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

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The study examined the socio-economic and farm level characteristics influencing adoption of rice production technologies in Lavun Local Government Area of Niger State, Nigeria. A total of 76 farmers were randomly selected from 24 villages and data were collected using interview schedule. Descriptive statistics, adoption index and discriminate analysis were used to analyze data. The result revealed that the mean age of the respondents was 38.70 years, while the average farm size of the respondents was 2.4 hectares. Also, 40.78% of respondents acquired one form of formal education or the other ranging from primary to tertiary education. The result further showed that more than half of the respondents (53.95%) were not members of co-operative associations. Majority of respondents (52.26%) were medium adopters of existing technologies. The study also indicated that estimated farm income, farm size, number of rice farms cultivated, number of visit to market, distance of residence to market and farming experience discriminate between categories of adopters. It was therefore suggested that avenue should be provided for favourable price to farmers to increase their farm income to enable them adopt improved technologies, while special agricultural programmes should be organize on rotational basis to take care of less mobile farmers.

Keywords: Socio-economic characteristics, Adoption, Rice production technologies, Lavun Local Government Area

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1. Introduction

Nigeria's desire to promote domestic production of food and cash crops to satisfy its increasing population and growing industrial sector need not to be over emphasized (Hamidu, 2001). To attain the realization of this goal, small-scale farmers responsible for the bulk of the food production cannot be ignored. These categories of farmers are willing to adopt new appropriate technologies and techniques that will improve their productivity and put the nation on the path of self sufficiency (Olaleye et al., 2009).

However, the introduction of 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 unfavourable consequence of outright rejection, low adoption or reinvention of the technologies (Umar et al., 2009). The inadequate focus on the socio-economic characteristics is one of the major reasons for low output especially among small-scale rice farmers (Hamidu, 2001). 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 on the use of improved technologies for increase rice production using Agricultural Development Programmes (ADPs) to purchase large quantities of improved technologies which are sold to small scale farmers at reduced prices. 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 (Niger State Agricultural Development Project, 2002). However, socio-economic and farm level characteristics inf1uencing adoption of rice production technologies have not been fully established in the study area. In most cases, the policy makers assume definition of both problems and solutions on behalf of the clientele. Therefore, a study need to be carried out to provide information on socio- economic and farm level

characteristics inf1uencing adoption of improved rice production technologies in the area. The specific objectives are to:

i. describe socio-economic and farm level characteristics of the respondents;

ii.determine the rate of adoption of existing improved rice production technologies in the study area; and

iii.determine the influence of socio-economic characteristics on adoption of rice production technologies in the study area.

2. Materials and Methods

Lavun Local Government is located in the Southern Guinea Savanna ecological region of Nigeria. The area falls within Latitude 8° - l0°N and Longitudes 3 ° - 8° east. The study area experiences two distinct climate seasons in a year (rainy and dry seasons). Rainfall is steady and is evenly distributed falling usually between Mid April and November (1000 to I500mm annually) peaking in August. Lowest temperature is recorded during the November to March. Average monthly temperature ranges from 23°C to 29°*C.* The vegetation consists mainly of short grasses, shrubs and scattered trees. Soils are predominantly light and well drained. Major crops grown include rice, sugar cane, sorghum, millet, maize, cowpea, yam and melon. Livestock reared include goat, sheep and cattle. (Niger State Agricultural Development Project, 1994).

Data for the study were obtained from a combination of primary and secondary sources but mainly through the former. The later was obtained from records and documents provided by 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. Primary data were obtained through cross-sectional survey of farmers directly involved in rice production with the use of interview schedule. The sample design for the study was based on Niger State Agricultural Development Project activities in the area. In line with the above consideration, rice farmers were randomly selected from the 2 extension blocks in the area. From each block 4 extension cells were selected, at each extension cell 3 villages were selected and in each village 3 or 4 farming families were selected. In all, seventy-six rice farmers were selected.

Descriptive statistical tools of minimum, maximum, means and standard errors, frequency distribution and percentages were used to achieve objective 1. To achieve objective 2, adoption index was employed to determine rate of adoption of existing rice production technologies (improved varieties, spacing practice, fertilizer, agro-chemicals, tillage and milling technologies) in the study area. The adoption index of each farmer ranges from 1 to 6 depending upon the number of 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, discriminant analysis was carried out to determine which of the selected socio-economic and farm level characteristics helped to explain the variations in the rate of adoption. In essence discriminant analysis was used to select from available variables, the ones that discriminate or account for differences between the three categories of adopters (Objective three). In a similar study, Agricultural Extension Society of Nigeria (2004) used discriminant analysis to select the variables which discriminate between two groups of extension agents: effective extension agents and ineffective extension agents.

3. Results and Discussion

3.1 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 age. 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 as well as adoption of technologies (Table 1).

Farming experience of respondents:

Table 1 indicated that the mean farming experience of the respondents was 23.60 years which showed that the respondents had long years of rice farming experience. The respondents' long years of experience in farming is expected to affect adoption of technologies. This is because experience is said to be the best teacher, and it enables farmers learn to overcome problems 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 sizes. Household size determines the proportion of food crops, which a farmer may decide to grow using technologies.

Another implication of the large family size is that family expenditure may tend to draw more on family income so that only a meager sum is saved and invested eventually on adoption of improved technologies.

Respondent's frequency of visit to market per month:

Finding in Table 1 also revealed three visits as the maximum number of visit to market outside locality by the respondents, this has implication for technology adoption because cosmopolitans exposes farmers to agricultural news and information; therefore, the higher the number of visit to market outside locality, the more likely he or she will be expose to agricultural news and information not available within his locality.

Estimated farm income of respondents:

The analysis of respondents' farm income revealed ₦1l, 000, ₦200, 000 and ₦84, 385.93 as their minimum, maximum and mean income, respectively. The fairly high mean income of ₦84.385.93 was attributed to high cash yielding characteristics of rice. According to Mahmood (1997), farmer with higher income will find it easier to afford the cost of technologies than the low income farmer.

3.2 Educational status of respondents:

Moor (1981) 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 for farming. This probably explains why all the 19.74 % of respondents who had tertiary education were found to belong to only high and medium adopter's category (Table 2). Other important feature of educational status noticed in the study area was that group of respondents who had either primary or those who never went to school at all mostly belong to low adopters category. Thus, this result supports the postulation that the higher the level of education of a farmer, the more likely he or she would adopt new innovations and be a correct user of the technologies. This is likely, because of their exposure to sophisticated channels of farm information like television programmes and the printed materials.

3.3 Group dynamics:

The result in Table 3 showed that more than half of the respondents were not members of co-operative associations. The table also showed that only 27.63 percent of the respondents had full membership in 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 respondents noted that lack of assistance from relevant government agencies is adversely affecting their abilities to organize extension activities. 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. While lending credence to this assertion, Poole (1994) said that many developing countries, Nigeria inclusive, due to the economic adjustment, are unable to provide essential agricultural services such as extension services, but this vacuum however could be filled by specialized organizations like Non-Governmental Organizations (NGOs). 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.

Table 1. Socio-economic characteristics of the respondents

Socio-economic Characteristics	Minimum	Maximum	Mean	Standard error of mean
Age	19	67	38.70	1.27
Farming experience (year)	4	59	23.60	1.44
Household size	2	29	9.00	0.72
Frequency of visit to market per month	1	3	1.00	0.615
Estimated annual farm income (N)	11,000	200,000	84,385.93	5,422.93

Table 2. Education level of the respondents

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

Table 3: 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

Table 4. Farm level characteristics of the respondents.

Farm level characteristics	Minimum	Maximum	Mean	Standard Error of mean
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 markets (km)	0.2	13	3.80	0.425

Table 5 Adopters categories of the respondents

Adopters 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

3.4 Number of rice farms cultivated by respondents:

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

3.5 Farm size of respondents:

Table 4 indicated that the mean farm size of the respondents 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 fanners have access only to small pockets of land does not promote agricultural production beyond subsistence level.

3.6 Distance of respondents' residence to farm:

Table 4 also showed 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 supervisors or extension agents visit to farmers' farm for assessment and complementary services which are required for a sustainable technology adoption. An added implication is that the closer farm holdings are to their homes, the more likely the efficiency in the use of technology will be achieved.

3.7 Distance of respondents' residence to market:

The result of distance between farmers' residence to the nearest major village market in Table 4 revealed 13 kilometers as the farthest distance between farmers' residence to market while no farmer's house was less than 0.2 kilometer to market. This will ease the transportation of produce to market and reduce cost of transporting the produce and technological inputs.

3.8 Adoption of Rice Production Technologies:

Table 5 showed that more than half of the respondents (55.26%) were medium adopters, while one quarter (25.00%) of the respondents were low adopters. Only 19.74% were high adopters, the result suggests that most of the rice farmers in the study area were medium adopters of rice production technologies/practices existing in the area. This is attributable to newness of some rice varieties; as such some farmers were still skeptical in adopting them. Other reason for low adoption was inadequate supply and high cost of technological inputs such as fertilizer.

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

The result of the study indicated that six variables out of nine considered in this study were significantly important for discriminating between the three categories of adopters in the following order of importance: estimated farm income, farm size, number of rice farms, number of visits to market outside locality, distance of residence to market and farming experience (Table 6).

A closer look at the above variables showed 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) also seem to be related. Thus, it would not be too surprising that farmers with high incomes, large farm sizes 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 the locality and experience (knowledge) that

exposes 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) who stressed that socio-economic status, such as farming experience and cosmopolitans influence adoption of technology.

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	-0385ns
Household size	0.043ns
Age	0.067ns
Group centeriods low adopter	-0.646
Group centeriods medium adopter	-0.654
Group centeriods high adopter	0.971

* Significant at $p<0.05$
** Significant at $p<0.01$
Ns Not significant

4. Conclusion and Recommendations

Technologies are key element in the modernization of agricultural production. However, available information from the study indicated 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 cultivated, 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 that influenced adoption of rice production technologies in the study area.

It is important that detail studies be carried out in the study area to determine the causes of low involvement of farmers in cooperative societies and what could be done to improve their participation. Given the enormous socio-economic benefits of cooperative societies, farmers stand to gain a lot from group dynamics. 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 by improving their accessibility to improved inputs and institutional credits. This could equally serve as a channel for disseminating relevant information. 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.

From the viewpoint of this study, estimated farm income, farm size and number of rice farms cultivated seem to be important for adoption of technologies. The stakeholders should therefore provide an avenue for favourable price to farmers to increase their farm income to enable them adopt new technologies. 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. While low literacy level should be address through provision of special literacy programme for farmers.

Since frequency of visits to market outside locality and experience are important for adoption of technology as indicated by the result of the study, special agricultural programmes should be organize on rotational basis to take care of less mobile farmers. This can be done through agricultural fairs and exhibitions where agricultural products, inputs and implements could be display for farmers to see. In addition, it could afford them opportunity to meet farm input manufacturers and marketers to see, choose and purchase in bulk. It may also enable them to display and market their own products.

References

1. Agricultural Extension Society of Nigeria (2004). Research Methods in Agricultural Extension. In : Olowu, T.A. (eds). Ilorin, Agricultural and Rural Management Training Institute (ARMTI) Printing Press Nigeria. Pp: 227 - 236.

2. Hamidu, B. M . (2001). Economics of Resources Use in Small Scale Rice Farms (A case of Labour Utilization in Dass local Government Area Bauchi State) Unpublished Ph.d dissertation submitted to Agricultural Economic and Extension programme ATBU Bauchi Pp: 36-38.

3. lgben, M. S. (1988). The Nigeria farmers and Agricultural Institutions. An assessment of Nigerian Institute of Social and Economic Research (NISER) Ibadan. Pp:1-267.

4. Mahmood, Y. Y. (1997). Extension Communication of Agricultural Innovations Paper Presented at Bauchi State Agricultural Development Programme Extension Staff Training hand out held at Darazo Farm Training Center Nov 7 – 20th . Pp:1 - 28.

5. Moor, A. (1997). Education and Basic Needs; World Bank Staff Working Paper in Agricultural Credit and Production Efficiency; A Case Study NISER Monograph Series, 4 : 67.

6. Niger State Agricultural Development Project (1994). Impact Study Final Report Pp 1- 128.

7. Niger State Agricultural Development Project NSADP (2001). An insight into agricultural activities in Niger State, Minna. 2001 edition.

8. Oladele, J.O., Akinbile L. A and Adekoya, A.E. (J999). Social Science Research: Approaches, Techniques and Reporting . Ijebu-Ode, Shanu Books Publishers Nigeria Limited. Pp 1 - 141.

9. Olaleye, R. S., Umar, I. S. and Ndanista, M.A. (2009). Effect of dry season tomato farming on poverty alleviation among women farmers in Niger State, Nigeria. Journal of Agricultural Extension,13 (2) : 1-11.

10. Poole. N. (1994). Contracting Out Agricultural Public Services: The NGO Sector as an Alternative Delivery System. Development in Practice, 4 (2) : I - 6.

11. Umar, S. I. , Ndanitsa, M. A. and Olaleye, S. R. (2009). Adoption of Improved Rice Production Technologies among Youth Farmers in Gbako Local Government Area, Niger State. Journal of Agricultural Extension ,13 (1): 1-8.