UTILISATION OF FADAMA III ADDITIONAL FINANCING TECHNOLOGIES AMONG RICE FARMERS IN NIGER STATE NIGERIA

Jacob, G. B., Ajayi, O. J. and Tsado, J. H.
Department of Agricultural Extension and Rural Development, School of Agriculture and Agricultural Technology Federal University of Technology P.M.B. 65 Minna, Nigeria
Correspondence contact details: jacobbulus1@gmail.com, 07057033771

ABSTRACT
The study assessed the utilisation of Fadama III AF technologies and the factors influencing utilisation of Fadama III AF among rice farmers. Primary data were used for this study and these were collected with the aid of structured interview schedule. Multi-stage sampling procedure was used to select 160 respondents randomly. Descriptive and inferential statistics such as multiple regression (OLS) were used to analysed the data. The age of the farmers revealed that 33% were between 40 – 49 years with mean age of 41 years. The majority (82%) were males, while 34% had secondary education. A total of 30% of the farmers had between 6 – 10 members of household. The result showed 21% had between 16 – 25 years of farming experience. All the farmers were active participants of Fadama III-AF programme and had contact with Fadama facilitators during the 2017/2018 cropping year. The study also revealed that 89% had access to credit and the average income from rice farming was ₦328,081.50. About 75% of the farmers had 3 – 4 information sources relating to the programme. The result implies that majority of the respondents had utilised Fadama III-AF technologies available in the study area. The regression analysis (OLS) shows that sex, education, farming experience, information source, contact with Fadama facilitators were significant at 1% or 0.01, farm size, social organisation and age significant at 5% or 0.05 and access to credit indicated positive and significant at 10% or 0.1 with utilisation of Fadama III AF rice technologies. It can be concluded that there was high rate of utilisation of Fadama III-AF technologies among rice farmers in the study area. The study recommended that farmers should be given more assistance to obtain credit facilities through financial institutions.
Keywords: Utilisation, Fadama III AF technologies, rice farmers.

INTRODUCTION

Nigeria is a key regional player in West Africa, with population of approximately 184 million, Nigeria accounts for 47 percent of West Africa's population, and has one of the largest population of youth in the world (World Bank, 2017). Agricultural sector, since the discovery of oil has witnessed lots of neglect from the various successive governments. At present, the sector accounts for 35 percent if not below of the real sector, while crude oil accounts for about 55 percent and above (Noko, 2017). While the sector is accounting for one-third of the GDP, it remains the leading employment sector of the vast majority of the Nigerian population as it employs two-third of the labour force (Noko, 2017). The Federal Government of Nigeria through the pooled World Bank loan came up with the National *Fadama* Development Project, to finance the development of *Fadama* lands which has a lot of agricultural potential than the associated upland soils. *Fadama* is a low lying land subject to seasonal flooding or water logging along the banks of streams or depressions. The term *Fadama* is a Hausa word meaning; floodable plains along major bank of rivers and streams. *Fadama* project is mainly aimed at sustaining increase in the income of users of rural land and water resources (IDA, 2010).

The objective of the Additional Financing (AF) for the Third National *Fadama* Development Project for Nigeria was to increase the income for users of rural lands and water resources within the *Fadama* areas in a sustainable manner throughout the recipient's territory. The additional financing focuses on improving farm productivity performance of clusters of farmers engaged in priority food staples namely rice, cassava, sorghum and horticulture in six selected states with high potential. According to Idrisa (2009), utilisation of improved technologies is an important factor to increase the productivity of small holder farmers in Africa, thereby fostering economic growth and improved well-being for millions of the poor households.

Fadama III AF project has been disseminating technologically improved production techniques/inputs to rice farmers in Niger state since 2015, however little or no effort has been made to investigate the utilisation rate of the various rice technologies by farmers. The research was therefore designed to describe the socioeconomic characteristics of the Fadama III AF rice farmers, examine *Fadama* III-AF rice technologies utilised by the farmers in the study area; and determine the factors influencing utilisation of *Fadama* III AF rice technologies by the farmers.

METHODOLOGY

The study was conducted in Niger State of Nigeria which lies between Latitude 8^{o} and 11^{o}20'N and Longitudes 4^{o}30' and 7^{o}40'E. The State is bounded by Kaduna State and FCT to north-east and south-east respectively; Zamfara State, Kebbi State, Kogi State, Kwara State, and the Republic of Benin. It has a land area of 76,363 km2 (Niger

State website, 2018). The population of Niger state was 3,950,429 (NPC, 2006). However, the Bureau of Statistics had maintained an approximated population growth rate of 2.5% geometrically for the country, based on which the projected population as at 2017 was estimated to be 5,135,558 (National Bureau of Statistics Estimates, 2018).

Multi-stage sampling was used in the study. The sample covered all the three agricultural zones in the state, namely: Bida, Kuta and Kontagora. According to the Niger state Fadama coordination office (2017), there are fifteen (15) Local Government areas that are into rice farming, with about 5,212 rice farmers supported (Implementation Status Report on Fadama AF Niger State, 2017).

One Local Government Area (LGA) each among the agricultural zones was randomly selected giving a total of three LGAs (i.e. Lavun LGA from Zone I, Gurara LGA from Zone II and Wushishi LGA from Zone III). In the second stage, three Fadama rice producing clusters were selected from each of the LGA, with exception of Gurara LGA that has only two rice producing clusters during the last cropping season, thereby making a total of eight (8) *Fadama* rice clusters for the study. In stage three, four production groups were selected from each cluster, giving a total of thirty-two (32) production groups. However, list of rice farmers in the selected communities was obtained from Niger State *Fadama* Office, this form the sample frame for the study. In the fourth and final stage, five (5) rice farmers which make up 50% of each group were proportionately selected from each of the thirty-two production groups, giving a sample size of 160 respondents.

Both descriptive and inferential statistics were used to analyse the data collected in this study. Ordinary Least Square (OLS) regression model was used in analysing the factors that influence utilisation of *Fadama* III-AF rice technologies, while descriptive statistics such as mean, frequency and percentages were used to analyse the socioeconomic characteristics of the respondents.

Measurement of variables

The variables measured are divided into two parts as shown: Dependent and Independent Variables.

Independent variables

Age: The age of the *Fadama* rice Farmers were measured in years as given by the respondents.

Sex: This explain the general sex of the respondents, which is either male or female. This was measured, male is equal one (1) and female is zero (0).

Education: This was measured as numbers of years spent in the formal educational system by the Fadama rice Farmers.

Farm Size: The Fadama Rice Farmers farm size was measured in hectares of land cultivated during the cropping season as given by the respondents.

Farmers Experience: This was measured by the total number of years in rice farming.

Household Size: This is defined as the total number of people living in a given household as at a particular point in time. Household size was measured by the total number of people the Fadama rice Farmers is feeding and taking care of. These include the husband or wife, children and any other dependent.

Contact with Facilitators: This was measured by the number of contacts the respondents have with their facilitators per month; either for demonstrations or information.

Income: Income, in this context, refers to the amount farmer obtained per annum. This was determined by the amount generated/received from the sales of their farm produce.

Access to Credit: This is the access to formal sources of credit by farmers for the purpose of farming. This was determined by knowing how much of the credit gets to the farmers and this will be measured in Naira amount.

Information Sources: This is measured by the number of information sources indicated by the farmers.

Membership of Association: This answered the question in years. That is the number of years the rice farmers have being in the group.

Dependent variables

The dependent variable of the model was utilisation of the *Fadama* III-AF technologies by rice farmers. The variables are operationalized as; (1) rice varietal trial, (2) plant per hole 2-3 seed, (3) transplanting one seedling per hole, (4) water management, (5) spacing 20cm/20cm, (6) fertiliser application NPK 4bags/Urea 2bags, (7) pre-emergence 2liter/post-emergence 2liters, (8) faro 44variety, (9) deep of hole 3-4cm, (10) bird scaring techniques, (11) urea deep placement, (12) threshing, (13) winnowing and (14) farm machines were considered. The dependent variable (Y) takes values between 1-14 based on the utilisation of *Fadama* III-AF technologies by the respondents. Respondents that utilised 1 technology have their Y value equal to 1, those who utilised 2 have their value to be 2, and this continues to the maximum of 14 to the respondent that utilised all the 14 technologies.

Ordinary least square (OLS) regression model

OLS model was employed to achieve the third objective of the study i.e. factors influencing utilisation of *Fadama* III-AF by rice farmers as used by Bawa and Ani (2015). The regression model is specified in its implicit form as follows:

$Y = f(\beta Xi.U)$ …… (1)

Explicitly, the functional form of the model is expressed as:

$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots\ldots\ldots + \beta_{11} X_{11} + e$ (2)

Where;

Y = Rice technologies utilised by the farmers, takes value between 1-14

i = 1, 2, 3....., n number of independent variables.

X_1 = Age (Years)
X_2 = Sex (Male=1, Female=0)
X_3 = Level of education (Years spent in school)
X_4 = Farm size (ha)
X_5 = Farmers experience (Number of years)
X_6 = Household size (Number of people per household)
X_7 = Income (₦) (Amount farmers obtained per annum)
X_8 = Contact with facilitators (number of contacts with facilitators)
X_9 = Access to credit (In Naira)
X_{10} = Information sources (Number of sources)
X_{11} = Membership of social organisations (Number of years)
$X_1 - X_{11}$ = set of explanatory variables
βo = Constant
$\beta_1 - \beta_{11}$ = Coefficients of the explanatory variables
e = error term

RESULTS AND DISCUSSION

Socioeconomic characteristics

Table 1 revealed that the majority (82.50%) of the farmers were males, while only 17.50% represent the female. This result implies that males dominated rice farming in the study area. However, Olaolu *et al*. (2013) asserted that the sex distribution of the respondents among *Fadama* rice farmers is skewed towards males in the *Fadama* development project. Also, studies by Idris *et al*. (2007) revealed that sex plays significant role in accessing production resources and hence utilisation of agricultural innovations.

On the level of education of the farmers, Table 1 shows that those who had secondary education dominated the distribution with a proportion of 34.38%. This result is in line with Folorunso (2015) who posited that there is a positive relationship between education and productivity in rice production.

The result in Table 1 reveals that the mean age of the Fadama rice farmers in the study area is 41 years. This age represents the active groups who are in their active period of life and are more likely to adopt and utilise new technologies readily and easily than the older age brackets. This result is in agreement with the findings of Nlerum, (2013) who opined that active age group of between 20 to 40 years dominates the society that contributes immensely to the productive sectors such as agriculture.

More so, the results in Table 1 revealed that about 21.88% had farming experience between 16 – 20years. The average farming experience was 16years. Ogunmefun and Achike (2015) indicated that farmer's experience in farming reveals the rate of his exposure to risk, and also the use of risk management strategy. Also results of household size show that 30.63% of the farmers had household size of 6 – 10 members. The mean household size of 10 people was recorded in the study. This implies that family labour is an important component of factor of production for small-scale farmers. This agrees with Ibok *et al*. (2015) that the main source of labour for subsistence farmers is man power, hence justifying the reason for large family size.

Furthermore, Table 1 revealed that all the farmers had 1 hectare of land. This is as a result of Fadama III AF intervention that allocated only 1 hectare of land to farmers in other to actualize maximum output. Small land holding is a typical situation which characterised the third world countries (World Bank, 2008). The majority (88.75%) of the rice farmers in the study area had access to credit. The study further revealed that the source of the credit was mainly from family and friends and not financial organisations.

According to an earlier study by Danjuma *et al*. (2016) farmers have the potentials to improve their productivity but they lack the capital necessary to finance their farming activities.

The study also revealed that 75.63% of the Fadama III AF rice farmers had between 3 – 4 sources of information. This implies that the more information sources available to farmers, the greater their chances of utilisation of technologies at their disposal. According an earlier studies Daudu *et al*. (2009), revealed that most farmers depend on extension agents and friends for agricultural information, which could be as a result of the ability of these farmers to have face-to-face contact with these sources. More than half (58.75%) of the respondents have spent between 6 – 10 years in which they belonged to social organisations as shown in Table 1 implying that all the Fadama III AF rice farmers interviewed were 100% active members of the project. According to Gasana (2011), farmers join social organisations for external support, cooperatives performance, market access and collective bargaining, access to input service and credits, wealth creation and risk sharing.

Table 1: Distribution of respondents based on their socioeeconomic characteristics (n=160)

Variable	Frequency	Percentage	Mean
Sex			
Male	132	82.50	
Female	28	17.50	
Education	18	11.25	
Primary	43	26.88	
Secondary	55	34.38	
Tertiary	44	27.50	
Age			
20-29	15	9.38	41
30-39	53	33.73	
40-49	54	33.75	
50-59	34	21.25	
60-69	1	0.63	
70-79	3	1.88	
Farming experience			
1-5	11	6.88	16
6-10	20	12.50	
11-15	33	20.63	
16-20	35	21.88	
21-25	24	15.00	
26-30	21	13.13	
31-35	11	6.88	
36-40	5	3.13	
Household (Number)			
1-5	28	17.50	10
6-10	49	30.63	
11-15	41	25.63	
16-20	24	15.00	
21-25	15	9.38	
26-30	3	1.88	
Access to credit			
Yes	142	88.75	0.89
No	18	11.25	
Information source			
1-2	11	6.88	3.21
3-4	121	75.63	
5-6	28	17.50	
Membership of organisation (years)			
1-5	58	36.25	6.73
6-10	94	58.75	
11-15	6	3.75	
16-20	2	1.25	
Income (₦)			
1- 500,000	139	86.88	328,081.50
500,001- 1,000,000	19	11.88	
1,000,001- 1,500,000	2	1.25	
Contact with Fadama facilitators			
12	20	12.50	22.50
24	140	87.50	

Source: Field Survey, 2018

In addition, the study also showed that 12.50% of the Fadama rice farmers received 12 visits from Fadama facilitators, while 87.50% received 24 visits. The visits were based on the Fadama facilitator's contact per annum. Result from the study shows that 86.88% of the rice farmers had an annual income between ₦1 – ₦500,000, 11.88% had more than ₦600,000, while 1.25% realized between ₦1,000,001 - ₦1,500,000. The mean annual farm income was found to be ₦328,081.50. Study by Danjuma *et al*. (2016) revealed that *fadama* project has a significant

positive impact on farmers' annual income as well as annual output.

***Fadama* III-AF Rice technologies utilised by the respondents**

The result in Table 2 showed the *Fadama* III-AF rice technologies utilised by the respondents in the study area. The result revealed that 100% of the respondents indicated to have utilised the following rice technologies in the study area: plant per hole 2-3 seeds, water management technique, spacing 20cm/20cm, fertiliser application NPK 4 bags/ urea 2 bags, pre-emergence 2litre/pre-emergence 2 litre, faro 44 variety and winnowing respectively.

Similarly, other technologies the respondents utilised are in this order: rice varietal trial (98.75%), farm machinery (75.0%), depth of hole 3-4cm (98.13%), bird scaring technique (5.0%), urea deep placement (85.0%), and threshing (98.75%). The result implies that majority of the respondents had utilised *Fadama* III-AF technologies available in the study area. This result agrees with the study of Idrisa (2009) who reported that utilisation of improved technologies is an important factor to increase the productivity of small holder farmers in Africa, thereby fostering economic growth and improved well-being for millions of the poor households.

Table 2: Distribution of respondents based on *Fadama* III-AF rice technologies Utilised

Rice Technologies	Frequency*	Percentage %
Rice varietal trial	158	98.75
Plant per hole 2-3 seed	160	100
Transplanting one seedling per hole	160	100
Water management	160	100
Spacing 20cm/20cm	160	100
Fertiliser application NPK 4bags/ Urea 2bags	160	100
Pre-Emergence 2liter Post- Emergence 2liters	160	100
Faro 44 variety	160	100
Machinery	120	75
Deep of hole 3-4cm	157	98.13
Bird Scaring	8	5.00
Urea deep placement	136	85.00
Threshing	158	98.75
Winnowing	160	100

Source: Field Survey, 2018
*** Multiple responses**

Factors influencing utilisation of Fadama III AF Rice technologies by rice farmers

The OLS result in Table 3 revealed that variables such as sex, age, education, farming experience, social organisation, Fadama facilitator, farm size, access to credit and information sources all indicated positive and significantly influence utilisation of Fadama III AF rice technologies among rice farmers in the study area. The coefficient of sex was significant at 1% and relates positively with utilisation of Fadama III AF rice technologies. The positive and significant relationship between gender of the farmers and the utilisation of Fadama III AF rice technologies implies that gender plays significant role in utilisation of agricultural technologies. Age of the farmers was significant at 5% level and relates negatively with utilisation of Fadama III AF rice technologies. This implies that an increase in the age of the farmers will translates to a reduction in rate of farmers' utilisation of technologies. This confirms to the study of Ibok *et al*. (2015) that young farmers are keen to adopt new knowledge and information faster than older farmers. It may also be that older farmers are more risk averse and less likely to be flexible than young farmers and thus have a lesser likelihood of information utilisation and new technologies.

Table 3 further revealed that there is a positive and significant (1%) relationship between the level of education and utilisation of Fadama III AF rice technologies. This result agrees with studies by (Bawa and Ani, 2015; Oyewole and Ojeleye, 2015) that revealed a positive significant relationship between farmers' level of education and utilisation of maize improved innovations. The coefficient of farmers' experience was significant (1%) and relates positively with utilisation of Fadama III AF rice technologies. This implies that farmers in the study are area highly experience in rice production. Also year of membership of social organisation was significant (5%) and positively relates with the rate of utilisation of Fadama III AF technologies. The implication is that as the years of membership of organisation increases, the rate of utilisation of Fadama III AF rice technologies increases by 0.1065.

Contact with Fadama facilitator was significant at 1% level of probability, with coefficient of 0.0810. This implies that as contact with Fadama facilitator increase, will translate in a corresponding increase in the rate of utilisation of Fadama III AF rice technologies, a unit increase in contact with Fadama facilitator, will increase utilisation by 0.0810. This means that as the rice farmers have more contact with Fadama facilitator, they will have increase access to latest farm practice, farm inputs and market information and these will lead to increase in farm output from the same size of land. Farm size was statistically significant at 5% level of probability. Farm size had a coefficient of 0.1161 at 5% level of significant. This means as farm size increase, utilisation of Fadama III AF rice technologies increases; a unit increment in farm size, will increase utilisation rate by 0.1161. Access to credit was significant at 10% level of probability with a regression coefficient of 0.3165. The implication is that the more farmers have access to credit, the greater the rate their utilisation of Fadama III AF rice technologies and a unit increment in access to credit will correspond to a unit increase in utilisation of Fadama III AF rice technologies by 0.3165. This agrees with the earlier study of Danjuma *et al*. (2016) that sufficient capital and credit aid farmers to purchase inputs as well as to procure farm machines to ease their farming activities.

Table 3: Regression estimate of factors influencing utilisation of *Fadama* III AF rice technologies by rice farmers

Variables	Estimated Coeff.	Standard Error	t-value	P-value
Constant	8.570397	0.5251743	16.32	0.000***
Sex	0.4655575	0.1503256	3.10	0.002***
Age	-0.0336822	0.0131031	-2.57	0.011**
Education	0.1899787	0.0218478	8.70	0.000***
Experience	0.1064868	0.0124514	8.55	0.000***
Household	0.0508341	0.0357813	-1.42	0.158^{NS}
Social organisation	0.1333786	0.0542485	2.46	0.015**
Fadama Facilitator	0.0809638	0.0127845	6.33	0.000***
Farm size	0.1161071	0.0558127	2.08	0.039**
Access to Credit	0.3164653	0.1804455	1.75	0.082*
Income	2.69e-07	3.55e-07	0.76	0.451^{NS}
Information source	0.2682218	0.0510152	5.26	0.000***
R^2	0.85			
R^{-2}	0.84			
F	81.27***			

Source: Field Survey, 2018

Note: *** Significant at 1%, ** Significant at 5%, * Significant at 10%, NS Not Significant

Finally, the information source shows positive and significant at 1% level of probability. Information source had a coefficient of 0.2682. This implies that the more information sources the farmers have concerning Fadama III AF rice technologies, the more the farmers utilises technology and a unit increment in information sources available to farmers will increase the rate of their technology utilisation by 0.2682. According to earlier studies Daudu *et al*. (2009), revealed that most farmers depend on extension agents and friends for agricultural information, which could be as a result of the ability of these farmers to have face-to-face contact with these sources.

CONCLUSION AND RECOMMENDATION

Utilisation of technology could assist farmers increase their production levels and income considerably. The capacity to educate their children would be enhanced and their standard of living improved. Government should therefore assist farmers to access the more efficient factors which influence technology utilisation. In areas where illiteracy level is high, the employment of extension agents and the use of radio would facilitate technology utilisation. Research institutions and organisations related to agriculture such as Fadama Development project and ADPs should intensify their research efforts in breaking new grounds for innovations to be disseminated by extension agents.

REFERENCES

Bawa, D. B. and Ani, A. O. (2015). Analysis of Utilisation of Agricultural Innovation among Farmers in Southern Borno, Nigeria. *International Journal of Research in Agriculture and Forestry*. 2(3), PP 31-37.

Danjuma, I. A., Oruonye, E. D., and Ahmed, Y. M. (2016). The Socioeconomic Impact of

Fadama III Project in Taraba State: A Case Study of Jalingo Local Government Area. *International Journal of Environmental and Agriculture Research,* 2(2): 2454-1850

Daudu, S., Chado, S. S., and Igbashal, A. A. (2009). Agricultural information sources utilised by farmers in Benue state, Nigeria. *5(1): 39-48. www.patnsukjournal.net/currentissue*

Folorunso, S. T. (2015). Impact of Fadama III on Productivity, food security and poverty status of tuber farmers in central states of Nigeria. Ph.D. Dissertation, submitted to the Department of Agricultural Economics and rural sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria Kaduna state, Nigeria

Gasana, G. (2011). Exploring the Determinants of Joining Dairy Farmers Cooperatives in Rwanda: A Perspective of Matimba and Isangano Cooperatives. A Published Masters of Arts in Development Studies. International Institute of Social Studies. The Huge, The Netherlands

Ibok, O. W., Ekarem, J. T., and Umoh, I. U. (2015). Factors influencing the utilisation of Agricultural extension technologies by Yam farmers in Yakurr LGA of Cross Rivers state, Nigeria. *Journal of Basic and Applied Research International. 5(2):100-109.*

Idrisa, Y. L., Sulumbe, I. M. and Mohammed, S. T. (2007). Socioeconomic Factors Affecting the Participation of Women in Co-operative Activities in Gwoza Local Government, Borno State. *Journal of Agriculture, Food, Environment and Extension.* 6(2), 72-78

Idrisa, Y. L. (2009). Analysis of the Determinants of Soybean Production Technology Adoption by Farmers in Southern Borno, Nigeria. A Ph. D Thesis, Department of Agricultural Economics and Extension, University of Maiduguri.

Implementation Status Report on Fadama AF Niger state, (2017). Prepared for the 8th Joint World Bank/ FGN fadama III AF, Implementation status report mission on Niger state on 28th November – 2nd December 2017.

Niger State Official Website (2018). Niger state official website: Powered by Ministry of Educational Science and Technology Minna, Niger state. www.nigerstate.gov.ng

Nleum, F. E. (2013). Determinants of Adoption of Agricultural Green River Project Among Rural Households in Niger Delta, Nigeria. *Journal of Agricultural Science and Technology*, 2(2): 284-288

Noko, E. J. (2017). Impact of Agricultural sector on Nigerian Economic growth and development Appraisal Report, 2003.Republic of Nigeria, Fadama Development Project.

Ogunmefun, S. O., and Achike, A. I. (2015). Socioeconomic Characteristics of Rural Farmers and Problems Associated with the Use of Informal Insurance Measures in Odogbolu LGA, Ogun State, Nigeria. *RJOAS, 2(38), February, 2015*

Olaolu, M. O., Akinnaagbe, O. M., and Agber, T. (2013). Impact of National fadama Development Project phase II on Poverty and food security among Rice farmers' Beneficiaries in Kogi state, Nigeria. *American Journal of Research communication,* 1(10): 280-295.

Oyewole, S. O., and Ojeleye, O. A. (2015). Factors Influencing the Use of Improved Farm Practices Among Small- Scale Famers in Kano State of Nigeria. *Net Journal of Agricultural Science, 3(1): 1-4.*

World Bank (2008). World Development Report 2008: Agriculture for Development. The World Bank Washington, DC

World Bank (2017). Nigeria at-a-glance. The World Bank Report, IBRD-IDA.