

Factors Influencing Farmer's Participation in Agro-Forestry in Igabi Local Government Area, Kaduna State, Nigeria

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Abstract:-The study examined the factors influencing farmer's participation in agro-forestry practices in Igabi local government areas of Kaduna State. Random sampling method was used to select 100 agro-forestry farmers and structured questionnaire administered on them. Descriptive statistics, and Probit Regression Analysis, were used to analyze the data obtained. The result revealed that male (72.00%) dominated the agro-forestry farming enterprise; 96.00 % of the respondents are in their working age group of 21-60 years. The greatest percentage (71.00 %) were married. 41.00 % had tertiary education, while 13.00 % never attended school. Majority (90.00 %) of the respondents had farming as their primary occupation while the remaining 10.00 % had farming as their secondary occupation. The probit model shows that farmers status has a direct and significant ($p<0.1$) relationship with the probability of farmers willingness to participate in Agro- forestry practices in the study area while the land tenure system in the area had negative impact on farmers willingness to participate in agro forestry practices. The study therefore recommends that Government should consider making promulgations on land tenure arrangements that give farmers sense of belongings on lands (i.e. to own more lands of theirs), which have the potentials to make the farmers more willing to plant Agro- forestry trees in the area.

Keywords: - Factors, Farmers, Agroforestry Practices, Probit Regression, Participation

I. INTRODUCTION

Agro- forestry is a land use management system in which trees or shrubs are grown around or among crops or pasture lands (ICRAF, 2007). It combines shrubs and trees in agriculture and forestry technologies to create more diverse, productive, profitable, healthy, and ecologically sound and sustainable land use system. On the other hand, Agro- forestry is a collective name for all land use system and practice where woody perennial plants are deliberately grown on the same land management unit as agricultural (and) or animals, either in spatial mixture or in temporal sequence. There must be both ecological and economic interaction between the woody and non-woody component to qualify as Agro- forestry. Agro-forestry practices can be categorized in two broad main part: farm based and forest based. The farm based practices deals with tree planting on and around agricultural field, tree wood lots and commercial crop under shade trees or food crops inter-planted with commercial tree (Oni, 2015). The forest based practices involve agricultural practices associated with

forest where farmers collect food, fruit and gum. In this study, Agro- forestry is referred to as farm based practices. Agro-forestry trees therefore involve those trees planted in and within home garden, agricultural fields and commercial trees inter planted with food such as mango, citrus, as well as some nut bearing trees, such as walnuts. Agro- forestry trees do not only yield useful products but also play vital role as more permanent elements in the land, sustaining the capacity of the land to feed people.

Several studies have indicated that access to Agro-forestry fruit trees reduce impact of food shortage during the hunger periods of the year (Akinnifesi *et al.*, 2008; Mithofer, 2006.) An impact analysis in Western Nigeria indicated that Agro- forestry fruits can reduce vulnerability of rural households to income by 33 % (Mithofer, Waibel and Akinnifesi, 2006). Therefore, investment in Agro- forestry tree planting conservation and commercial constitute a safety-net during the period of famine, and provide income to women and children (Ramadhani, 2002). White and Robinson (2000) indicate that most female headed households tend to seek small-scale income generating activities like selling Agro- forestry fruits for raising cash. Agro- forestry also helps to address some of the complex and challenging environmental problems such as marginal economic of rural resources management, disruption of the soil hydrologic cycles, air quality problems, loss of rare and endangered ecosystem species and population system and field management, harvesting and post harvesting technology, economic analysis and market research (Akinnifesi *et al.*, 2008). Agro- forestry tree domestication is aimed at promoting the cultivation of indigenous trees with economic potential as new cash crops.

According to (Mercer, 2004) Agro- forestry practices require the integration of trees with crops and livestock, in most cases it is carried out through forestry related programs. In addition, there are important issues with respect to complexity of combining crop, livestock and trees in one system and the unclear economic return. More recent environmental concerns over water quality biodiversity and climate change and the desire for income diversification among farmers and forest land owners, led to more interest in Agro- forestry practices such as riparian buffers alley

cropping, silvo pasture and forest farming (High and Jacobson, 2005). The aim of this study is to evaluate the factors influencing farmers participation in Agro- forestry practices in Igabi Local Government, Kaduna State.

II. MATERIALS AND METHODS

A. Study Area

The study was conducted in Igabi Local Government Areas of Kaduna state. Igabi is one of the four local government areas which constitute Kaduna metropolitan city, an important commercial and administrative centre in Northern Nigeria and comprises of different sets of people with diversified socio-cultural characteristics. Igabi local government is located in Guinea savannah of Nigeria on latitude $10^{\circ} 32^{\circ}$ and $7^{\circ} 17^{\circ}$ E. The headquarter of Igabi Local Government Area is Turunku. The population of Igabi local government area according to 2006 population census was estimated at 570,000 people (NPC, 2006). Annual rainfall is between 250mm-1000mm and usually begins early May and ends in October and the dry season is between October-April. The major crops produced in the area are cowpea, yam, cassava, maize, millet, guinea corn and cocoyam. The social set up of the place attributes to the natural resources found in the area e.g. forest, granite and timber etc. The Agro- forestry trees that exist in this study area include *Gliricidia sepium*, *Leucaena leucocephala* and other tree species.

B. Sampling Techniques and Frame

Multi stage sampling technique was employed in this study. In the first stage Igabi local government area was purposively selected out of twenty three local government areas in Kaduna state because of the preponderance of Agro-forestry in the study. At the second stage, five (5) villages which include Sabon Afaka, Rigasa, Sabon-Birin, Rigachikun Turunku were also purposively selected from the local government area due to existence of Agro- forestry practices in these areas. The final stage was random selection of thirty (30) respondents from Sabon Afaka, twenty (20) respondents from Rigasa, twenty (20) from Sabon Brini, fifteen (15) respondents from Rigachikun and another fifteen (15), respondents from Turunku due to the spatial population of the area. This gave the total number of one hundred respondents.

C. Data Collection

Data for this study was obtained from primary sources. The primary data was obtained through the use of structured questionnaire to gather information on the socio-economic characteristics such as age, sex, level of education, household size etc. Other information that was gathered from the respondents include the factors influencing farmer's participation in Agro- forestry (availability of plant materials, extension contact, land ownership etc.).

D. Data Analysis

Data obtained were analysed using simple descriptive statistics such as frequency distribution,

percentages and mean in addition with binary probit regression model.

1). *Probit Model* : Probit model was employed to analyze the factors influencing the farmers' participation in Agro-forestry trees. The dependent variable here was the farmers' participation to plant while the factors influencing their participation to plant Agro- forestry trees were the independent variables. Here, the dependent variable takes on the value of one (1) if the farmer is willing to plant Agro-forestry trees ($Y=1$), and 0 otherwise i.e. if the farmer was not willing to plant Agro- forestry trees ($Y=0$).

$$Y_i = 1 = X_i'\beta_i + e_i,$$

The explicit form of the model is

$$\Pr(Y=1) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + e.$$

Where;

Y = conditional probability with 1 as farmers willing to engage in Agro- forestry practice, 0 if otherwise.

β_0 = intercept

$\beta_1 - \beta_8$ = coefficients of independent variables.

e = stochastic error term.

The hypothesized factors influencing the farmers' participation to engage in Agro- forestry practice include;

X1 = Age of Farmer (in years)

X2 = Gender of Household head (1 if male, 0 if otherwise)

X3 = Education level (years in schooling)

X4 = Availability of planting materials (1 if available, 0 otherwise)

X5 = Extension Contact (Number of visit (s) per annum)

X6 = Farm distance to farmer's residential areas (in kilometer)

X7 = Farming status (1 if farming is primary occupation, 0 otherwise)

X8 = Land ownership (1 if farmer owns land, 0 otherwise)

III. RESULTS AND DISCUSSION

E. Socio – Economic Characteristics of Respondents

The results of the socio – economic characteristics of the respondents is shown on Table 1. The result shows that male (72.00 %) dominated the practice of agro forestry farming in the study area. The result also revealed that majority (70.00 %) of the respondents are between 31 – 50 years old. The modal age was forty five (45) years which shows that most of the

respondents were 45 years.. This agrees with the study of Kolade (2007) that found out that Ondo State cocoa farmers were of average age of 40 years. This positively influences the decision of the respondents to practicing Agro- forestry. Table1 also showed that 41.00 % of respondents had tertiary education .This contradicts the finding of Nwaru and Onuoha (2010) that a greater percentage of smallholder food crop farmers Imo state, Nigeria, only attempted secondary school or its equivalent with average years of schooling of about 10 years and also contradicts the findings of Ogundari (2008) that rain fed rice farmers in Nigeria had the average age of schooling of 10 years. This suggests that majority of the agro forestry farmers in the study area were at least lettered (they could read and write). 71.00 % Of the farmers were married while 28.00 % were single. This shows that majority of the farmers are married with about 83.00 % of the having a family size that is 6 people and above with most of then having good years of experience i agro forestry practices.

F. Type of Agro Forestry Practices

Table 2 shows the various type of agro forestry practices carried out by the respondent in the study area. 28.00 % of the respondent practice approved tungya system, 23.00 % does mulching with agro- forestry species, 19.00 % adopts planting and retaining of trees with arable crops, 12.00 % of the farmers retained trees on their farm land 10.00 % of the respondent practice alley farming..

G. Availability of Agro forestry Planting Materials

Table 3 shows the result of availability of Agro-forestry planting materials to respondents. 80.00 % of the respondent have access to agro forestry planting materials while 20.00 %) rdo not have access to agro forestry planting material.

H. Extension Contact

Table 4 shows the visit of extension workers within the last one year to respondents. 27.00 % of the respondents were visited in the last one year while 73.00 % of the respondents were not visited in the last one year

I. Respondent Farm Distance

The result of the farm distance to farmers resident in Table 5 revealed that 60.00 % of the farmers have their farms located 1-10 km away from their homes, 18.00 % are 11- 20 km away from their home, 12.00 % are 21-30 km while 10.00 % have their farms 31-40 km away from their resident

J. Farming Status

Table 6 shows the farming status of the respondents. 90.00 % of the respondents occupation are primarily farming while 10.00 % of them engaged in farming as a secondary occupation.

Table 1: Socio-Economic Characteristics of the Agro Forest Farmers

Socio-Economic Variables	Frequency N = 100	Percentage (%)
Sex		
Male	72	72.00
Female	28	28.00
Age		
21-30 years	18	18.00
31-40 years	40	40.00
41-50 years	30	30.00
Above 60 years	4	04.00
Level of Education		
No Formal Education	13	13.00
Primary	14	14.00
Secondary	32	32.00
Tertiary	41	41.00
Marital Status		
Single	29	29.00
Married	71	71.00
Household size		
1-5	17	17.00
6-10	39	39.00
11-15	12	12.00
Above 15	32	32.00
Years of Experience		
1-5	48	48.00
6-10	26	26.00
> 10	26	26.00

Table 2: Distribution of Respondents based on Type of Agro- Forestry Practices

Agro- forestry practices	Frequency	Percentage
Approved tungya system	28	28.00
Retaining trees on farm land	12	12.00
Mulching with agro-forestry species	23	23.00
Alley farming	10	10.00
Planting and retaining of trees with planting of arable crops	19	19.00
Total	100	100.00

Source: Field Survey 2018

Table 3: Distribution of Respondent based on Availability of Agro- Forestry Material

Availability of Material	Frequency	Percentage %
Yes	80	80.00
No	20	20.00
Total	100	100.00

Source: Field Survey 2018

Table 4: Distribution of Respondent based on Extension Contact.

Extension contact last farm year	Frequency	Percentage %
Yes	27	27.00
No	73	73.00
Total	100	100.00

Source: Field Survey 2018

Table 5: Distribution of Respondent Based on Farm Distance

Distance to residential area(km)	Frequency	Percentage %
1-10 km	60	60.00
11-20km	18	18.00
31-40km	10	10.00
Total	100	100.00

Source: Field Survey 2018

Table 6: Distribution of Respondents based on Farming Status

Farming Status	Frequency	Percentage %
Primary	90	90.00
Secondary	9	9.1
Total	100	100.00

Source: Field Survey 2018

K. Land Tenure System in Association with Agro- forestry Tree Planting

Land tenure is the method by which individuals or groups acquire, hold, transfer or transmit property rights in land (Ogundari, 2008). Such property rights may include rights to use, cultivate, transfer, build, alienate and so on. It is the body of rules and practices that regulate peoples’ rights and obligations in relation to land, including any conditions and time limits to the use of land resources (Usman, 2003). Table 7 shows the land tenure system practiced by the farmers in association to Agro- forestry tree planting. 47.00 % of the respondent inherited land for their Agro- forestry practice, 25.00 % rented the farm land, 21.00 % purchased their farm land while 7.00 % got their farm as a gift. This shows that within the study area most of people rely and use inherited land tenure system to practice agro forestry followed by those that rented their fland and those that bought their farm land.

L. Factors Influencing Farmer’s Participation in Agro- forestry Practices

The result of the probit regression model in Table 8 indicates that different factors (education, farm distance to Farmers’ residents, farming status, and land ownership) influence farmers’ willingness to participate in Agro- forestry practice in the study area. The likelihood ratio statistics as indicated by χ^2 statistics are highly significant ($P < 0.10$), suggesting the model has a strong explanatory power. The other factors aside famer’s status showed negative coefficient and were not significant at 10%.The result shows that farmers status has a direct and significant ($p < 0.1$) relationship with the probability of farmers willingness to participate in Agro- forestry practices in the study area. This implies that farmer choosing farming as primary occupation there is more likelihood to engage in Agro- forestry practice in the study area. This is because it is those whose primary occupation is farming that should adopt Agro- forestry practice within the study area. Furthermore $\text{prob} > \chi^2$ shows the level of significance , $\text{pseudo } R^2 = 0.0871$ this shows that 8.71% of the variability in the model can be explained by independent variables (this is similar to R^2 coefficient or variability in OLS regression). This agrees with the findings of Akinwalere in 2016 which shows that 92% of farmers whose major occupation is farming easily adopts Agro- forestry practice

Table 7: Land Tenure System in Association with Agro- Forestry Tree Planting

land tenure system	Frequency	Percentage %
Inheritance	47	47.00
Gift	7	07.00
Purchasing	21	21.00
renting/lease	25	25.00
Total	100	100.00

Source: Field Survey, 2018

Table8: Factors Influencing Farmer’s Participation in Agro Forestry Practices

Variable	Coefficient	Standard Error	Z-Ratio	P> z
Age of farmer	-0.0027	0.1975	-0.14	0.888
Gender	-0.1940	0.3833	0.51	0.613
Education	-0.0531	0.3512	-1.51	0.130
Availability of farming material	-0.7523	0.5080	-1.48	0.139
Extension contact	-0.3551	0.4005	0.89	0.375
Farm distance	-0.0040	0.1923	0.21	0.834
Farming status	1.2438	0.7171	1.73*	0.083
Land ownership	-0.2284	0.3842	-0.59	0.552
Constant	-1.4764	1.4861	0.99	0.320

Number of observation = 100, Log likelihood ratio $\chi^2(8) = 53.028^{**}$, $\text{Prob} > \chi^2 = 0.2570$, $\text{Pseudo } R^2 = 0.0871$ * stands for 10% significance level; Source: Computed from field data, 2018

IV. CONCLUSION

Based on the data analyzed, the studies found that majority (70.00 %) of the respondents were within 31-50 year's age bracket while the average age of the farmers was 40.22 years. Majority of the farmers (72.00 %) were male. The greatest percentage (71.00 %) were married. 41.00 % had tertiary education, while 13.00 % never attended school. Majority (90.00 %) of the respondents had farming as their primary occupation while the remaining 10.00 % had farming as their secondary occupation. The probit model shows that farmers status has a direct and significant ($p < 0.1$) relationship with the probability of farmers willingness to participate in Agro- forestry trees in the study area. This implies that one unit increase in the number of farmers whose primary occupation is farming will result in 1.2438 (12.43%) increase in the probability of being willing to engage in Agro- forestry in the study area. The study therefore recommends that Government should consider making promulgations on land tenure arrangements that give farmers sense of belongings on lands (i.e. to own more lands of theirs), which have the potentials to make the farmers more willing to plant Agro- forestry trees in the area.

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