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ASSESSING THE IMPACT OF FARO 58 RICE PRODUCTION PACKAGE: A STUDY ON ADOPTION AND CHALLENGES FACED BY SMALLHOLDER FARMERS IN KATSINA STATE

[*1]Sani, Ibrahim Ibrahim and [2]Rabi'u Musa

[1]Department of Agricultural Economic and Extension

[2]Department of Fisheries and Aquaculture

Faculty of Agriculture

Umaru Musa Yar'adua University, Katsina P.M.B 2218, Katsina, Katsina State, Nigeria.

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***Corresponding Author: Sani, Ibrahim Ibrahim**

Department of Agricultural Economic and Extension, Faculty of Agriculture Umaru Musa Yar'adua University, Katsina P.M.B 2218, Katsina, Katsina State, Nigeria.

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ABSTRACT

This research contributes to the ongoing discourse on the effectiveness of agricultural innovations and production in addressing food security and rural development challenges in Nigeria.Rice production plays a vital role in the agricultural landscape of Katsina State, Nigeria, with smallholder farmers forming the backbone of this sector. This study focuses on evaluating the impact of the FARO 58 Rice Production Package, a comprehensive set of agricultural technologies and practices designed to enhance rice cultivation. The research aims to assess the awareness and adoption of FARO 58 rice production package among smallholder farmers in Katsina State, as well as to identify the challenges faced during its implementation. The methodology involves a combination of quantitative and qualitative approaches. A structured questionnaire was used to collect data on the adoption rates of FARO 58 technologies among smallholder farmers, their socio-economic characteristics, and the perceived benefits and challenges associated with its implementation. Additionally, in-depth interviews and focus group discussions are employed to gather qualitative investigation into the farmers' experiences and perspectives.

KEYWORD: Adoption; Challenges; FARO 58 Rice; Production package; Smallholder Farme.

INTRODUCTION

1.Nigeria diverse climate from tropical of the coast to the arid zone of the north make it possible to produce virtually all agricultural products that can be grown in the tropical and sub-tropical areas of the world (Nigerian forum, 2007). Research records therefore indicated that about 33% of Nigeria land area is under rice cultivation (Komawa and Akande, 2004). As a result, the Federal Government of Nigeria has launched the Anchor Borrower Agricultural Programme in the year 2015 and the programme was introduced in some state including Katsina State. The Anchor Borrowers Programme in the state has created millions of jobs for the rice farmers especially those who adopted improved (FARO 58) varieties and has aided in eradicating indolence and redundancy, especially among youths (KATARDA, 2017). Most of the factors which influence the adoption of improved rice package by the small-scale farmers in Katsina state will include; Socio-economic factors, Institutional factor, Technologies related, and Environmental factors (KATARDA, 2017).According to Nigeria Federal Ministry of Agriculture and Rural Development- FMARD (2015), rice sub-sector generates about ₦ 4, 706 billion to the Nigerian economy and over the last three years of rice transformation programme, rice had added ₦ 3, 206 billion to the nation's economy. Federal ministry of Agriculture and Rural Development FMARD further reported that from 2011-2015, rice subsector in Nigeria has attracted over $2billion over private sector investments. It was further reported that the Federal Government of Nigeria has saved about $800 million by encouraging local production of rice in the country (Premium Times, 2018).In order to boost agricultural production in the past, the Nigeria government and some non-governmental organizations had initiated agricultural programmes that aimed at improving the livelihood of the farmers and at the same time creating conducive environment for the adoption of the introduced agricultural programmes (Tule, 2003).Dontsop and Diagne (2010), opined that for a successful adoption of new technology, farmers must not only know about it, but must be able to follow the recommendations attached to the technology. It is well known fact that, not all the farmers adopt technologies at the same rate due to differences in behavior to the technologies and their socio-economic attributes (Van den Ban and Hawkins, 1996). Therefore, adoption by voluntary methods depends solely on the effectiveness of demonstration, which may be very rapid or slow. Many studies (Aremo *et al,* 2015, Abd, 2013 and Bawa, 2011), reported that the adoption of agricultural technologies in the agricultural extension transfer process that can be applied in the transfer of various technologies and innovations in the agricultural sector, the transfer process had been done from agricultural research centers to extension personals and finally to farmers who were able

to be convinced and latter adopt these agricultural techniques in order to evoke agricultural development and raise their economic level.Farmers experience in farming is one of the factors, which determine the adoption of agricultural technology. In accordance to Mamuda*et al,* (2012), years of farming experience is positively related to determining the level of adoption of modern agricultural technologies by households.Extension workers' role is to disseminate and teach farmers about how to use new package. They also help in teaching farmers the value of improved agricultural package, recommending suitable crops, encouraging adoption of appropriate package, and evaluating farmers' reaction and attitudes toward development projects. Extension workers also help in encouraging farmers in adoption of new agricultural technologies, involvement in project identification, planning, implementation, and evaluation as well as support viable development projects (Aremu.,Kolo, Gana, and Adelereke, 2015). In addition to the above functions, extension workers also create awareness of innovation; something new or perceived to be unknown before to his clients, persuade farmers to accept new technologies and highlight the usefulness or importance of the new technology to the farmers; and reinforcement of continued use of technology that was transferred. The interest to continue to practice the new in idea that introduced is sustained through supporting services like input provision and Intermediary between the researchers and farmers. This is done by creating awareness to the farmers, and taking of farmer's problem to the researchers, diagnose problems by telling them the way out. Extension workers functioning in stabilizing change and attempts to prevent discontinuance. Extension workers can effectively stabilize new behaviour by directing and reinforcing messages to those clients who have adopted innovation. Extension workers act as catalyst to speed up the rate at which his clients accept changes or innovation. Extension worker is considered as solution provider that is he/she has an idea about effective solution to farmer's problems. Extension worker play a role of resource linker that is linking them farmers with necessary agricultural input, locate source of finance for their farms, strengthening and supporting farmer organizations (Aremu.,Kolo, Gana, and Adelereke, 2015).

Observability

This is termed as the degree to which the results of an innovation are visible to farmers (Ray, 2001; Rogers, 2003; Van den Ban & Hawkins, 1998). The decision by farmers to adopt or not is usually based on the profitability and risk associated with the new technology. It is obvious that farmers do critically compare the characteristics of new varieties with those of prevailing

varieties. The process of adoption begins with farmers experimenting with new varieties. The decision in favor of a new variety is expected if its performance is viewed to be superior to the local varieties (Rogers, 2003). Farmers have a subjective preference for technological characteristics and these could play major roles in technology adoption. Adoption or rejection of technologies by farmers may reflect rational decision-making based upon farmer's perceptions of the appropriateness or inappropriateness of the characteristics of the technology under investigation (Rogers, 2003). Therefore, the adoption pattern to a technological change in agriculture is not uniform at the farm level; it is a complex process, which is governed by many socioeconomic factors. The farmers' degree of readiness and exposure to improved practices and ideas, (that is, changes like the awareness and attitude of farmers towards improved agricultural technologies), act as incentives or disincentives to agricultural practices in bringing about technological change in agriculture. The literature on the adoption of improved crop varieties and crop management technologies in developing countries points toward a number of factors operating in quite complex and interactive ways that condition the adoption decision of farmers.

According to Kaliba*et al.* (1998), the factors that affect the adoption of any agricultural technologies are divided into three major categories: farmer specific and farmer-associated attributes, technology specific attributes, and the farming objectives. Farmer-specific and farmer-associated attributes are age, farming experience, family size (labor resource), education, farm size, number of livestock owned, income (on-farm and off-farm), availability of credit, distance to the nearest market, and access to information (access to mass media, access to markets, contact with extension services, attendance at agricultural training and field days), among others. Technology-specific attributes are taste, yield, ease of cooking, ease of threshing, and tillering capacity among others (Adesina&Badhu-farson, 2011). Many studies on the adoption of technology have been conducted in developing countries. However, because of natural resources, cultural, political, socioeconomic, and institutional differences, the importance of factors affecting technology adoption differs across countries. Technology adoption studies showed that factors influencing adoption differed by location. Therefore, there is a need to conduct specific studies on technology adoption in areas where extension and research programs are implemented to understand the important factors affecting adoption in these areas (Nkonya, Schroeder, & Norman, 1997). For the adoption of innovation to take place by the farmers, it has to undergo in to; Awareness stage, interest stage, evaluation stage, trial stage, adoption or rejection stage and discontinues of the innovation (Rogers *et al.,* 2003).

Awareness Stage: This is the time by which the farmer has an idea about the new package. At this stage the farmer lacked necessary details about the innovation in term of actual content, the way it works, the cost of the innovation and benefits. Most of the farmers become aware of innovation through the market media, conversation with friends and neighbors but may not bother to ask for the details of such innovation, which is beneficial to his farming enterprise (Rogers, 2003). The stages as explained by Rogers (2003) include:

Interest Stage: At this stage, the individual farmer is motivated to seek detail information or facts on the innovation. He may want to know about the innovation in term of content, functions and merit. Interest stage is the period where by the farmers develops desire to the rate of innovation interns of financial and time resources as well as time frame within which he can recover whatever investment he made in the adoption.

Evaluation Stage: This is the stage, which determines the acquired information concerning the new ideas, innovation or technology. It is a mental stage where the farmers examine all the evidence gathered. He subjected himself in to a mental arrangement in term of determine survivability of new ideas or innovation. This mental investigation will enable the farmer to decide whether he can take the risk involved or not.

Trial Stage: this is the period of application of the new package, many farmers carry out adoption trial process on small-scale base to minimize possible losses in case of failure. The farmer at this stage needs the assistance of extension agent.

Adoption/Rejection Stage: This is the period of the scale integration of new practice or innovation in to the ongoing farm enterprise. At this stage, the farmer desires to employ the new practices or innovation for a full-scale basis or reject it.

2. Theoretical Framework of the Study

The Theory of Planned Behavior (TBP) will used in the study in order to examine farmers' attitude, subjective norms, perceived behavioral control, awareness and knowledge of improved package, farmer's intention to adopt improved package and demographic profile that could influence farmers to adopt improved rice production package. According to Fielding *et al*. (2008) and Kaufmann and Franks, (2009), attitude, subjective norms and perceived behavioral control can influence farmer's intention to adopt new farming systems. However, various other researchers have found that awareness, knowledge and demographic profiles are also influential variables (Mccann*et al*., 1997; Jacobson *et al*., 2003). Thus awareness and knowledge as well as socio-demographic profiles such as farmers' age and

education level are used in the study to determine the factors influencing farmer's level of adoption of improved rice production package.

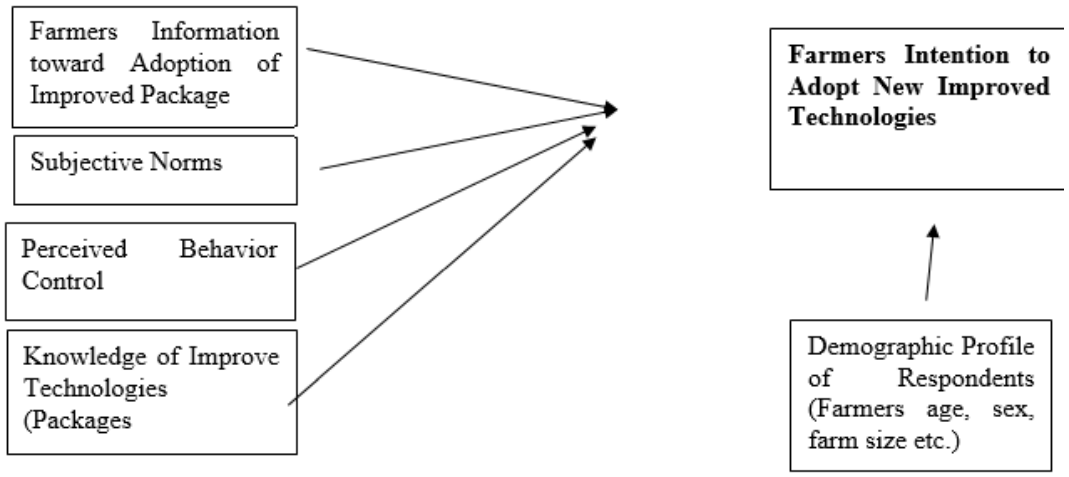

Figure 1. Theoretical Framework based on Theory of Planned Behavior (TBP) Mccann et al., (1977) and Ajzen (2011).

3. METHODOLOGY

The Study Area

This study was conducted in Katsina state, Nigeria. The area fall within the Sudan Savannah agro-ecological zone of Nigeria.Katsina state has 34 Local Government Areas. The state lies between latitude 12° 52'N and 13° 19'N and longitude 7° 16'E and 8° 43'E. Katsina State shares a common boundary with Niger Republic to the north, Kaduna State to the south, Zamfara State to the west and Jigawa State to the east. The State covers about 9, 341 square miles (24, 192 km2) of land mass. Based on and projected 2006 Census 3.5% increments the Population of the state is 7, 831, 300 million people (NPC, 2007). The climate of the study area is generally classified as Semi-arid (Tomlinson, 2010) with a long dry season of about 7-8 months (November to May) and a hot rainy season lasting for 4 months (June to September). Temperatures are high in most part of the year with the mean daily maximum temperature ranging between 27^0C to 40^0C occurring between (March to May) and the mean minimum ranging between 18^0C to 25^0C. The area has an average relative humidity of 60% and it's characterized by unimodal rainfall pattern with most of the rainfall received between May to September, annual averaging below 700mm (Tomlinson, 2010).

Agriculture is the most important occupation of the people of the state; about 82% of the people in the study area are farmers operating mostly on small scale with an average farm

size of 1-2 hectares. Crops cultivated in the state include; Rice, millet, sorghum, maize, cowpea, groundnut, sesame, cotton (KTARDA, 2017).

Method of Data Analysis

Data generated for the study were analyzed using both descriptive (frequency, percentage, mean, and standard deviation) and inferential (t-test) statistics and Adoption index.

Sampling method

Stratified random sampling to ensure representation across different regions within Katsina State. Random selection of villages within each stratum and Systematic random sampling of smallholder farmers within selected villages. A sample size was Calculated based on the population of smallholder farmers in the selected villages in order to ensured statistical significance.

Age of the Respondents

Age is an important factor affecting crop production, consumption and household food security in Nigeria (Balarabe, 2012).

Table 1: Distribution of Respondents According to Age. (n= 220)

Age (years)	Frequency	Percentage	Mean	S.D
25 – 35	52	24.0		
36 – 45	50	22.6		
46 – 55	53	24.2	47.61 years	13.18
56 – 65	43	19.1		
66 years and above	22	10.1		

Source: *Field Survey, 2019*

Results presented in Table 1 indicated that 24.2% of the respondents were within the age range of 46 – 55 years, 24.0% were within the age bracket of 25 - 35 years, 22.6% were within the ages of 36 – 45 years, 19.1% were within the ages of 56 – 65 years and 10.1% were within the age bracket of 66 years and above. In addition, the mean age of the respondents was 47.61 years. This finding implies most of the farmers were at adulthood and were capable to adopt new technologies than the older ones. This finding is in accordance with Isa *et al.* (2013) reported that, farmers at ages of 40 – 50 years are more receptive to new ideas than the older ones. In another findings by Ango*et al.,* (2011) shows that majority of the rice farmers in Northern Nigeria are within their active and productive ages and hence could

cope with the rigours associated with rice farming and they termed the period as tie in which the farmer is more capable and energetic to carry out agricultural activities.

Sex

Sex is one of the fundamental socio-economic characteristic in terms of adoption of rice production technologies. It is also used to determine the attribute, gender and other qualities of an individual farmer.

Table 2: Distribution of Respondents According to their Sex (n= 220)

Sex	Frequency	Percentage
Male	215	97.7
Female	5	2.3

Source: *Field Survey, 2019*

Result presented in Table 2 shows that majority (97.7%) of the respondents were males while few (2.3%) of them were females. Therefore, male farmers were capable of adopting new agricultural technologies than their female counterpart. This is because females were not supplied with any agricultural inputs by the governments (KATARDA). Some studies (Ango*et al,* 2011; Ango*et al,* 2012) reported that male farmers ware capable of adopting agricultural innovations than their female counterpart and this could be due to the fact that female farmers are not statistically identified as an active population in farm operations due to their productive and economic roles and household chores, based on which most of the women partake in processing of agricultural produce indoors.

Marital Status

This is one of the fundamental attribute of the farmers, because most of the farmers are differentiated by their marital status as either married, single, widow or divorced.

Table 3: Distribution of Respondents According to Marital Status. (n= 220)

Marital Status	Frequency	Percentage
Married	204	92.7
Single	13	5.9
Widowed	3	1.4
Divorced	0	0.0

Source: *Field Survey, 2019*

The findings presented in Table 3 revealed that majority (92.7%) of the respondents were married, 5.9% were single and only few (1.4%) of the respondents were widows. These findings imply that the majority of the respondents were married. This could be due to the religious and traditions of the people in the study area where marriage is encouraged and considered as a sign of responsibility. This finding is in line with (Guti, *et al.* (2018) in their study of sustainable and technological strategies for basic cereal crops in the face of climate change in Nigeria where they reported that the majority (87%) of the respondents were married due to the culture of the peoples in their study area.

Household Size

Household size refers to number of persons in a family including wives, children and labour force for farm activities that live in the same house and eat for the same pot of food. It is also an important variable, which indicates the availability of labour to the households (Habibu, 2015).

Table 4 Further reveals that 23.6% of the respondents had a family size of 6 - 10 members in their households, 22.7% had a family size of between 11 and 15 members, and 22.2% of them had a family size of 1 to 5 members. The mean household size of the respondents was 12 people. This implies that the household size of the respondents in the study area was large.

Table 4: Distribution of Respondents According to Household Size. (n= 220)

Household Size (people)	Frequency	Percentage	Mean	SD
1 – 5	49	22.2		
6 – 10	52	23.6		
11 – 15	50	22.7	12 people	7.044
16 – 20	33	15.1		
21 people and above	36	16.3		

Source: *Field Survey, 2019*

4.1.5 Educational Level

Educational level is acknowledged as one of the factors that facilitate rice farmer's adoption of new rice improved technologies. Based on Muzari*et al*. (2012), educational level does not only increase productivity, but also increases the ability to understand and evaluate information on new technologies.

Table 5: Distribution of Respondents according to Level of Education. (n= 220)

Educational Level	Frequency	Percentage
Primary School	70	31.8
Secondary School	83	37.7
Tertiary Institution	26	11.8
Qur'anic education	41	18.6

Source: *Field Survey, 2019*

Results in Table 5 reported that 37.7% of the respondents attended secondary school, 31.8% of them attended primary school, 18.6% attended Qur'anic education only and few (11.8%) of the students attended tertiary institution. This findings implies that respondents with moderate level of education would participate more and ready to accept new technological changes. Many studies conducted (Ogundele and Okoruwa, 2006), indicated that most of the farmers had one form of education or the other. However, at low level, education is expected to enhance adoption of farming techniques, therefore, farmers with high level of education are likely to be more efficient in the adoption of agricultural innovations.

Table 6: Distribution of Respondents According to Farming Experience. (n= 220)

Farming Experience (years)	Frequency	Percentage	Mean	SD
1 – 10	69	31.4		
11 – 20	68	31.0		
21 – 30	34	15.6	19.42years	13.35
31 – 40	25	11.5		
41 years and above	24	10.8		

Source*: Field Survey, 2019*

As indicated in Table 6 reveal that 31.4% of the respondents had 1 - 10 years of farming experience, 31.0% of the respondents had a farming experience of 11 – 20 years, 15.6%, of the respondents had a farming experience of 21 – 30 years, 11.5% of the respondents had 31 – 40 years of farming experience and only few (10.8%) of the respondents had a farming experience of 41 years and above. The mean farming experience of the respondents was 19.42 years. This finding implies that the respondents had ample farming experience in term of adoption of agricultural technologies. These findings is in line with Mamuda*et al.* (2012), reported that years of farming experience determinine the level of adoption of modern agricultural technologies by households in northern Nigeria.

Membership of Association

This is the voluntary participation of an individual in a group or society on the ground of common interest and similar belief. Membership of farmers to any association always assist them to have access to agricultural information and loans.

Table 7: Distribution of Respondents According to Membership of Association. (n=220)

Membership of Association	Frequency	Percentage
Water Users Association	1	0.4
Rice Farmers Association	189	86.0
Farmers' Cooperative Societies	7	3.2
Fadama Users Association	23	10.4

Source: *Field Survey, 2019*

Results in Table 7 shows that majority (86%) of the respondents were members of Rice Farmers Association, 10.4% of the respondents were registered with Fadama Users Association, 3.2% of them were in to Farmers' Cooperative Societies and only few (0.4%) of the respondents were registered with Water Users Association. This finding implies that majority of the respondents were registered members of Rice Farmers Association during the programme. This finding is in line with Okocha and Obinne (2010), who reported that membership of farmers within a group always aid them to have access to information on new technologies and learn from each other on how to produce and market agricultural crops.

Contact with Extension Agents

Extension agents are those individuals or personnel who facilitate the information to farmers in adoption of any agricultural innovation.

Table 8: Distribution of Respondents based on Contact with Extension Agents. (n=220)

Contact with Ext. Agents	Frequency	Percentage
Yes	220	100.0
No	00	00.0

Source: *Field Survey, 2019*

Results in Table 8 reveal that all the respondents had contact with the extension agents. This implies that respondents had contact with extension agents through either farm or home visit, radio and television or through group discussion. Many studies (Obinna, 1991; Ahmadi, 2010

and Ann, 2013) reported that famers with a regular extension contact are more willing to adopt agricultural innovations, lack of which resulted in a weak extension services and its consequence effect adoption of improved agricultural innovations

Frequency of Contact with Extension Workers

This indicates the period by which agricultural extension personnel had contact with farmers in the study area.

Table 9: Distribution of Respondents According to Frequency of Contact. (n=220)

Frequency of Contact	Frequency	Percentage
Daily	4	1.8
Weekly	152	69.1
Monthly	43	19.5
Quarterly	21	9.5

Source: *Field survey, 2019*

Results in Table 9 reveal that most (69.1%) of the respondents had contact with extension agents on weekly basis, 19.5% of the respondents had contact with extension agents on monthly basis, 9.5% of the respondents had contact with extension agents on quarterly basis and only few (1.8%) of the respondents had contact with extension agents on daily basis. This findings implies that majority of the respondents had contact with extension agents on weekly. This finding is in line with Oluwafemi*et al.* (2011) reported that extension contact has influence on the frequency of visits by the extension agents during adoption of new agricultural technologies.

Differences in Rice output Between FARO 58 Package and Local Rice Variety

T- test analysis result in Table 10 shows a significant increase in the mean yield after adoption of FARO 58 rice package production was (1940kg) of rice compared to the mean yield before the adoption of rice technologies of 1189.5kg. The differences of mean before and after the adoption of FARO 58 rice production technologies was 50.5kg. This implies that there is significance differences in yield of 750.5kg of rice before and after adoption of rice production package in the study area.

Table 10: Distribution of Respondents According to their Yield Before and After Adoption of FARO 58 Rice Production Technology. (n= 220)

Yield (kg)	Mean	S.D	S. E	D.F	P-value
Yield Before	23.79	15.50	1.045		
Yield After	38.80	25.39	1.712	219	0.000***
Differences	15.01	9.89			

Source: *Field Survey, 2019* Significant level = 0.001%

Hypothesis Test

There is no significant difference in rice yield of farmers before and after adoption of FARO 58 rice production package in the study area.

The t-test analysis result presented in Table 10 above shows that there is significant differences in rice yield after adoption than before at ($P < 0.001$) level of probability in the study area. Therefore, it was concluded that FARO 58 rice package have significant influence on farmer's yield adoption. Hence, null hypothesis is rejected**.**

Challenges Faced by the Respondents During Adoption of FARO 58 Rice Package

Constraints faced by respondents during adoption refers to the inhibiting factors that may result to non-adoption. Constraints may also be the problems, which farmers faced during adoption of improved rice variety. These constraints are categorized in to biotic, abiotic and environmental factors (KATARDA, 2017).

Table 11: Distribution based on Challenges Faced by Respondents During Adoption of FARO 58 Rice Package. (n= 220)

Constraints	Frequency	Percentage	Mean	Rank
Pest and Diseases	214	29.6	3.288	1st
Inadequate Nutrients	32	4.4	0.488	5th
Inadequate Water Supply	213	29.4	3.266	2nd
Farmers Herders Conflict	53	7.3	0.811	4th
Lack of Knowledge/Skills on Package	11	1.5	0.166	6th
Lack of Credit Facilities	188	26.0	2.888	3rd
Insufficient Farm Size	6	0.8	0.088	7th

High Cost of Input	5	0.7	0.088	8th
Complexity to Practice	2	0.3	0.033	9th

Source: *Field Survey, 2019* *** 724** ** Multiple Response*

Result presented in Table 11 revealed that 29.6% of the respondents faced constraints of pest and diseases, 29.4% of the respondents faced a problem of inadequate water supply, 26% of the respondents faced a problem of credit facilities, 7.3% of the respondents faced a problem of farmer harder conflict, 4.4% of the respondents had a problem of inadequate soil nutrient. Pest and diseases had the highest mean and was ranked first, indicating that, it's the most pressing constraint faced by respondents in the study area. This is seconded by inadequate water supply to the rice crops in the study area. Studies conducted by Singh and Jay, (2010) reported that constraints faced by rice farmers in Jabalpur, India include high cost of technology, lack of training on technology and also problem of pest and diseases. It was reported by Pawa (2010), that the notable constraints faced by rice farmers in the field in Nigeria are weed infestation, disease influence, floods, lack of credit facilities, climate change, water scarcity and temperature.

CONCLUSION

Based on the findings of this study, it is concluded that majority of the respondents were males and married and most of them practice smallholder farming. The study on assessing the impact of FARO 58 Rice Production Package among smallholder farmers in Katsina State reveals valuable insights into the adoption patterns and challenges faced by the farming community. The research demonstrates that FARO 58 adoption levels among smallholder farmers in Katsina State vary. Factors such as socio-economic status, access to resources, and educational background influence the likelihood of farmers embracing the technology. The study underscores the critical role of extension services in promoting the adoption of agricultural innovations. Farmers who have regular access to extension services are more likely to adopt FARO 58 technologies, indicating the importance of effective knowledge transfer and support mechanisms. Financial constraints emerge as a significant barrier to the widespread adoption of FARO 58. Many farmers face challenges in accessing credit and resources required for implementing the recommended practices. Additionally, technological complexity and environmental factors pose hurdles, indicating the need for targeted interventions to address these challenges.

The research suggests that FARO 58 has a positive impact on rice production outcomes, as evidenced by improved yields and quality. Farmers who have successfully adopted the package report enhanced productivity, indicating the potential for FARO 58 to contribute to food security and economic well-being in the region.

Based on the findings of the study, it's concluded that the constraints faced by the rice farmers in the study area were pest and diseases, inadequate water supply and lack of credit facilities.

Recommendations

Based on the findings the following recommendation were made. Government should develop and implement targeted financial support programs to assist smallholder farmers in accessing credit and resources necessary for adopting FARO 58 technologies. This can include low-interest loans, grants or subsidies to alleviate financial constraints and promote widespread adoption, Strengthen agricultural extension services to provide continuous support and knowledge transfer to smallholder farmers. This can involve training and capacity-building programs for extension officers to effectively communicate the benefits of FARO 58 and address farmers' concerns and queries. Then Design and implement customized training programs that cater to the specific needs and technological proficiency of smallholder farmers. These programs should focus on simplifying the implementation of FARO 58 practices, ensuring that farmers can easily adopt and integrate them into their existing farming systems.Katsina Agricultural Development Agency (KATARDA) should intervene and continue provide support of agrochemicals (herbicide, pesticide and insecticides) and sustainable water supply to the improved rice production in the study area.

Contribution to Knowledge

In addition, these research provides the knowledge on constrains faced by the farmers after adoption of FARO 58 rice package, agricultural technologies, impact of improved technologies and socio-economic characteristcs of the respondents in the study area.

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