Socio-Economic and Farm-Level Characteristics Influencing Adoption of Rice Production Technologies in Lavun Local Government Area of Niger State, Nigeria.

Umar[1*], S. L. Iliyasu[1], A.Y., Ndanitsa[1], M. A. and Ibrahim[1], M.

[1]Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Niger State
[2]Department of Agricultural Economics and Extension, Faculty of Agriculture, Federal University Dutse, Jigawa State
*Corresponding Author: umarsheshi@gmail.com

ABSTRACT

The study analyzed the socio-economic and farm level characteristics influencing adoption of rice production technologies in Lavun Local Government Area of Niger state. A total of 76 respondents were randomly selected from 24 villages and data were collected using structured questionnaire. Descriptive statistics, adoption index and discriminate analysis were used in the data analysis. The results reveal that the mean age of the respondents was 38.70 years while the average farm size of the respondents was found to be 2.4 hectares. Also 40.78 percent of the respondents acquired one form of formal education or the other ranging from primary to tertiary education. Furthermore, more than half of the respondents (53.95 percent) were not members of any co-operative societies. Majority of the respondents (52.26 percent) were found to be medium adopters of new technologies. It is therefore suggested that an avenue should be provided for favorable price to farmers to increase their farm income to enable them adopt improved technologies, while special agricultural programmes should be organized on rotational basis to take care of less mobile farmers.

INTRODUCTION

Nigeria, with a substantial proportion of its population engaged in agriculture, the desire to promote domestic production of food and cash crops to satisfy its increasing population and growing industrial sector needs not to be over emphasized.

To attain the realization of this goal, small-scale farmers responsible for the bulk of the food produced cannot be ignored. These categories of farmers are willing to adopt new and appropriate technologies and techniques that will improve their productivity and put the nation on the path of self sufficiency.

However, the introductions of new technologies to small-scale farmers often ignore the influence of socio-economic characteristics of the farmers on the adoption of these technologies. This usually leads to the unfavorable consequence of outright rejection or low adoption rate of the technologies. The inadequate focus on the socio-economic characteristics is one of the major reasons for low output especially among small-scale rice farmers. The social, economic and cultural environment of the small scale farmers are generally acknowledged to be backward, difficult and characterized by high level of poverty, illiteracy, lack of social amenities, poor self concept and lack of motivation to change (Mahmood, 1997).

Presently, emphasis is placed on the use of improved technologies for increased rice production using the Agricultural Development Projects (ADPs) to procure large quantities of improved technologies which are passed on to small scale farmers for adoption. Incidentally, some small-scale farmers adopt the technologies while some do not. Much work has been done on the technology needs of farmers and how to facilitate technology adoption in Nigeria to achieve the desired goals. However, many of the technology programmes have failed to solve the problem of agricultural development. This failure could be traced to bad planning and implementation due to inadequate information on the socio-economic characteristics of farmers.

Socio-economic and farm level characteristics influencing adoption of rice production technologies have not been fully established in the study area. Therefore, a study needs to be carried out to provide information on socio- economic and farm level characteristics influencing adoption of improved rice production technologies in the area. The specific objectives are to determine the following:

i. Socio-economic and farm level characteristics of the respondents;
ii. Rate of adoption of improved rice production technologies in the study area;
iii. Influence of socio-economic characteristics on the adoption of rice production technologies.

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METHODOLOGY

Lavun Local Government Area is located in the Southern Guinea Savanna region of Nigeria. The area falls within Latitude 8° - 10° north of the Equator and Longitudes 3° - 8° east of the Greenwich Meridian. The study area experiences two distinct climatic seasons in a year (Wet and dry season). Rainfall is steady, evenly distributed, falling between mid April to November and a mean of 1000.00 mm per annum with its peak in August. Lowest temperature is recorded during the harmattan in the months of November to March. Average monthly temperature ranges from 23°C to 29°C. The vegetation consists mainly of short grasses, shrubs and scattered trees. The soils of the area are predominantly light and well drained. Major crops grown include rice, sugar cane, sorghum, pearl millet, maize, cowpea, yam and melon. Livestock reared include goat, sheep and cattle. (NSADP, 1994). Data for the study were obtained from a combination of primary and secondary sources.

Mainly the data were collected through primary source, however, secondary data was obtained from records and documents provided by the Niger State Agricultural Development Programme (NSADP). Additional secondary data came from official documents of the state Ministry of Agriculture and Natural Resources (MANR) as well as other publications on adoption of rice production technologies. The primary data were obtained from a cross-sectional survey of the farmers who are directly involved in rice production through the use of Structured Questionnaire. The sampling method was based on the existing Niger State Agricultural Development Programme activities. Rice production farmers were randomly selected from the two (2) extension blocks of the area. Four (4) cells were randomly selected from each block, three (3) villages from each cell and 4 farm families were selected from each village to give a total of seventy-six (76) selected rice farmers.

Descriptive statistics (Minimum, maximum, means, standard errors, frequency distribution and percentages) were used. Adoption index was employed to determine the rate of adoption of existing rice production technologies (Improved varieties, spacing practice, fertilizer, agro-chemicals, land preparation and milling technologies) in the study area. The adoption index of each farmer ranges from 1-6 depending on the number of proven practices or technologies adopted by the farmer. Based on the adoption index, farmers were classified into three categories: Low adopters (1-2 Technologies), Medium adopters (3-4 Technologies) and High adopters (5-6 Technologies).

Based on adopters' categories, discriminate analysis was carried out to determine which of the selected socio-economic and farm level characteristics helped to explain the variations in the rates of adoption. In essence, discriminate analysis was used to select from the variables, the ones that discriminate or account for differences between the three categories of adopters. In similar study, AESON (2004) used discriminate analysis to select the variables which best discriminate between effective extension agents and Ineffective extension agents. The discriminate analysis model used is:-

$$Z = a+b_1+x_1+b_2+x_2+ b_3+x_3+ b_4+x_4+ b_5+x_5+ b_6+x_6+ b_7+x_7+ b_8+x_8+ b_9+x_9 \quad (1)$$

Where Z = Adoption index
a = Constants
b_1-b_9 = Coefficients of discriminate variables
x_1 = Age (Yrs)
x_2 = Household size (No.)
x_3 = Farming experience (Yrs)
x_4 = Number of visits to market
x_5 = Estimated farm income (N)
x_6 = Farm size (Ha)
x_7 = Distance of residence to farm km.
x_8 = Distance of residence to market (Km)
x_9 = Number of rice farm.

RESULTS AND DISCUSSION

Socio-Economic and Farm Level Characteristics of Respondents.

Age of respondents.

The study revealed that the respondents' minimum, mean and maximum ages fitted into the three broad age groups (Young, Middle and Old). In an earlier study, Igben (1988), commenting on the personal characteristics of farmers, postulated that elderly farmers resist adoption of new innovations because they feared risk of their security or prestige. However, the maximum age of 67 years for respondents in the study area showed that elderly farmers were involved in rice production and technology adoption.

Farming experience of respondents

Table 1 indicates that the mean farming experience o the respondents was 23.60 years which shows that the have longer years of rice farming experience. Th respondents' longer years of experience in farming expected to affect adoption of technologies. This because experience is said to be the best teacher, and enables farmers learn to overcome the problem encountered in the previous adoption process.

Household size of respondents

From Table 1, it is evident that the maximum household size of the respondents in the area of study was 29, while the mean figure for the household size was 9. This means that most of the respondents had large household size. Household size determines the proportion of food crops grown and which a farmer may decide to grow using the adopted technologies. Another implication of large family size is that family expenditure may tend to draw more on family income which will eventually result to being left with only a meager sum saved and invested on adoption of improved technologies.

Frequency of visit to market per month by respondents

Findings, as revealed in Table 1, shows that three visits are the maximum number of visit to market outside the locality. This has implication for technology adoption because cosmopolitans exposes farmers to agricultural news and information; therefore, the higher the number of visits to markets outside the farmers' locality, the more likely he will be exposed to agricultural news and information not available within his locality.

Estimated farm income of respondents

The analysis of respondents' farm incomes reveals N11, 000, N200, 000 and N84, 385.93 as minimum, maximum and mean incomes, respectively. The mean incomes of ₦84.385.93 were attributed to high cash yielding characteristics of rice production. According to Mahmood (1997), farmers with higher incomes will find it easier to afford the cost of technology adoption than the low-income farmers.

Educational status of respondents

Moor (1997), revealed that the educational level of a farmer does not only increase his productivity but also raises his ability to understand and evaluate the information on new techniques of farming. This probably explains why all the 19.74 percent respondents (Table 2) who had tertiary education were found to belong to only high and medium adopter's category. Other important feature of educational status noticed in the study area is that the group of respondents who had either primary or those who never went to school at all belongs to the low adopters' category. Thus, this result therefore indicates that the higher the level of education of a farmer, the more enlighten he will be and is likely that they would adopt new innovations and be a successful user of the new technologies. This is likely, because of their exposure to sophisticated channels of farm information like the electronic and print media.

Group Dynamics

The results in Table 3 show that more than half of the respondents were not members of any cooperative societies and associations. The table also shows that only 27.63 percent of the respondents had full membership in cooperative societies and associations, while 18.42 percent had only part time membership. This situation may not be unconnected to lack of adequate awareness, publicity and absence of institutional support. Most of the cooperators noted that lack of assistance from relevant government agencies is adversely affecting their abilities to organize extension activities for their members. The importance of cooperative societies arises from the fact that the small-scale individual farm holdings of peasant production can no longer cope effectively with technological and capital demands of modern production. Poole (1994) reported that government of many developing countries, Nigeria inclusive, are unable to provide essential agricultural services such as extension services. However, this vacuum could be filled by specialized organizations like Non-Governmental Organizations (NGO's) and the Community Based Organizations (CBO's). This therefore makes it important to exploit the possibilities of involving other stakeholders in the agricultural sector such as farmers' cooperative societies into the extension delivery system.

Number of rice farms cultivated by respondents

Table 4 shows that the maximum number of rice farms cultivated in the study area was three. One important feature of note in the study area is the scattered and fragmented nature of farm holdings for those who have more than one farm. This scenario has serious consequences for mechanization most especially where these farm plots are far apart.

Farm size of respondents

Table 4 indicates that the mean farm size in the study area was 2.4 hectares which implies that majority of the respondents were in small scale farming. The lesson to be drawn here is that, a situation where a large percentage of farmers have access only to small pockets of land does not promote agricultural production beyond subsistence level

Distance of respondents' residence to farm

Table 4 reveals that the longest distance between the respondents' farms to their homes was 25 kilometers with mean distance of 7.6 kilometers. The above situation affects the transportation activities of the farmers. It will also affect the ease with which credit supervision or extension agents visit to the farmers' farm for assessment and complementary services which are required for a sustainable technology adoption. An added implication is that the closer the farms are to their homes, the more likely the efficiency in the use of technology will be achieved.

Distance of respondents' residence to market

The distance between farmers' residence to the nearest major village market in Table 4 recorded 13 kilometers as the longest distance between farmers' residence to market while no farmer's house was less than 0.2

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kilometer to market places. Low distance between place of residence and market places will reduce the cost of transportation and eventually promote the socio-economic advancement of the farmers.

Adoption of Rice Production Technologies

Table 5 shows that more than half of the respondents (55.26 percent) were medium adopters, 25 percent were low adopters and only 19.74 percent were high adopters. The result suggests that most of the rice farmers in the study area were medium adopters of rice production technologies and practices. This is attributable to the availability of new rice varieties; however some farmers are still skeptical in adopting such new innovations. Other reason for low adoption is inadequate supply and high cost of technological inputs such as fertilizer.

Influence of Respondents' Socio-Economic and Farm Level Characteristics on Adoption of Rice Production Technologies.

Findings, as indicated in Table 6, show that six socio-economic variables out of nine are considered significantly important for discriminating between the three categories of adopters. The six variables, in their order of importance, are farm income, farm size, number of rice farms, number of visits to market outside locality, distance of residence to market and farming experience.

A closer look at the variables shows that the first three discriminating variables (estimated farm income, farm size and number of rice farms) are directly related, while the last three variables (number of visits to market outside the locality, distance of residence to market and farming experience) are slighted related. Thus, it would not be too surprising that farmer with high incomes, large farm size and more number of rice farms were in the high adopters' category. This is likely, because of their relatively high number of visits to market outside their locality and the exposure of such farmers to greater understanding of existing technologies. In line with this, Mahmood (1997) stressed that farmers with high socio-economic status in terms of income, will be more willing to adopt new technology because they will accept higher risk than poor farmer. This finding is also in agreement with the report of Oladele *et al.* (1999) that socio-economic status, such as farming experience and cosmopolitans influence promotes the adoption of new technologies.

Table 1. Socio-economic characteristics of the respondent

Socio-economic characteristics	Minimum	Maximum	Mean	SE
Age	19	67	38.70	1.27
Farming Experience	4	59	23.6	1.44
Household size	2	29	9.00	0.72
Frequency of visits to market/month	1	3	1.00	0.615
Estimated annual farm income (N)	11, 000	200, 000	84, 385.93	422.93

Source: Field Survey, 2011

Table 2: Distribution of respondents according to education level

Education level	Frequency	Percentage
Never been to school	17	22.37
Quranic only	14	18.42
Primary	16	21.05
Secondary	12	15.78
Tertiary	7	9.22
Adult classes	10	13.16
Total	76	100.00

Source: Field Survey, 2011

Table 3: Distribution of respondents according to membership of association

Membership of association	Frequency	Percentage
No membership	41	53.95
Part time membership	14	18.42
Full time membership	21	27.63
Total	76	100.00

Source: Field Survey, 2011

Table 4: Farm level characteristics of the respondents.

Farm levels characteristics	Min.	Max.	Mean	SE
Number of rice farm	1	3	1	0.006
Farm size (ha)	0.6	5.2	2.40	0.160
Distance of farm to residence (km)	0.5	25	7.60	0.645
Distance of residence to nearest local market (km)	0.2	13	3.80	0.425

Source: Field Survey, 2011

Table 5: Adopters categories of the respondents

Adopter category	Adoption index range	Frequency	Percentage
Low adopters	1-2	19	25.00
Medium adopters	3-4	42	55.26
High adopters	5-6	15	19.74
Total		76	100.00

Source: Field Survey, 2011

Table 6: Estimated discriminant function for socio-economic characteristics of adopter categories of the respondents

Estimated parameters	Functions
Estimated farm income	0.576**
Farm size	0.466**
Number of rice farm	0.406*
Number of visits to outside markets	0.390*
Distance of residence to market	0.260*
Fanning experience	0.178*
Distance of farm to residence	-0385
Household size	0.043
Age	0.067
Group centeriods low adopter	-0.646
Group centeriods medium adopter	-6.54e -02
Group centeriods high adopter	0.971

Source:- field survey data 2011

* Significant at $p<0.05$

** Significant at $p<0.01$

CONCLUSION

Technologies are a key element in the modernization of agricultural production. However, available information from the study indicates that the adoption of rice production technologies has not been optimized in the area. The respondents were generally medium adopters with low socio-economic status in terms of educational level, farm size, among others. Estimated farm income, farm size, number of rice farms, number of visits to market outside locality, distance of residence to market and farming experience were some of the socio-economic and farm level characteristics influencing adoption of rice production technologies in the study area.

RECOMMENDATIONS

i. Farmers in the study area should be encouraged to form cooperative societies so that they can pool their resources together to increase their scale of operations. This will enable them to take advantage of large-scale production, enhance technology adoption and improve their accessibility to inputs and institutional credits. This could equally serve as a channel for disseminating relevant information.

ii. Enlightenment campaigns should be carried out in the area to educate both adopters and non-adopters alike on the numerous socio-economic benefits of adoption of improved production technologies.

iii. Stakeholders should provide an avenue for favorable price to farmers to increase their farm income to enable them adopt new technologies.

iv. Policies and plans should be put in place to remove socio-economic barriers such as land tenure that restrict the use of land for farming purposes.

v. Low literacy level should be addressed through provision of special literacy programme for farmers.

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