



IMPACTS OF INTEGRATED AGRICULTURAL DEVELOPMENT PROJECT ON INCOME AND LIVELIHOODS OF RICE PRODUCERS IN LERE LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA

¹Mohammed, U., ²Waziri, A., ¹Baba, K. C. and ³Ahmad, B. S.

¹Department of Agricultural Economics and Extension Services,
Ibrahim Badamasi Babangida University, Lapai

²Department of Crop Production Ibrahim Badamasi Babangida University, Lapai

³National Cereals Research Institute Baddegi, Niger State.

Corresponding Author's E-mail: mohammedusman.usmanou@gmail.com

Tel.: 08035146337

ABSTRACT

The research was aimed at impacts of integrated agricultural development project on income and livelihoods of rice producers in Lere Local Government Area of Kaduna State, Nigeria. This study was carried out in five communities of Lere LGA of Kaduna State, Nigeria which were; Abadawa, Garu Mariri, Kayarda, Kudu and Dan Alhaji as participation communities in Integrated Agricultural Development Project. Multi-stage random sampling was used to choose 212 respondents. Face-to-face interviews with rice producers generated primary data, which was obtained using structured questionnaire. The socio-economic profile of the sampled respondents was determined using descriptive methods. The data obtained from objective i and iii was analyzed using descriptive statistics such as (frequency distribution, percentage mean) objective ii was achieved using Ordered Probit Model. The objective iv was achieved using the Kendall's coefficient of concordance (W). The outcome of the research appeared that most of the respondents were of active working group and the average age of the sample respondents was approximately 46 years while the average family size was 10. The findings of the study showed that 88.6% were married and educational mean was 9 years and almost 73.7% of sample respondents has access to credit. The results showed that the mean annual income of the respondents was ₦12,2875, indicating that majority of the rice producers in the study area had large annual income. The coefficient of training (110430.2) was positively significant at 1% level of probability, implying that access to training is expected to increase rice producers' income in the study area. The result also indicates that increase income and increase in quality and quantity of rice production were both ranked as 1st implying that introduction of IAD project has resulted into significant in income and increase in quality and quantity of rice in the study area. The results inadequate fund ($\bar{X} = 4.90$) ranked 1st as the most serious constraint faced by rice producers. It was recommended that credit facilities should be provided for the rice producers in the study area to enable then expand their farming activities.

Keywords: Impacts, Integrated, Agriculture, Rice, Livelihoods, Producers.

INTRODUCTION

Rice (*Oryza sativa*) is the most important food crop for half of human race (United State Agency for International Development [USAID], 2021). It is the world's most consumed cereal after wheat which shapes the lives of millions of people; more than half of the world's population depends on rice for 80% of the daily calories ingested (Braun, 2022). The world rice production is 691.6 million metric tons of paddy per year with global rice production increasingly considerable, since the sixties (FAOSTAT, 2021). More than 90 percent of the world rice production takes place in developed countries, mostly in Asia with China and India



being the two largest producers, while Latin America and Africa produce 3.8 and 2.8 percent respectively (FAOSTAT, 2021). There are three different types of rice: japonica, javanica, and indica. Japonica rice varieties are high yielding and tend to be resistant to disease. Javanica types of rice fall between japonica and indica varieties in terms of yield, use, and hardness. Although quite hardy, indica yield less than japonica types and are most often grown in the tropics, because cultivation is so widespread, development of four distinct types of ecosystems has occurred. They are commonly referred to as irrigated, rainfed lowland, upland, and flood-prone agroecological zones. Irrigated ecosystems are the primary type found in East Asia.

Irrigated ecosystems provide 75% of global rice production. Irrigated rice is grown in banded (embanked), paddy fields. Rainfed lowland ecosystems only sustain one crop per growing season and fields are flooded as much as 19.7 in (50 cm) during part of the season (USAID, 2021). In integrated agricultural development projects, farmers are linked to consumers' needs working closely with suppliers and processors to produce specific goods to meet consumer's demand. Similarly, through the flows of information and products, consumers are linked with needs of the farmers. Under this approach, and through continuous innovations, the return to farmers can be increased and livelihoods enhanced. It is against this background that the Kaduna state integrated agricultural development project was initiated by Federal Government of Nigeria and World Bank Development Project to address the constraints along rice production through an inclusive strategy of strengthening the capability of rice producers as well as public and private institutions, service providers and access to market (Magaji *et al.*, 2021). Although Kaduna State has a potential land area for the production of rice of about 2,045,506.18 million hectares of upland and 883,717.47 hectares of lowland only used for cultivation of rice. According to Magaji (2021), Kaduna State is one of the largest productions of rice in North West in Nigeria. Rice is presently one of the most staple food crops in Nigeria. Magaji (2021). It is grown mainly by small holder farmers and consumed by over 2.8 million people in Kaduna State, over.

There is an organization 7.3% Per capita increase annually in consumption of rice in Nigeria; a combination of various factors has triggered the structural increase in rice consumption. Increase population and urbanization among others appear to be the most important causes of the shift in the consumer preference towards rice in Nigeria. Compared to other cereals, rice is easy to prepare there by reducing the chore of food preparation and fitting more easily into the urban lifestyle for the rich and poor alike (Adeju *et al.*, 2020).

MATERIAL AND METHODS

Selection of the study area and sample

The research was carried out in five different communities in Lere Local Government area of Kaduna State. Both descriptive and analytical techniques were used for the study. The communities are: Abadawa, Garu Mariri, Kayarda, Kudaru and Dan Alhaji as participation communities in Integrated Agricultural Development Project.

Sampling Procedure and Sample Size

Multi-stage sampling technique was used for the study. The first stage involved random selection of Agricultural zones I in the State. At the second stage, one (1) Local Government Area (LGA) was randomly selected, this is due to the abundance of Rice production activities in Lere local government area of agricultural zone I. The third stage involved random selection of five (5) communities from the Local Government Areas (LGA). At the fourth stage, 15% of the Rice producers were randomly selected from the sampling frame of each community in all, a total of 212 respondents were selected from the LGA as the sample size for the study.



Table 1: Sample distribution of the respondents in the study area

Communities	Sample frame	Sample size (15%)
Abadawa	557	37.1
Garu Mariri	308	20.5
Kayarda	306	20.4
Kudaru	190	12.7
Dan Alhaji	140	9.3
Total	1000	100

Sources: Field survey, 2022

Method of Data collection and Analytical Techniques

Primary data was used for the study, the data were collected by researchers and trained enumerators using structured questionnaire complimented with interview schedule. The data obtained from objective I and III was analyzed using descriptive statistics such as (frequency distribution, percentage mean) objective II was achieved using Ordered Probit Model. While, objective IV was achieved using the Kendall's coefficient of concordance (W) adopted from Mohammed *et al.* (2020) was used to rank the problems. A lower mean rank indicates the problem is severe and vice versa. The Kendall's W was computed as shown below.

$$W = \frac{12 \sum R^2 i - 3N(N-1)^2}{N(N-1)}$$

where:

W = Kendall's value,

N = total sample size,

R = mean of the rank. The Kendall's coefficient of concordance (W) is a measure of the extent of agreement or disagreement among farmers of the rankings obtained. The value of W is positive and ranges from zero to one where one denotes perfect agreement among farmers of the rankings and zero denotes maximum disagreement.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Results in Table 2 revealed that majority (81.2%) of rice producers in the study area were males. These findings showed that more males might be attributed to women involvement in processing, packaging, marketing and other post-handling activities in rice business. This finding is in line with Titus *et al.* (2021), who reported that larger percentage of rice farmers in Kaduna State, Nigeria were males. Similar findings by Aisha *et al.* (2021) indicated that majority of rice farmers in Katsina State, Nigeria were males. This finding may due to the fact that women are constraints in all aspect of production in Northern Nigeria due to unquantified social economic factors such as beliefs, norms, value and culture. (Aisha *et al.*, 2021).

Table 2 indicated that the mean age of rice producers in the study area was 46.1. This implies that rice producers in the study area were still in their active and productive age, strong, innovative and always ready to adopt new techniques that would enhance their income. This agreed with Sherif (2020) who reported that farmers in Kano State, Nigeria were within the age range of 30 years and 50 years are still agile and active in carrying out their farming activities.



Table 2: Socio-economic characteristic of rice producer

Variables	Freq (n =212)	
Sex		
Male	78(81.2)	
Female	22(39.8)	
Age		
<30	11(12.5)	Mean = 46.1
31-40	18(20.5)	
41-50	24(27.3)	
51-60	29(32.9)	
>60	6(6.8)	
Mean	46.1	
Marital status		
Married	78(88.6)	
Single	5(5.7)	
Widow	2(2.3)	
Widower	3(3.4)	
Divorced	0(0)	
Education status		
Primary	8(9.1)	Mean = 9 years
Secondary	24(27.3)	
Non-formal	56(63.6)	
Years spent in formal education		
1-6	8(9.1)	
7-12	24(27.3)	
>12	0(0)	
None	56(63.6)	
Mean	4	
Household size		
1-5	18(20.5)	
6-10	37(42.1)	
11-15	24(27.3)	
16-20	8(9.1)	
>20	1(1.1)	
Mean	10	

Sources: Field survey, 2022

Result in Table 2 also revealed that majority (88.6%) and (84.6%) of rice producers in the study area were married. These results indicated that larger proportions of rice producers were married which imply high level of responsibilities. However, family responsibilities can prompt farmers' interest in seeking for new knowledge and innovation in rice farming that will enhance farmers their income to enable them cater for their families. The finding is in agreement with Dakpo *et al.* (2020), who stressed that larger proportions of the rural farmers were married in Kwara State, Nigeria.

Table 2 further indicate that the mean years spent in formal education in the study area was 9 years. These findings indicated significant low literacy level in the study area. However, low literacy level is expected to influence rice farmers' income due inability to access information more quickly and inability to be more likely adventurous. This finding agreed with Dapo *et al.* (2020) who reported that level of awareness and adoption of agricultural innovation are affected by the literacy status of farmers



Table 2: Socio-economic characteristic of rice producer **Cont'd.**

Variables	Freq. (n=212)
Years in agricultural activities	
1-10	9(10.2)
11-20	7(7.9)
21-30	17(19.3)
31-40	31(35.2)
>40	24(27.3)
Mean	32
Access to extension	
Yes	82(93.2)
No	6(6.8)
Extension contacts	
1-5	82(93.2)
6-10	0(0)
>10	0(0)
None	6(6.8)
Mean	2.4
Income	
<100000	38(43.2)
101000-200000	49(55.7)
201000-300000	1(1.1)
301000-400000	0(0)
>400000	0(0)
Mean	122875
Access to credit	
Yes	65 (73.7)
No	23 (26.1)

Table 2 also indicated that the mean household size of rice producers in the study area was 10 persons. This result implies that rice farmers had moderate household sizes. However, moderate household size could negatively affect access to unpaid family labour and subsequently influence rice producers' income. The finding is in line with that of Aisha *et al.* (2021) who stated that majority of farmers in rural province of Sub-Saharan Africa had moderate household sizes. Also, a mean year in agricultural activities of rice producers in the study area was 32 years. The findings implied that rice producers had long time experienced and are well exposed in rice farming and this is expected to enhance their income and output level. This result is in consonance with Titus *et al.* (2021) who stated that the average rice farming experience of farmers was 25 years in Anambra State, Nigeria.

Table 2 showed that all the respondent 80% in the study area had access to extension services. The findings indicated that majority of rice producers had access to extension. However, access to extension services is expected to exposure rice producers to new innovation and techniques that will enhance rice producers' income. The mean annual income of rice producers in the study area was 122875 This finding agreed with that of Elisa (2021), who stressed that most of the farmers in River State, Nigeria were moderate income earners. Table 2 aslo indicated that majority 73.7% of rice producers in the study area had accessed to credit Access to credit is expected to grant rice producers access to inputs and also enable them to pay the percentage required of them before they can participate in Integrated Agricultural Development Project. This finding agreed with Baba *et al.* (2020) who reported that most of rural farmers in Kogi State, Nigeria accessed credit.



Effect of the IAD Project on the Income of Rice Producers in the Study Area

The result of the regression model showing the effect of the IAD project on the income of rice producers in the study area is presented in Table 3.

Table 3: Effect of the IAD project on the income of rice producers

Variable	Linear Coefficient t-value	Semi-log Coefficient t-value	Double log Coefficient t-value	Exponential Coefficient	t-value
Training	110430.2 3.31***	204280.8 2.73***	.4293385 2.99***	.2291289	3.56***
Cost of improved seed	8.354905 1.95**	31219.95 1.09	.0674837 1.23	.0000219	2.65***
Mou	100281.6 2.98***	220284.2 3.05***	.6039732 4.37***	.2882759	4.44***
Cost of fertilizer	-.3704738	-0.05 -10.04564 0.00***	-	-.0134106 0.11	2.58e-070.02
Expansion of land	7866.476 0.21	71708.29 0.90	.0609781 0.40	-.0317491	-0.43
Size of farm	17109.62 1.07	92881.96 1.77*	.2195577 2.18**	.044571	1.44
Duration of participation	31288.19 0.50	43343.21 0.42	.0866194 0.43	.084378	0.70
Cost of agro	89924.74 1.59	7730.548 0.08	-.1066706 -0.56	.0476508	0.44
Cost of mechanization	-68933.03 2.21**	-158436 2.38**	-.3501903 2.74***	-.1549342	-2.58**
Labour cost	-27184.53 0.81	-	-88759.65 1.12	-.1059362 0.70	-.0223241 -0.35
Constant	325166.9 1.53***	242739.5 0.38***	12.35242 10.00***	12.65566	30.85***
F-value	0.0000	0.0016	0.0000	0.0000	
R-square	0.4163	0.3132	0.3950	0.3894	
Adjusted R-square	0.3918	0.2885	0.2535	0.2476	

Sources: Field survey, 2022

The result (Table 3) of the multiple regression analysis showed R^2 value of 0.416 which implies that 42% variation in the effect of IAD project on the income of rice farmers in the study area was explained by the independent variables included in the model. Four functional forms (linear, exponential, double log and semi log) were tried. Linear function gave the best fit in the study area. The coefficient of training (110430.2) was positively significant at 1% level of probability, implying that access to training is expected to increase rice producers' income in the study area. This finding is in consonance with Titus *et al.* (2021) who reported that training of rice farmers should be given topmost priority to improve their skills on the adoption of improved rice packages in order to increase their productivity. The coefficient of cost of improved seed was negatively significant at 5% level of probability, implying that reduction in cost of improved seed will enable rice producers to purchase more and this is expected to have positive effect on their income. The coefficient of Mou was positively significant at 5% level of probability, implying that increase in memorandum of understanding is expected to have positive effect on rice producers' income. Also, the coefficient of cost of



mechanization was negatively significant at 5% level of probability, implying that reduction in cost of mechanization is expected to increase rice producers' income.

Benefits Derived by Rice Producers from IAD Project

Table 4 indicated that increase income and increase in quality and quantity of rice production were both ranked 1st, implying that introduction of IAD project has resulted into significant in income and increase in quality and quantity of rice in the study area. The findings agreed with Adewale *et al.* (2022), who reported that the most significant effects of any interventions programme are increased income and livelihood beneficiaries.

Table 4: Benefits derived by rice producers from IAD project

Variables	Lere LGA (n=212)		
	Mean (\bar{x})	Rank	Decision
Diversification of rice production	2.79	5 th	High
Expansion of new site	2.83	3 rd	High
Increase in the production of rice	2.83	3 rd	High
Increase in income	2.84	1 st	High
Reduction in post-harvest losses	2.76	7 th	High
Able to send children to school	2.31	9 th	High
There cordial relationship between the farmers	2.78	6 th	High
Increase in quality and quantity of rice production	2.84	1 st	High
The children have sponsorship in higher institution	2.26	10 th	High
Profit level of rice production have increase by 56%	2.60	8 th	High
Access to credit	1.05	11 th	Low
Extension services	1.03	12 th	Low
Gaining higher status	2.26	10 th	Low

Sources: Field survey, 2022

Also, in Table 4, expansion of new site and increase in the production of rice were both ranked 3rd implying that IAD programme as enable farmers to cultivate on more hectares and also increase their production. Further findings revealed that diversification of rice production was ranked 5th while their cordial relationship between the farmers was ranked 6th. Other benefits derived according to rice producers in the study area were reduction in post-harvest losses ranked 7th, profit level of rice production have increase by 56% ranked 8th, able to send children to school ranked 9th, gaining higher status ranked 10th, the children have sponsorship in higher institution ranked 10th, access to credit ranked 11th and extension services ranked 12th.

Constraints faced by Rice Producers

Table 5 showed that Kendall's coefficient of concordance obtained in the analysis was 0.319 and significant at 1% level of probability, suggesting that 31.9% of rice producers agreed on the outcome of the ranking. The situation in the study area revealed 51.4% level of probability. The finding in the study area showed a strong agreement on the outcome of ranking. Table 5, showed that thirteen constraints were identified as constraints faced by rice



producers. The results inadequate fund ($\bar{X} = 4.90$) ranked 1st as the most serious constraint faced by rice producers. This was followed by poor credit facilities ($\bar{X} = 5.02$) ranked 2nd. Titus *et al.* (2021) reported that inadequate fund was the major constraints faced by rice producers in Jigawa State Nigeria. More so, high cost of farming equipments ($\bar{X} = 5.29$) was ranked 3rd while flood ($\bar{X} = 5.76$), weed ($\bar{X} = 5.80$) and problems of farm inputs ($\bar{X} = 6.35$) were ranked 4th, 5th and 6th respectively.

Table 5: Constraints faced by rice producers

Variables	Lere (n=212) Mean (\bar{x})	Ranking
Inadequate information about new innovation	6.37	7 th
Inadequate fund	4.90	1 st
Poor credit facilities	5.02	2 nd
High cost of farming equipments	5.29	3 rd
Long distance to the market	7.28	9 th
No cooperative societies	9.70	11 th
Inadequate extension contacts	9.73	12 th
Poor access to market center due to bad road	7.94	10 th
Conservation attitude of rice farmers towards adoption of innovation	6.76	8 th
Lack of technical know how	10.09	13 th
Problems of farm inputs	6.35	6 th
Weeds	5.80	5 th
Flood	5.76	4 th
Kendall's W ^a	0.319	
Chi-Square	784.220	
Degree	12	
Asymptotic significant	0.000***	

Sources: Field survey, 2022

The results of Table 5 agreed with Titus *et al.* (2021) who reported that flood and high cost of farming inputs were one of the major constraints faced by rice producers in Jigawa State, Nigeria. Moreover, inadequate information about new innovation ($\bar{X} = 6.37$) ranked 7th, conservation attitude of rice farmers towards adoption of innovation ($\bar{X} = 6.76$) ranked 8th. Other constraints faced by rice producers in the study area were long distance to the market ($\bar{X} = 7.28$), poor access to market center due to bad road $\bar{X} = 7.94$, co cooperative societies ($\bar{X} = 9.70$) and lack of technical know-how ($\bar{X} = 10.1$) ranked 9th, 10th, 11th, 12th and 13th, respectively.

CONCLUSION AND RECCOMENDATIONS

Based on the findings of these research it can be concluded majority of rice producers were male and in their active age. Also, majority of rice producers were in their active age and married. The literacy level of rice producers in the study area was low. Moreover, majority of the rice producers had moderate household size with high experience in rice farming. Further findings revealed that majority of the rice producers had access to extension services and of moderate-income earners. The findings furthered showed that more than half of rice producers



accessed credit. Further findings showed that the coefficient of training, cost of improved seed, Mou and cost of mechanization had significant effect on income of rice producers. Findings furthered showed that increase income and increase in quality and quantity of rice production were both ranked 1st and expansion of new site and increase in the production of rice were both ranked 3rd. The most constraints faced by rice producers in the study area were inadequate fund ($\bar{X} = 4.90$) ranked 1st, poor credit facilities ($\bar{X} = 5.02$) ranked 2nd and cost of farming equipment ($\bar{X} = 5.29$) ranked 3rd, it was recommended that credit facilities should be provided for the rice producers in the study area to enable them expand their farming activities.

REFERENCES

- Adeju, Y. L., Gwary, M. M. & Ibrahim, A. (2020). Determinants of adoption of rice/cassava farming technologies in Mubi North Local Government Area of Adamawa State Nigeria. *An International Journal of Agricultural Research*, 1(4).
- Adewale, A.A., Adekanye, T.A., Adewunmi, D.A & Ashamu F. F (2022). Assessment of Rice Processing Operations in Ekiti State, Nigeria, *International Journal of Civil Engineering and Technology (IJCET)*, 1(3).
- Aisha, F. N. & Osahon, E. E. (2021). Socio-economic determinants of adoption of improved rice technology by farmers in Ayamelum local government area of Anambra State, Nigeria. *International Journal of Scientific and Technology Research*, 1(2).
- Baba, V. B., Jonathan, A. and Lawal, H. (2020). Structural Analysis of Paddy Rice Markets in Southern Part of Taraba State, Nigeria. *Journal of Agriculture and Social Sciences*, 1(1).
- Braun, N. E. (2022). Intermarket Performance and Pricing Efficiency of Imported Rice Marketing in South – South Nigeria: A Case of Akwa Ibom State Traders. *Science and Education Centre of North America*, 3(2).
- Dapo, M. F., Babatunde, R. O., Ayinde O. E., and Adeoti E. I. (2020). Determinants of Poverty Among Local Rice Processors in Kwara State, Nigeria, *Trakia Journal of Science and technology* 2 (5).
- Food and Agriculture Organization Statistics (FAOSTAT), (2021). FAO Statistical Bulletin Rome, pp 16- 21.
- Magaji, S. J., Idoko, D. and Shaibu, U. M. (2021). Economic Assessment of Rice Processing In Bassa Local Government Area Of Kogi State, Nigeria, *Asian Journal of Basic and Applied Sciences* 3 (1).
- Mohammed, S. C., Rabiul, I. & Zahurul, A. (2020). Constraints to the development of small and medium scale enterprises in Bangladesh: An empirical investigation. *Australian Journal of Basic and Applied Sciences*, 5(2).
- Shariff, J. B. (2020). Economic analysis of fish farmers in Osun State, South-Western Nigeria. Paper presented at the 20th Annual Conference of International Institute of Fisheries Economics and Trade (ITFET) held at University of Dar es Salaam, Tanzania, August 20-23, 2020.
- Titus, A. A & A. Gbado (2021). Appropriate rice machinery and processing technologies; small scale option for Nigeria's self-sufficiency in rice production. Nigeria rice memorabilia, project synergy limited. Regent printing and publishing limited Abuja.
- United State Agency for International Development (USAID) (2021). Research and Development Progress Report. Washington D.C., USA.