Socio-Economic Determinants Of Adoption Of Improved Rice Technology By Farmers In Ayamelum Local Government Area Of Anambra State, Nigeria

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Abstract: The study investigated socio-economic determinants of adoption of improved rice technologies by farmers in Ayamelum Local Government Area by Anambra State, Nigeria. The specific objectives of the study were to: describe the socio-economic characteristics of rice farmers in the study area; identify the varieties of rice grown (local and improved); determine the level of adoption of improved rice varieties and identify the constraints that affected the adoption of improved rice varieties. Primary data were collected through structured questionnaire from 120 farmers who were selected with multi-stage random sampling technique. Analysis of data were carried out using frequency count percentages, mean scores and multiple regression analysis. Results showed that 80% of the framers were within the age range of 30 years and 50 years. Majority (57.5%) were female farmers, both male and female farmers (60.0%) were married, 75.0% were literate, 75.0% had household size of 1 to 10 people, 87.0% were small–scale farmers, 63.3% had between 6 to 15 years of farming experience. However, majority (73.3%) were members of Farmers' Association. Also, majority (93.3%) cultivated swamp rice and the improved MASS 240 rice which had highest level of mean adoption score of 3.13. The farmers were constrained in the adoption of the improved rice farming technologies by scarcity of inputs and paucity of fund. The test of the hypothesis of the study showed that age, gender, education, farm size, farming experience and membership of Farmers' Association were significant in the adoption of improved rice farming technologies. It was therefore recommended that the Farmers Association should be assisted by Extension Agents to access credit from financial institutions. Also, Extension Agents should increase activities in the study area to make information available to the clientele on improved rice production.

Key words: Socio-economic, Determinants, Adoption, Improved Rice, Technologies

Introduction

Rice (*Oryza sativa L*.) which belongs to the family *Poaceae* is a semi-aquatic plant, although there are few upland varieties. Rice probably originated in South-East Asia, but today it is widely grown in other parts of Asia; America and Africa. In Nigeria, rice is grown mainly in Abakaliki, Bende, Bida, Eha – Amufu, Idah, Ayamelum, Ibaji and Takum. Rice is an important component of food consumption pattern in Nigeria. It has emerged as one of the fastest growing agricultural subsector and has also moved from a ceremonial to staple food in many Nigerian homes within the last three decades. Audu *et. al*. opined that rice is the second largest crop produced in the world after wheat. This view is countered by Fashola *et. al*. who reported that rice is the fourth largest crop produced after sorghum, millet and maize. Nevertheless, the unprecedented increase in the price level of rice in March, 2008 affected the price of other commodities. This effect on the price of other commodities portrayed rice as the most important cereal in the World.

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Apparently, rice is the leading cereal crop of the South-east Asia which constitutes the highest population of the world. Statistically, over 65% of the World's output of rice comes from China, India, Bangladesh, Pakistan and the adjourning Island in the Pacific. Africa only accounts for about 22% of the World output of rice, out of this; Nigeria is the highest producing country. The production of rice in Nigeria is no longer the question but rather how to meet the growing demand, reduce import and be self-sufficient. However, the green revolution in the 1960's laid the foundation for the rapidly growing economies of Asia today. Nigeria is yet to attain the green revolution as such she depends mainly on importation of rice for consumption. Nigeria is by far the largest rice importer in West Africa with an average yearly import of 2.4 million metric tons which translates into one billion naira every day or over 356 billion naira annually. The only way to stem this importation tide and pave way towards self–sufficiency in rice production in Nigeria is the adoption of improved rice farming technologies. To date, farmers in Ayamelum are still planting non-improved rice varieties despite the availability of improved ones. The adoption of the improved varieties will not only boost rice production, reduce importation and generally lead to self-sufficiency in rice production. The thrust of the study therefore was to examine the socio-economic determinants of adoption of improved rice technology by farmers in Ayamelum Local Government Area of Anambra State, Nigeria. Specifically the study was designed to:

i. describe the socio-economic characteristics of rice farmers in the study area;
ii. identify the varieties of rice grown
iii. determine the level of adoption of improved rice varieties and ;
iv. identify the problems that affected the adoption of improved rice varieties.

Hypothesis of the study

There is no significant relationship between the respondents' socio-economic characteristics (age, gender, marital status, level of education, household size, farm size, farming experience and membership of farmers association) and adoption of improved rice varieties in the study area.

Methodology

The study was carried out in Ayamelum Local Government Area of Anambra State, Nigeria. The area was selected for the study because high proportion of the inhabitants are predominantly farmers and their primary source of livelihood is in rice production. The LGA lies between longitude 6^0 45^1 and 7^0 25^1 and latitude 6^0 21^1 and 6^0 65^1 and at altitude 213 meter above sea level [11]. The climate is tropical with two seasons: the wet and dry. It has five months of dry season (November to March) and substantial annual average temperature is 20^0C to 28^0C and 18^0C in the coldest month [12]. The vegetation is Guinea Savanna with loamy soil and soil PH ranging from 5 to 9.5. Major food crops produced in the area include yam, cassava, maize, Okro and melon. The topography is riverine which supports production of varieties of rice. However, cashew, mango and orange made up the fruit-tree crops while sheep, goat and poultry consist the important livestock farming. The study area is made up of (8) eight autonomous communities, namely: Omasi, Umueje, Ihite, Owuari, Igbakwu, Omor-Umerum, Umumbo and Anaku which is the Headquarters of the LGA. They are predominantly farmers. Multi-stage random technique was employed to select four (4) communities, Viz: Umumbo, Umerum, Igbakwu and Omor-Umerum from the eight (8) autonomous communities. The four (4) communities are the major producers of rice in the study area. From the communities, four (4) villages, namely: Ifite-Orah, Ukpanmaka, Isiokwe and Akanato were randomly selected. Finally, thirty (30) rice farmers were randomly selected from each village giving a sample size of one hundred and twenty (120) farmers who participated in the study. Data were collected with pre-tested structured questionnaire and the data generated were analyzed using descriptive statistics such as percentages, frequency distribution and mean. Inferential statistics such as multiple regression was used to test the hypothesis of the study. The implicit form of the model is given thus:

$Y = f(X_1 + X_2 + X_3 + X_4 \ldots\ldots\ldots X_n)$

Where:

Y = Adoption level of improved rice varieties

X_1 = Age of farmers in years

X_2 = Level of education in years

X_3 = Marital status

X_4 = Gender (dummy variable; 1 = male, 0 = female)

X_5 = Household size in numbers

X_6 = Farmers experience in years

X_7 = Farm size in hectare (ha)

X_8 = Membership of Farmers' Association (dummy variable; 1 = members, 0 = Non-members)

e = Error term

RESULTS AND DISCUSSION

Table 1: Distribution of the Farmers According to Socio-economic characteristics (n = 120)

Analysis of the socio-economic profile of the farmers is presented in Table 1. The entries showed that 40% of the farmers fell in the age category of 41 – 50 years, 33.3% were in the age range of 31 – 40 years, 11.6% were in 30 years of age or younger. This implied that about two – third (80.0%) of the farmers were within the age range of 30 years and 50 years which are still agile and active. The age distribution among rice farmers in this study tends to agree with Ekong that farmers in Nigeria are within the age bracket of 30 – 50 years. Gender indicated that majority (57.5%) of the farmers were female while 42.5% were male. This implied that many women rice farmers were likely to be reached and consequently, the spread of improved agricultural technology in farming would be evenly distributed between male and female farmers. Also, 60.0% were married while 21.7% single. This implied that married people were more in rice farming and this could be as a result of more responsibilities they were saddled with as married people who had the role for providing household needs of their families. Forty-five percent of the farmers had primary education, 30% attended secondary school, 13.3% had no formal education. It could be inferred that rice farmers in the study area were literates who could read and write. This could serve as an impetus in adopting improved rice technologies. According to Akinnagbe and Ajayi, education is an important factor influencing adoption of farm innovations. Data in Table 1 further indicated that 43.37% of the farmers indicated that 43.3% of the farmers had household size of 6 to 10 people, 31.7% had 1 to 5 people while 17.5% had 11 to 15 people. This implied that the farmers had a fairly large household which might serve as an insurance against short fall in supply of farm labour. Household size has a great role to play in family labour provision in agricultural sector. Majority (55.3%) of the farmers had farm size of 1.0 to 2.0 ha while 31.7% of them had 2.0 to 3.0 ha farm holding. The size of a farm is a strong determinant of the expected output yield [16]. Entries on farming experience showed that 33.3% of rice farmers had 11 to 15 years while 30.0% had between 6 to 10 years of experience. It therefore implied that the farmers were well experienced in rice farming. Majority (73.3%) of the farmers were found to be members of Farmers' Organization. It is expected that membership of farmers' organization would influence their adoption of improved rice technologies. Also, membership of a group might provide easy access to farm inputs for the farmers.

Table 2: Distribution of Rice Farmers According to Types of Rice Cultivated

Table 2 presents the types of rice cultivated by the farmers in the study area. Majority (93.3%) of the farmers cultivated swamp rice, 33.3% planted upland rice while 8.3% preferred inland rice. These findings implied that majority of the farmers that cultivated swamp rice might be to save cost of production. The farmers had no need for weeding, fertilizer application and other farm maintenance activities which required labour and capital. While upland and inland types of rice production did not require silvicultural activities.

Table 3: Distribution of Respondents According to Types of Improved Rice Cultivated

Entries in Table 3 showed the types of improved rice planted by the farmers. Majority (65.0%) adopted and planted MASS 240, 15.0% cultivated Ofoda while 10.0% planted Faro 48. Other improved varieties the farmers planted were negligible. Preference of cultivating MASS 240 of improved rice over other improved rice might be attributed to high yield, taste, market demand and pest/disease resistance. These indices according to Onumadu and Udemgba, influence farmers to adopt new farm technologies.

Table 4: Distribution of Respondents According to the Level of Adoption of Improved Rice Planted in the Area.

Table 4 shows that the levels of adoption of improved rice cultivated by farmers in the study area. The results showed that the respondents could be classified into two categories of high and low. Thus MASS 240 had mean score of 3.13, FARO 7 had 2.95 mean, FARO 11 scored mean of 2.75, FARO 8 scored 2.70 while FARO 48 had a mean score of 2.68. These fell under high level adoption. However, low level adoption included IR 20, OFODA, OSO, OSODI and IR 22, AGBEDE, GEB and GUYANA 79. The adducible reason for these results might be that majority of low level adopters recorded had not exploited the advantages of other improved rice species appropriately. Finding of this study is in agreement with the observation of Fakoya and Daramola that farmers adopt new farm technologies if well educated.

Table 5: Distribution of Respondents According to Constraints faced by Farmers in Adoption of Improved Rice Farming Technologies

Table 5 shows the various constraints faced by farmers in the adoption of improved rice farming technologies. Scarcity of inputs (37.5%) and paucity of fund (35.8%) respectively were the major constraints of the farmers, while (25.0% of the farmers identified dearth of information as another type of constraint. This finding is corroborated with the report of BBS which opined that fund is an important input in the adoption of some new farm technologies. Fakorede and Daramola however, observed that the use of relatively primitive tools for farm operations are time consuming and that lack of exposure to improved farm technologies is as a result of dearth of information.

Table 6: Regression Analysis of Socio-economic Determinants of Adoption of Improved Rice Farming Technologies

A Multiple regression analysis was used to determine the socio-economic factor that affects rice production. The linear functional form was chosen based on the explanatory power of the R_2, its conformity with the apriori expectation sign and magnitudes of expected coefficient as well as over all significance of the model (F – ratio). The coefficient for age (-1.800)***, Gender (-2.650)*** were negative and significant at 1.0% level of probability. This implies that any increase in the variables (age and Gender) would lead to a corresponding decrease in the adoption of improved rice farming techniques. This is because elderly people are more risk averters. Education is significant at 1.0%, but positively related to adoption of improved rice farming technology. This implies that the more educated rice farmers are, the higher the adoption of improved rice technologies. The result is desirable in the sense that according to Obasi the level of education of a farmer not only increases his farm productivity but also enhances his ability to understand and evaluate new production technologies. Subsequently, farm size is significant at 1.0% and positively related to adoption of improved rice technology. This result implies that the larger the farm cultivated by the rice farmer, the greater the adoption of the technology would be. This is consistent with apriori expectations. Farming experience is significant at 1.0% and positively related to adoption of improved rice farming technology. This implies the longer the years the farmer has spent in rice farming, the more would his adoption of rice farming technology. It has been noted that farmers would count a lot more on their farming experience for increased productivity. The result has some positive implications for increased rice productivity because according to Nwaru, as the number of years a farmer has spent in the farming business may give an indication of the practical knowledge he has acquired on how he can overcome certain inherent farm production and adoption problems. Membership of Farmers' Association is significant at 1.0% but positively related to adoption of improved rice farming technologies. This implies that as membership of respondents to Farmers' Association increases, access to acceptance of improved rice technology could allow a respondent gain access to greater economic opportunities.

CONCLUSION

Based on the finding, the following conclusions were drawn. Majority of the farmers were within the age range of 30 years and 50 years. Many were female farmers while majority of both female and male farmers were married and literate. Their household sizes were sizeable, farm size depicted that the farmers were small-holders and were experienced in rice farming. Majority of the rice farmers were members of Farmers' Association. Also, majority of the rice farmers cultivated swamp rice and the improved MASS 240 rice which also had highest level of mean adoption score. The farmers' constraints in the adoption of the improved rice farming technologies were scarcity of inputs and paucity of fund. The test of the hypothesis showed that age, gender, education, farm size, farming experience and membership to Farmers' Association were significant in the adoption of improved rice farming

technologies. It was recommended that the Farmers' Association should be assisted by Extension Agents to access credit from financial institutions.

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Table 1: Distribution of the Farmers According to Socio-economic characteristics (n = 120)

Variable	Frequency	Percentage
Age (years)		
Below 20	8	6.7
20 – 30	14	11.6
31 – 40	40	33.3
41 – 50	48	40.0
51 – 60	5	4.2
Above 60	5	4.2
Gender		
Male	51	42.5
Female	69	57.5
Marital status		
Married	72	60.0
Single	26	21.7
Separated	12	10.0
Divorced	10	8.3
Level of Education		
No formal education	16	13.3
Primary school	54	45.0
Secondary school	36	30.0
NCE/OND		5.0
HND/B. Sc		5.0
Postgraduate		1.7
Household size		
1 – 5	38	31.7
6 – 10	52	43.3
11 – 15	21	17.5
16 – 20	9	7.5
Farm size		
1.0 – 2.0	67	55.3
2.0 – 3.0	38	31.7
3.0 – 4.0	10	8.3
4.0 – 5.0	5	4.2
Farming experience		
1 – 5	14	11.7
6 – 10	36	30.0
11 – 15	40	33.3
16 – 20	18	15.0
Above 20	12	10.0
Membership of Farmers' Organization		
Yes	88	73.3
No	32	26.7

Source: Field Survey, 2012

Table 2: Distribution of Rice Farmers According to Types of Rice Cultivated

Types of Rice	Frequency	Percentage
Upland Rice	40	33.3
Swamp Rice	122	93.3
Inland Rice	10	8.3

Source: Field survey, 2012
*** Multiple Responses**

Table 3: Distribution of Respondents According to Types of Improved Rice Cultivated

Types of Improved Rice	Frequency	Percentage
FARO 48	12	10.0
OSO	5	4.2
IR 20	8	6.7
FARO 8	10	8.3
FARO 11	5	4.2
GEB 24	8	6.7
MASS 240	78	65.0
AGBEDE	25	20.8
GUYANA 79	4	3.3
OSODI	10	8.3
FARO 7	5	4.2
OFODA	18	15.0
IR 22	7	5.8

Source: Field Survey, 2012
*** Multiple Responses**

Table 4: Distribution of Respondents According to the Level of Adoption of Improved Rice Planted in the Area.

Improved Rice Planted	Strongly Agreed (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Total	Number of Respondents	Mean (X)	Level of Adoption
FARO 48	33 (4)	41 (3)	20 (2)	26 (1)	321	120	2.68	High
OSO	18 (4)	20 (3)	56 (2)	26 (1)	270	120	2.25	Low
IR 20	24 (4)	27 (3)	41 (2)	28 (1)	287	120	2.39	Low
FARO 8	33 (4)	39 (3)	27 (2)	21 (1)	324	120	2.70	High
FARO 11	31 (4)	46 (3)	25 (2)	18 (1)	330	120	2.75	High
GEB 24	15 (4)	18 (3)	51 (2)	36 (1)	252	120	2.10	Low
MASS 240	62 (4)	30 (3)	9 (2)	9 (1)	375	120	3.13	High
AGBEDE	13 (4)	21 (3)	61 (2)	25 (1)	262	120	2.18	Low
GUYANA 79	17 (4)	15 (3)	47 (2)	41 (1)	252	120	2.10	Low
OSODI	18 (4)	19 (3)	52 (2)	31 (1)	264	120	2.20	Low
FARO 7	41 (4)	45 (3)	21 (2)	13 (1)	354	120	2.95	High
OFODA	21 (4)	23 (3)	46 (2)	30 (1)	275	120	2.29	Low
IR 22	13 (4)	27 (3)	51 (2)	29 (1)	264	120	2.20	Low

Source: Field Survey, 2012

Table 5: Distribution of Respondents According to Constraints faced by Farmers in Adoption of Improved Rice Farming Technologies

Constraints Influencing Adoption	Frequency	Percentages
Scarcity of inputs	45	37.5
Paucity of fund	43	35.8
Practice is time consuming	21	17.5
Illiteracy among farmers	18	15.0
Dearth of information	30	25.0

Source: Field Survey, 2012
*** Multiple Responses**

Table 6: Regression Analysis of Socio-economic Determinants of Adoption of Improved Rice Farming Technologies

Variables	Linear	Exponential	Double Log	Semi Log
Constant	3.264	1.021	1.643	5.045
	(3.703)***	(3.255)***	(2.136)***	(2.452)**
X_1 Age	-0.0233	-0.00581	-264	-752
	(-1.800)***	(-1.716)**	(-1.247)	(-1.402)
X_2 Marital status	-.220	-0.0233	0.0642	-.271
	(-.268)	(-.112)	(-372)	(-.502)
X_3 Gender	-1.967	-0.36	-0.075	-3.431
	(-2.650)***	(-2.810)***	(-3.24)***	(-2.73)***
X_4 Education	-0.041315	-0.01747	174	323
	(2.618)***	(2.563)***	(2.371)***	(2.335)**
X_5 Household size	-0.00537	0.002512	-0.002346	0.0715
	(-0.213)	(0.309)	(.024)	(-0.427)
X_6 Farm size	0.94	8.216	0.167	7.475
	(2.431)***	(0.233)***	(3.76)***	(3.43)***
X_7 Farming experience	0.206	-0.006	0.084	-3.631
	(2.52)***	(-1.231)	(-2.64)**	(-2.83)
X_8 Membership of Farmers' Association	168	0.032	-0.033	-0.042
	(2.03)***	(1.53)	(-0.50)	(-0.061)
R_2	0.133	0.115	0.065	0.072
Adjusted R_2	0.073	0.064	0.038	0.055
F-Value	3.143***	3.004**	1.658**	2.064

Source: Field Survey, 2012
**** Significant at 10.0%***
***** Significant at 5.0%***
****** Significant at 1.0%***