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Determinants of the Decision to Plant Trees on Farmland among Rural Farmers in Ido Local Government Area of Oyo State

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Abstract
Tree planting plays an important role in improving the livelihoods of rural farmers, through soil enrichment, leading to improved crop productivity among the farmers. It also a substitute source for income generation to farmers. Consequent upon this, the study attempted to assess the factors that influenced the decision of rural farmers to engage in tree planting in Ido Local Government Area of Oyo State. A multi-stage sampling procedure was used to choose the respondents from the study area. Descriptive statistics including frequencies and percentages as well as inferential statistics such as Logistic Regression Analysis were applied in the study to analyze the collected data. It was revealed that some socioeconomic variables such as age, gender, farm size, education as well as the availability of planting materials significantly influenced the decision of rural farmers in the study area to embark on tree planting on their farmland. In addition, the study also revealed that several constraints were opposing the decision of the farmers to engage in tree planting in the study area. Some of the stated constraints by the farmers included lack of knowledge and required skills on tree planting, the long gestation period of trees, and insufficient land for tree planting, lack of planting materials among others.
Keywords: Logistic regression, gestation period, planting materials, multi-stage sampling, descriptive statistics

Introduction

Tree planting provides diverse range of essential non-timber forest products (NTFPs) apart from timber production, and other services for farmers (Shackelton *et al*. 2007). Many farmers endorse tree planting is an economically driven activity, providing a source of income. Farmers plant trees as cash crops to produce medicines, barks, poles, bark, pulpwood, fruits, timber etc. (Scherr *et al*. 2003). Fodder, wood and other NTFP's also make valuable contribution to domestic consumption. Planting of trees, especially multipurpose trees, has the capability to lift poor farmers and urban residents from poverty, if the potentials are properly harnessed. Trees provide various advantages such as materials and fuel wood for cooking, and can improve the nutritional stability of rural farmers. It can also serve as a source of income generation as well as job creation opportunities tailored for various age demographics, with a particular focus on empowering women, to bolster livelihoods of many rural neighborhoods (Zenebe *et al*., 2007: Birru *et al*., 2013; Tsegaye, 2015: Selamyihun, 2004; Tegegne *et al*., 2018).

Having recognized the significance of tree planting in the preservation of biodiversity and natural resources, Nigerian governments, both at federal and state levels as well as numerous organizations committed to environmental conservation have conducted awareness-raising campaigns, especially among rural farmers to encourage tree planting on their farms. Despite these campaigns and sensitizations, not many farmers have taken up the practice of tree planting. However, farmers' decision to engage in tree planting or not could be attributed to quite a number of factors. Some previously conducted research has revealed that certain variables such as household size, educational status age, membership in social groups, farm size, distance to market, income, labour and distance to the forest among others have a significant influence on the decision of farming households to engage in tree planting. This study therefore attempted to examine factors that informed the decision of farmers either to plant or not to plant trees as well as the factors militating against tree planting in Okun area of Kogi State, Nigeria.

Study Area

The study was conducted in Ido Local Government Area, Oyo State, situated at latitude 70 30" 24' N and

longitude 30 42" 43' E, with its administrative center in Ido town. Originally part of Akinyele Local Government, Ido covers an expanse of 986 km2 and harbors a population of 103,261 (NPC, 2006), encompassing areas like Apata, Ijokodo, Omi Adio, Akufo, and Apete. Its borders touch Oluyole, Ibarapa East, Akinyele, Ibadan South-West, and Ibadan North-West Local Governments within Oyo State, and Odeda Local Government in Ogun State. While transitioning into an urban center, Ido still retains agrarian area where crops flourish due to fertile soil, supporting farming as the primary occupation. Cash crops like cocoa, kola nut, palm oil, and timber thrive alongside staple foods such as maize and rice. Additionally, industrialization has left its mark on the area, evidenced by the presence of industries, including the recently established Ibadan terminus of the Nigerian Railway Corporation within Ido Local Government (Ayinde, 2021)

Sampling methodology and Data Collection Technique

This study utilized two-stage random sampling procedure. In the first stage, random selection was employed to select six communities from the fourteen (14) communities in the LGA (Adebisi *et al*, 2015). The second stage involved the random selection of thirty (30) farmers from every chosen community, a total of one hundred and eighty (180) participants were selected for the study. Nonetheless, only one hundred and seventy-four (174) questionnaire responses were obtained and subsequently analyzed. The data collection technique used include: questionnaires, focus group discussions, key informant interviews, and observational techniques. Utilizing Focus Group Discussion (FGD) and Key Informant Interview Techniques proved invaluable in gathering insights from various groups, supplementing the information gathered via questionnaires.

Method of Data Analysis

Inferential statistics and descriptive and inferential statistics were employed in the analysis of the data collected from the study area. Descriptive statistics encompassed frequency distribution and percentages, while inferential statistics utilized Binary Logistic Regression. The primary objective of this study was to ascertain the determinant factors of rural farmers' decisions regarding the adoption or non-adoption of tree planting. Consequently, the dependent variable was dichotomous, with values of 0 and 1, representing the decision to adopt or not adopt tree planting. Binary logistic regression was employed to assess the influence of independent variables on this dependent variable within the rural farming community. In the logit model, rural farmers who actively participated in tree planting or maintained existing trees on their farms were categorized as "adopters," assigned a value of 1. Conversely, those who did not engage in tree planting or did not maintain the existing trees were labeled as "non-adopters," receiving a value of 0.

According to Gujarati (2004), the functional form of the logit model is presented as follows:

$$Li = \ln\frac{Pi}{1-Pi} = \beta 0 + \beta 1X1 + \beta 2\ \ 2 + \beta 3X3 + \cdots + \beta nXn \ \ldots (1)$$

Where Pi = probability of adoption of tree planting (0 to 1)

L = Natural log of odds ratio or Logit

$$Zi = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \cdots + \beta nXn + e \ \ldots \ (2)$$

$\beta 0$ = Intercept

$\beta 1$- βn = Parameters

e = Error term

L= Adoption of Tree Planting

X_1 = Age of respondent (in years)

X_2 = Gender of respondents (1, if male; 0, if female)

X_3 = Household size

X_4 = Educational Status (0, if no formal education; 1, if educated)

X_5 = Farm size

X_6 = Land fertility (0, if the land is not fertile; 1, if otherwise)

X_7 = Access to Credit (0, if no access; 1, if otherwise)

X_8 = Access to extension services (0, if no access; 1, if otherwise)

X_9 = Availability of planting materials (0, if planting materials are not available; 1, if otherwise).

The above explanatory variables were selected based on prior investigation in the study area as well as information obtained from the literature.

Results and Discussion

Table 1 shows the socio-economic characteristics of rural farmers in the study area. It was observed that about 66% of the farmers who engaged in tree planting were between 40 and 59 years of age, while 68.42% of those who did not practice tree planting were within the same age range. Furthermore, about 75% of the tree-planting farmers had farm sizes ranging from 8ha and below while about 84% of the non-planters had equivalent land area. This, therefore, is in tandem with the study carried out by Idumah *et al.* (2021) where 72.68% of farming households that adopted agroforestry technology did not have more than 8ha of farmland and 83.81% of the non-adopter farming household had similar farm size. This suggests that most of the farming households in the research area operate on a small-scale. This is in line with the study by Ozowa (2005), where it was stated that farm households with less than 10ha of farmland are categorized as small-scale farmers. Following international standards measurement for farm sizes.

Factors Influencing Rural Farmers Decision to plant Trees on their Farmland

In Table 2, it was discovered that age influenced the farmers' decision to engage in tree planting on their farmland. According to the result, age has a significant but negative relationship with farmers' decision to embark on tree planting. This implies that the older a farmer becomes, the less likely his decision to engage in tree planting on his/her farmland. This may not be unconnected to the fact that the younger an individual, the more likely such is to take risks, as tree planting could also be regarded as risk-taking. The result are

consistent with the studies by Adesina *et al* (2001) and Ajayi *et al* (2006), indicating that the likelihood of adopting tree planting decreases as farmers' age increases and that age was significant in determining the decision of farmers to either continue with technology or not.

Findings also showed that the gender of the farmers was statistically significant at 5% level and influenced the decision of rural farmers to embark on tree planting. What this means is that male farmers had a higher tendency to engage in tree planting than female farmers in Ido LGA. The odd ratio value of 21.349 is an indication that male farmers are at least 21 times more likely to engage in tree planting than their female counterparts. This shows that gender is a significant factor in determining farmers' decision to embark on tree planting on their farmland in the study area. The lower level of tree planting among female farmers could be attributed to what Buyinza and Wambede (2008) described as a lack of control of women over land due to largely patrilineal inheritance systems in the Kabale District of Uganda.

The table additionally illustrates a strong relationship between education and farmers' decisions to plant trees on their farmland. Education has the potential to empower farmers by equipping them with the knowledge needed to make informed decisions and recognize agricultural opportunities that can benefit their families. This is because educated farmers are more knowledgeable on the right species to plant, the best quality of seedlings and the required method to plant trees.

In addition, educated farmers have a better understanding of the importance of tree planting and the need to conserve trees. This corroborates studies by Haglund *et al* (2011) and Muhammad *et al* (2011) the household head level of education has a positive effect on on-farm tree planting. Educated farmers tend to have greater income opportunities, enabling them to invest in expanding tree planting on their land. Additionally, there's a significant positive relationship between farm size and the decision to engage in tree planting. This suggests that as farm size increases, farmers are more likely to undertake tree planting, as they have ample land to accommodate both trees and traditional crops, maximizing their overall benefits.

The result also revealed that there was a positive and significant relationship between farmers' access to extension services and their decision to plant trees on their farmland. The odd ratio of 16.660 shows farmers who had access to extension services are about 17 times more likely to engage in tree planting than those who did not have access to extension services. This therefore affirms the findings by Adesina *et al.* (2001) and Basamba *et al*. (2016) that farmers with higher extension contact are more likely to adopt agroforestry technology. Furthermore, the availability of planting material, such as the needed tree seedlings, has a positive and significant relationship with farmers' decision to plant trees on their farmland. With the odd ratio of 13.979, it implies that farmers who had access to tree planting materials are about 14 times more likely to plant trees on their farmland than those who did not have planting materials available to them.

In the study, it was discovered that there were several constraints to the practice of tree planting by rural farmers in the study area. Some of these constraints, as stated by the farmers, were long gestation period of trees (ranked 2nd), lack of technical assistance, insufficient land for tree planting, illegal felling of trees, lack of planting materials, lack of knowledge and skills as well as competition among trees and arable crops on farmland (ranked 6th). Approximately 70% of respondents, regardless of the study's findings, of whether they planted trees or not, identified a lack of knowledge and necessary skills in tree planting as the primary barrier to adopting tree planting on their farmland, as depicted in Table 3. This further corroborates the study by Idumah *et al*. (2021), where lack of knowledge and required skills emerged as the top-ranking factor hindering the adoption of agroforestry technology among farming households. Furthermore, approximately 58% of respondents identified insufficient land as a constraint to integrating tree planting alongside their arable crops.

Conclusion

It can therefore be concluded from the study that several socioeconomic attributes of the farmers influenced their decision either to engage in tree planting on their farmland or not to participate in the planting of trees. In addition, several factors were given as constraints to the farmers' decision to plant trees on their farmland. Some of these included lack of knowledge and skills, long gestation periods of trees and insufficient land for tree planting, among others. Given these stated constraints, it is therefore recommended that training sessions facilitated by extension agents and subject matter specialists be conducted to educate farmers on how to make effective use of their land for both tree crops and arable crops. These sessions should focus on imparting the necessary skills for effective tree planting. This initiative will not only enhance soil fertility but also promote sustainable land use practices among farmers, particularly in rural areas.

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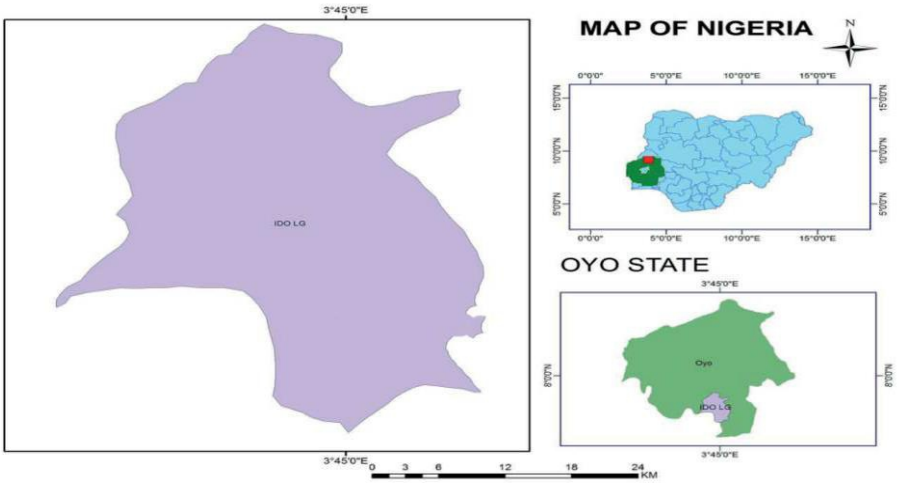

Figure 1: Map of Ido Local Government Area of Oyo State, Nigeria
Source: Olatunji *et al*. (2016)

Table 1: Socio-economic Characteristics of Respondents

Variable	Tree Planters(N=79) Frequency	Percentage	Non-planters(N=95) Frequency	Percentage
Age (Years)				
≤ 39	04	5.06	8	8.42
40-49	15	18.99	28	29.47
50-59	37	46.84	37	38.95
60-69	17	21.52	17	17.89
>70	6	7.59	05	5.26
Gender				
Male	71	89.87	81	85.26
Female	08	10.13	14	14.74
Educational Status				
No Formal	07	8.86	07	7.37
Primary	5	6.33	12	12.63
Secondary	31	39.24	31	32.63
Tertiary	26	32.91	36	37.89
Vocational	10	12.66	9	9.47
Farm Size (Ha)				
≤2	17	21.52	22	23.16
2.1 – 5.0	30	37.97	50	52.63
5.1 – 8.0	12	15.19	8	8.42
≥8.1	20	25.32	15	15.79
Household Size				
≤ 5	20	25.32	32	33.68
6-10	48	60.76	57	60.00
11-15	10	12.66	05	5.26
≥16	01	1.27	01	1.05
Farming Experience Years)				
≤ 10	04	5.06	08	8.42
11-20	34	35.79	46	48.42
21-30	20	25.32	23	24.21
≥31	21	26.58	18	18.95

Source: Field Survey, 2022

Table 2: Logistic Regression Result of Factors Influencing Tree Planting Decision among Rural Farmers in Ido LGA

Variable	Coefficient	Odd Ratio	Significance
Age	-2.012	7.478	*0.023
Gender	3.061	21.349	*0.033
Household size	-2.234	9.337	0.089
Educational Status	1.434	4.195	*0.001
Farm Size	-1.233	3.432	*0.042
Land Fertility	1.125	3.080	0.082
Access to Credit	2.044	7.721	0.064
Access to Extension Services	2.813	16.660	*0.003
Availability of planting materials	2.571	13.979	*0.044

****Significant at 5%***

Table 3: Constraints to Tree Planting among Rural Farmers in Ido LGA, Oyo State

Constraint	*Frequency	Percentage	Rank
Lack of knowledge and skills	121	69.54	1ST
Competition among trees and arable crops on farmland	81	46.55	6TH
Lack of planting materials	86	49.43	4TH
Illegal felling of trees	78	44.83	7TH
Lack of technical assistance	83	47.70	5TH
The long gestation period of trees	106	60.92	2ND
Insufficient land for tree planting	101	58.05	3RD

****Multiple Responses; Source: Field Survey, 2022***