predictor variables (objective II) as shown in the table below:

Results and Discussion

Socio-Economic Characteristics of the Respondents

The Socio-economic characteristics of the respondents considered for this study were; age, gender, marital status, family size, educational qualification, farm size and farming experience.

Table 1: Socio-economic Characteristics of the Respondents (n=95)

Variables	Frequency	Percentage (%)
Ages (Years)		
18-20	12	12.2
21-30	18	18.4
31-40	34	34.7
41-50	26	26.5
> -50	8	8.2
Gender		
Male	59	60.2
Female	39	39.8
Marital status		
Single	11	11.2
Married	42	42.9
Divorced	16	16.3
Widowed	29	29.6
Family size		
Less than 5	21	21.4
6-10	32	32.7
11-15	20	20.4
>-15	25	25.5
Educational level		
Non formal education	33	33.7
Primary education	35	35.7
Secondary education	24	24.5
Tertiary education	6	6.1
Farming Experience		
1-5	8	8.2
6-10	21	21.3
11-5	29	29.6
Farm Size (hectare)		
1-3	12	12.2
4-6	48	49.0
>-6	10	10.2
Land acquisition		
Inheritance	51	52.0
Purchased	12	12.3
Renting/lease	19	19.4
Communal	16	16.3

Source: field Survey, 2013

Table1 shows that the age ranges of the respondents falls between 31-40 years (34.7%). About 12.2 percent of the respondents were less than 20years old while 18.4 percent were between the ages of 21-30 years. About 26.5 percent falls between the ages of 41-50 years and only 8.2 percent were above 50 years. This suggest that young farmers could still be very active in all sort of farming activities, and could embark on farm operations that require more farm size .Abu, et al (2011) reported that youths are known to have ability to withstand the drudgery associated with traditionally based crude farm implements commonly used in traditional rice activities. He added that farmers productivity decrease with increase in age among old age farming population. Marital status of the respondents indicates that majority (42.9%) was married, 11.2 percents were single, 16.3percent were divorced and 29.6 were widows. The high level of married respondents could mean adoption of rice production technology by female farmers who may have been influenced by their husbands Abu(2011) used socio- cultural reason to buttress his arguments that the hierarchy position of the male dominate over female subservience was among the factor that make females to adopt farm technology. Table 1 indicates that 60.2 percent of the respondents were males, while only 39.8 percent were females. The high proportion of male respondents as compared to females may be due to cultural reasons that hinder women from participating in some farm activities.

Family size of the respondents shows that 21.4 percent had less than five members as their family size, 32.7 percent had between 6-10 family members, 20. 4 percent had up to 11.15 persons. About 25.5 percent of the respondents had more than 15 persons in their households. Based on these findings, the adoption of the rice production technology could be influence by the respondents' family size. It can be said that majority of the respondents had family size below 10 persons and could participate in the decision making to adopt or reject the adoption of rice production technology. Educational level of the respondents shows that 33.7 percent had no formal education. About 35.7 percent attended primary school, while 24.5 percent attended secondary school level and only 6.1 percent had attained tertiary institution. Educational attainment of the respondent is a prerequisite to their adoption of technology. Majority (69.4%) of the respondents had attained no formal education implies that the respondents may find it difficult to understand information on rice varieties; this could lead to low result in the adoption of rice production technology. Farming experience of the respondents indicate that 8.2 percent of them had between 1-5 farming experience, 21.3 had 6-10 years, 41.8 percent of the respondents had 11-15 years while 10.2 percent of the them opined to have had farming experience of more than 15years. This means that majority (71.4%) of the respondent had more farming experience. Experience is considered to

have positive influence on decision as whether to adopt rice production technology or not.

The result also shows that 12.2 percent of the respondent had farm size below 1ha, 49.0 percent had their farm size between 1-3ha, 28.6 percent had their farm size between 4.6ha, and 10.2 percent had farm size above 6ha. This finding shows that high proportion (38.6%) with farm size between 4 and above is more likely to adopt rice production technology than those with small area of land.
Acquisition of land by the respondents indicates that majority(52.0%) acquire their land by inheritance, 12.3 percent got their land through purchase, while 19.4 percent rent land for farming and only 16.3 percent got their land through communal ownership. This means that land is acquired through different ways among the respondents. The importance of land acquisition as observed among the respondent is supported by Shehu *et al* (2009), which indicated that land acquisition in rice production is an importance factor in promoting high level of agricultural productivity among farmers. This is because the land acquisition has significant role in changing the attitude of famers towards adoption of technology innovation.

Relationship between Yield and Constraints of Improved Rice Production
The regression model used to determine the relationships between the yield and constraints as predictor variables is shown in the equation below and the result shown in Table 3.

Table 2: Regression Analysis Showing the Relationship between Yield and Constraints

Variable	Stand Coeff	T-Value	P	Decision(0.05)
Land acquisition and tenure	-0.34	-2.34	0.02	Significant
Production and on-farm constraint	-0.13	-1.06	0.30	Not Significant
Economic market constraints	0.13	0.94	0.35	Not Significant
Input availability related constraints	0.05	0.34	0.74	Not Significant
Information and training constraints	-0.02	-0.18	0.86	Not Significant
Technological and scientific constraints	-0.429	-3.597	0.01	Significant
Attitude and perception constraints	0.22	1.68	0.05	Significant
Total constraints	-0.27	-2.22	0.03	Significant

R = 0.46, R2 = 0.22, Adjusted R2= 0.13, F = 2.44,
Source: **Field survey. 2013**

Y = 12556.16 - 0.34 X1 - 0.13 X2 + 0.13 X3 + 0.05 X4 -0.02 X5 - 0.429 X6 + 0.22 X7 - 0.27 X8

The yield is inversely related to land acquisition and land tenure constraints (□□= -0.34; p < 0.05). This showed that lack of access to farm land has negative effect on yield. In most cases, land fragmentation, due to tenure system practiced limits the availability of land for sawah-based rice production. Sakurai (2005) reported that investment in water supply canals is influenced by land tenure security and that the canals enhanced yield. Farmers who have no land for production are likely to spend money that was supposed to be used for the procurement of inputs and machines for the payment of land rent. Emanating from the discussion with the respondents during the course of this study, farmers pay as much as N 12000 ($83) annually as rent for an acre of land. This may increase with increase in the rate of adoption of sawah technology in Nigeria. Yield of sawah was also inversely related to technological constraint (□□= -0.43; p <0.01). The non-availability of power tillers, unavailability of technical guidance on the use of power tiller, lack of skill for seed and site selection, lack of knowledge and skill about weed management, power tiller operation for puddling and maintenance and lack of knowledge and skill about bunding have negative effects on the yield of farmers. However, there were positive relationships between farmers' yield and attitudes to sawah technology (□□= 0.22; p < 0.05). This implies that farmers' positive attitude towards sawah technology has a positive effect on his commitment to sawah and timeliness of operations hence increases his yield. This may be as a result of higher yield, better water and weed control qualities of sawah as reported by Fu *et al.* (2009). Addressing the farmers' constraints will require a holistic approach in which all the constraints identified are addressed to improve on rice development among the farmers.

Farmers 'Attitude and Perception of Rice Technology

The result of the study however shows that farmers have positive attitude toward NERICA Technology. As shown in Table 3, there was no resistance from the farmers to adopt NERICA technology and they have positive attitude toward it. Attitude and perceptions of the farmer who are the end users of the various activities that makes up the NERICA package must be taken into account. Wossink and Boonsaeng (2003) opined that perception and knowledge is crucial for successful research and development strategies and that many promising agricultural policies shave failed because they were inappropriate to farmers need and perception. Farmers' attitudes and perception are of crucial importance to successful development strategies. Many promising agricultural innovations and supporting policies have failed because they were inappropriate to farmers' needs. It must be noted that the perceived risk of technologies may serve as a barrier to adoption. Majority of the farmers believe that NERICA

pose no risk to their production. Also, farmers believe that NERICA rice production is profitable and worth adopting.

Table 3: Farmers Attitude and Perception of Rice Technology

Variable	Agree	Indifferent	Disagree
Perception of risk	55(24.7)	42(18.9)	45(20.3)
Perception of low productivity	47(21.1)	58(26.1)	34(15.2)
Impact on belief and tradition	38(17.1)	44(19.8)	59(26.6)
Negative attitude towards innovation	54(24.4)	56(25.3)	66(29.7)
Farmers resistance to change	28(12.7)	22(9.9)	18(8.2)

Source: Field Survey, 2013

Adoption Constraints of Improved Rice Production

The major constraints of adoption of rice varieties were identified and presented viz.

Table 4: Constraints of Adoption of Improved Rice

Constraints	Freq*	Percentage
Land Acquisition and Tenure	67	29.1
Market fluctuation Constraint	58	25.2
Cultivation Constraints	46	20.0
Input Availability Constraints	38	16.5
Communication Constraints	21	9.2
Total	**230**	**100**

Source: Field Survey, 2013.
***Multiple Responses**

The finding of Table 4 reveals that Land acquisition and tenure, market price constraint and cultivation constraints affected 29.1%, 25.2% and 20.0% of the respondents respectively. This study is in accord to Vosanka *et al.,* (2011) who reported that farmers adoption levels were affected due to taste of improved crop varieties high cost of inputs and intensive management practices of some selected crops. Other problems that affected the rice farmers' adoption activities were input availability (16.5%) and information constraints represented by 9.2 percent. These findings also agrees with Hamidu *et al., (*2006), Umar *et al* (2006) and Ani *et al* (2006) that reported farmers' most

adoption problems include incompetent agricultural personals, information regarding the existence of agricultural innovations, inadequate farm inputs and cost of technologies.

Conclusion and Recommendation

Based on the findings of this study, farmers mostly are at their youthful ages with small farm size holding and having a considerable farming experience. They are literate to some extent (secondary level). The discussion highlights on the constraints of rice adoption technology that must be addressed in order to improve the adoption of rice production in Kwami LGA of Gombe State, Nigeria. The constraints, covering a wide array of issues included land acquisition and tenure, market fluctuation, input variability, communication and training, techni. The problems were found to be interwoven and influence each other. As constraints of land tenure persist, farmers are bound to be confronted with production, inputs and technology constraints. Lack of adequate information was found to be related to economic, input and production constraints of the farmers. Addressing these problems will lead to increase in the rate of adoption of rice production technology and ultimately rice productivity in Nigeria. The study recommends a reform on land by the government with appropriate legislation that will ensure effective, simplified, sustainable and successful land administration in Nigeria and give access and security on land for farmers willing to use land for agriculture especially rice development. In addressing the credit challenge faced by rice farmers, government should strengthen the financial base of informal institutions such as the cooperative societies in the rural communities by providing credit subsidies to them. This will encourage them to continue to offer credit delivery to rural farmers. Government should train and deploy more extension agents to the areas where they can help train the farmers on how to best use rice technology to improve on their rice production and for effective information communication. This can be achieved by organizing on-the-job trainings for the extension agents in order to effectively train the farmers all the rudiment of rice technology to bridge the training and information gap of the farmers.

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