Pattern of Farm Land Use on Crop Diversification in Ido Local Government Area Oyo State, Nigeria

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ABSTRACT

The study examined the pattern of farmers land use on crop diversification in Ido Local Government Area of Oyo State. Multistage sampling technique was used to sample eighty (80) crop famers in the study area, with the aid of a well structured questionnaire and analysed using descriptive percentage, mean, frequency count and inferential statistic. The result showed that 73.8% of the crop farmers were male with mean age of 49.8 years, 83.7% were married with mean family size of 8 persons, and 43.8% of the farmers had one form of formal education, 60% used hired labour for their farm operation with minimum labour cost of ₦ 1000- ₦ 10000 on daily basis. 67.5% source their farm land through hired/rent and 61.2% source their capital through personal saving, 62.5% of them acquired information through radio and television. 93.7% of the farmer cultivated farm size less than 5 hectare with mean farming experience of 16.01years, 45% practice four cropping combination, which showed the extend of crop diversification among farmer in the study area. It was also revealed that 58.7% realize income of ₦ 80,000- ₦ 200,000, from their farm output per season, 75% of the crop farmer used inorganic fertilizer. The major dominant of crop in the area was cassava (91.3%), maize (86.3%) and vegetables (48.8%) different species, which may be inter/mixed cropping. The major land management practices adopted by the farmer in the study area were, manual method of land clearing (95%), Inorganic fertilizer (67.5%), improve varieties of crop specie(65%), crop rotation (61.2%) and cover cropping(21.3%), while 72% apply chemical for weeding. The major problem of farmer on the land use on crop diversification, are basically land tenure, pest infestation among others. It was therefore concluded that there should be good land tenure system, farmer should be encouraged to adopt organic input method of farming, effort should be made by extension workers and research institute to the need of orientating and organizing organic farming system training program in other to improve soil fertility through combination of leguminous based cropping system should be encouraged in the study area.

Introduction

Land as part of the earth surface that is not covered by water, MichaelAllaby, *et al*., (2013), with no cost, but as an input and factor of production, and as a natural resource is a critical input in agriculture production. The critically is imposed by it availability, accessibility, quality and quantity. Land use is the total arrangement or input activities of human on certain land cover in other to produce and obtain benefit; it depends largely on the topographic, condition and fertility of the land area. The land use management practice had had a major impact on natural resources including water, soil, nutrient, plants and animals.

According to Fabiyi (1990), land to a farmer is home and work which involve Nigerian agriculture, the quality factors of land stand out as major determinant of agricultural productivity. Raufu and Adetunji (2012) Apart from this, land is the major resources for live-hood of the poor in Nigeria, different communities in their effort to obtain maximum return from their land, Farming systems contribute tremendously to the growth of economic sector of the country.

Cropping pattern are the product of the decision of farmer operating a farming system, (Fresco 1996) while farming activities is carried out on the piece of land such as crops, live – stock, processing and marketing, which interact because of the joint use of inputs they receive from the environment and delivery of output to the environment, by having a common objective of satisfying the farmers' aims and the community at large, it can be identify by it predominant functional unit, hence a yam based system is a system in which yam production is the predominant among several other, these can be characterized by the fertility management, shifting cultivation, rotational bush fallow, of the farming system.

Crops diversification is a cheaper way of overcoming income uncertainties caused by market Conditions as well as Climate changes (Joshi *et al.,* 2005). On the other hand crop diversification, Also increase soil fertility and brings yield stability in crop production (Lin, 2011), this could only be utilized if there are enough resources, heterogeneity in the soil to support different crops at a time, the success of crop

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diversification depends upon the skills of handling a diversified farmland (Jill and Erin, 2005). The cultivation and combination of more than one crop in a certain area in form of rotation or intercropping at any given time is term crop diversification, (Makate *et al.,* 2016).

Land has always been at the centre of struggles because of the opportunity cost of alternative uses. Nigeria largely remained an agrarian economy since a high percentage of the labour force continues to engage in agricultural production (Adefila, 2014). The sector however remains labour intensive and this explains in part the reason for downward trend in productivity.

In Nigeria, the distance of farmlands and types of crops grown are of importance in the type of pattern of agricultural land use that emerges. However, a lot of problems affect agricultural land use pattern. Pressure on nearby farmlands as a result of increasing demand for land by non-professional farmers such as teachers, clerical workers and also the aged farmers had led to small holding and shorter fallow period, (Adelana Ojo-atere1997, Agbonlahor *et al.,* 2003, Bamire 2003, Oyekale 2007).

Crop diversification is self-motivated low-cost protective measure against certain risks to decrease income invariability. It is indeed very difficult for the small farmers to improve their earnings only by raising the yields of the existing crops, mainly cereals. Thus, the high-value crops being more labour intensive usually provide stable employment and income to a large section of the rural households who face the severe problem of seasonal unemployment and underemployment under the mono-crop economy (De and Chattopadhyay, 2010).

The need for increase food production call for knowing socio-economic characteristic of farmers, in term of physical input as well as highlighting the farmer pattern of land use and crop diversification, poor farming practices, mainly those of continuous cropping with few external inputs, have gradually led to the depletion of soil fertility in smallholder systems. It was for this reasons that the following objectives were considered

• describe the socio-economic characteristic of the farmers in the study area.

• highlight the type of crop combination practiced by farmers in the study area.

• examine the type of land management adopted in the study area.

• examine the problems to the pattern of land use in the study area .

• analyse the determinant of land management use diversification.

Study Area

The study was carried out in Ido-local government area of Oyo state, Nigeria. This was between Latitude 7.506780 and Longitude 3.711860. Ido- local government area of Oyo state was an area of 986km^2 and a population of 103,261 using a growth rate of 3.2% from 2006 census; it is located between 7^0 N 9 and 3^0 E 5, The Government was created during the second republic on May 29, 1989 with the administrative headquarter located at Ido and it shares boundary with Oluyole Local Government, Ibarapa East Local Government, Akinyele Local Government, Ibadan North West Local Government, Ibadan South west Local Government, Ibadan North Local Government areas of Oyo state and Odeda local Government in Ogun state.

Like most cities in Southern Nigeria, Ido is characterized by two distinct seasons: the dry and the rainy season. It enjoy rainfall of between 1250mm and 1800mm, temperature ranges between 27^0C and 32^0C with relative humidity of about 75% and 70%, annually Ido Local Government covers the area spanning Apata, Ijokodo, Omi-Adio, Akufo and Apete. The council formerly has six wards, which had been sub-divided to ten wards for easy exercise of franchise. The people are predominantly Yoruba's, scribe of various parts the area is blessed with fertile land, which is suitable for agriculture. The soil fertility has enhanced the production of Cocoa, Oil palm, Maize, Cassava, Cocoyam, Yam, Kola nut and Vegetables. The people of Ido are mainly small scale farmers with significant proportion of the farmers engaging in secondary occupation such as hunting, trading, artisan, civil service.

Sampling procedure and Data collection

The data for this research was collected in form questionnaire thereby increasing and aid in deducing the true information. The population of the study consist of mainly crop farmers in the study area, A multiage sampling technique was employ in selecting farmers respectively in study area. The first stage consist of selecting four wards in the local government area namely ward Ido, Apata, Omi-adio, and Bakatari were intentionally selected due to crop farmers available in the areas. Second stage involved random selection of two villages from each selected ward, which are: Alako, Idi-iya, Oke-siba, power-line Omi-adio, Lade-owo, Aba-tisa, Bakatari-eleso. The last stage involved random selection of 10 farmers from each village, which were determined by the probability of the household, thereby making a total of 80 respondents for the study.

Data Analysis

Data collected were analyzed using descriptive statistics such as distribution tables, frequency, percentage, mean and inferential statistics to analyze the data collected for the study.

The regression analysis was applied with the following implicit relationship to analyze the determinant of land management use diversification.

$Y = f (X_1, X_2, X_3, X_4, X_5, X_6, X_7 + U)$

Y = Pattern of land use (Crop diversification)

X_1 = Age of farmer

X_2 = Gender

X_3 = Educational level

X_4 = Farming experience (year)

X_5 = Farm size (Hectare)

X_6 = Source of farm

X_7 = Source of capital

b = parameter estimated

u = error term

Results and Discussion

Table 1a and b, Present the socio-economic characteristic of the respondent in the study area; it revealed that 26.2 % of the respondents were female while 73.8% are male. This shows that majority of the farmers in the study area were male, 28.7% were between the age of 30 and 40 years, while 30 % of them were between 51-60 years old, with the mean age of 49.8 Years, this shows that majority of the farmers are within the active stage of working age, 17.5% of the farmer had no formal education, 26.3% had secondary education, 26.3% had tertiary education, 6.3% of them had adult education, while 43.8% of the crop farmer had primary education.

Table 1a.Socio- Economic Characteristics of the Respondents in the Study Area

Variable	Frequency (N=80)	Percentage (%)	Mean
Gender			
Female	21	26.2	
Male			
Age	59	73.8	
30-40	23	28.75	
41-50	23	28.75	
51-60	26	32.50	
61 and above	8	10.00	49.7
Educational level			
No former education	14	17.5	
Primary education	35	43.7	
Secondary education	21	26.2	
Tertiary education	5	6.3	
Adult	5	6.3	
Marital status			
Single	6	7.5	
Married	67	83.7	
Separated	4	5.0	
Widow/Widowe	3	3.8	
Family size			
1-5	21	26.3	
6-10	46	57.5	
11-15	7	8.7	
16-20	6	7.5	
Source of labour			
Hired	48	60.0	
Famil	6	7.5	
Both	26	32.5	
Labour cost (₦)			
1000-10000	37	46.2	
12000-50000	25	31.3	
120000and above	14	17.5	
None	4	5.0	45082.89
Secondary occupation			
No	26	32.5	
Yes	54	67.5	
Source of land			
Hired/ rented	54	67.5	
Purchase	7	8.7	
Inherited	12	15.0	
Government	1	1.3	
Gift	6	7.5	
Mode of information			
No access to information	12	15.0	
Radio/Television	50	62.5	
Extension agent	1	1.3	
Other farmer	8	10.0	
Internet	1	1.3	
Research institute	8	10.0	

Source: Field Survey, 2018

Table 1b.Socio- Economic Characteristic of the Respondent's continued.

Variable	Frequency (N=80)	Percentage (%)	Mean
Belonging to association			
Do not belong	53	66.3	
Belong	27	33.7	
Adequacy of Labor			
Very adequate	23	28.7	
Moderately	54	67.5	
Inadequate	3	3.8	
Farming Experience (year)			
1-10	41	51.2	
11-20	20	25.0	
21-30	11	13.8	
31 and above	8	10.0	16.01

Source of credit			
Bank loan	2	2.5	
Cooperative	28	35.0	
Personal savings	49	61.2	
Government	1	1.3	
Cropping system			
Mixed cropping	41	51.2	
Continual cropping	9	11.3	
Land rotation	20	25.0	
Shifting cultivation	10	12.5	
Type of fertilizer			
Inorganic fertilizer	60	75.0	
Organic	20	25.0	
Quantity of fertilizer (Kg)			
None	22	27.5	
1-10	21	26.2	
11-20	5	6.3	
50-400	32	40.0	62.67
Amount of fertilizer (₦)			
None	21	26.3	
100-1000	14	17.7	
2000-10000	24	30.3	
11000-20000	12	15.1	
21000-30000	6	7.7	
31000 and above	3	3.8	9830.51
Extension agent visit			
Do not have contact	63	78.8	
Had contact	17	21.3	
Water source on farm			
Irrigation system	7	8.7	
Rain	73	91.3	
Output / season of the farmer			
80000-200000	47	58.7	
250000-400000	20	25.0	
460000 and above	13	16.3	
Farm size (hectare)			
Small size 0.10-4.99	75	93.75	
Large size 5.0-10.0	5	6.25	

Source: Field Survey, 2018.

This implies that majority of the farmer could not go beyond Secondary education.However majority of them had one form of formal education, education cannot be over emphasis in development and production of agricultural system,   83.7% of the farmer were married, 7.5% were single, 3.8% widower/widow, 5.0% of them farm were separated, this shows that majority of the farmer are married, this is in with Mesfin *et al.,* (2011) statement about agricultural practice among the married people. 26.3% had family size of 1-5 household, 57.5% had family size of 6-10 house hold, and 8.7 % had family size of 11-15 household, while 7.5% had family size of 16-20 household, with mean household size of 8 persons which is fairly large and may be used as family labour. 60% used hired labour, 7.5% used family labour, while 32.5% used both the family and hired labour for their farming operation indicating that the farming system practiced by the farmers is labour intensive, labour cost vary in term of payment most worker are paid daily, monthly and yearly. 46.2% of the worker were paid N1000-N 10000, which implies that workers in this range obtain daily payee, 31.3% were paid N12000-N50000, which are likely to be monthly payee, while 17.5% were paid N120000 yearly payee, while 5% of the farmer did not pay labour, this may be due to the use of family labour only, 67.5% crop farmer are off farm, they are having secondary occupation apart from farming, while 32.5% of the farmer are full time farmer,

15.0% of farmer source their farm land through inheritance,8.7% through purchase, 7.5% through gift, 1.3% source through government, and 67.5% source through hired/rented which may not enhance crop diversification practices. Kiær *et al*., (2009) noted the land fragmentation result in small holder farmer to depend less on farming.

This revealed that majority of farmer acquire their farm land through hired/rented source, 62.5% of the farmer source information through radio and television, 1.3% source through extension agent, 10% through fellow or experience farmers, also 10% source through Research institute like (IAR&T and NIHORT). Only 1.3% source information from internet, while 15% had no access to information, this show that majority of the farmer source information on use of land on crop diversification was radio and television this implies that knowledge towards the use of land on crop diversification as bring about early majority of diversifying crops, while farmers do not have adequate contract with extension agent in the study area, information and awareness is not effectively created among farmers about improved Agricultural technologies for adoption, this is in line with the work of Agbamu (2006) that information is the first and Indispensable step of an adoption process.

The study further explain that 66.3% of the farmers belongs to farmer association while 33.7% does not belong to any association, labour used on the farm land were

moderately adequate at 67.5%, 28.7% very adequate, while 3.8% are inadequate, the result reveals that 51.2 % of the crop farmer had farming experience of 1-10 years, 25% and 13.8% had farming between 11-20 years and 21-30 years respectively, while 10% of the respondent had 31 years and above farming experience, 16.01% mean value of the farming experience show the farmers had long years of farming experience which can also be use by farmer in method diversifying cropping pattern, this is in line with the work of (Hasam, 1996). 2.5% source their capital through bank loan, 1.3% the crop farmer source capital through government, while 61.2% and 35% source capital through their personal savings and cooperative respectively. This revealed that majority of farmer in the study area depend on their personal savings for capital which may therefore not be enough to improved the efficiency of the output, the study further revealed that 35% of the crop farmers were practicing mixed cropping in other to improve the yield and varieties of crop, 11.3% practice continuous cropping system, while 25% and 28.7% were practicing land rotation and shifting cultivation respectively, 75% of the crop farmer uses inorganic fertilizer to improve the soil nutrient since the soil is in use continually. While 25% depend on organic fertilizer for their soil improvement. 26.2% of the crop farmer used 1-10 (kg) of fertilizer, 6.3% and 40% uses 11-20 (kg) and 50-400(kg) quantity of fertilizer respectively, while 27.5% does not use fertilizer, having the mean of 62.67 shows that most of the farmer depend on inorganic fertilizer in large amount Pasquini *et al*., (2015) to improve their soil nutrient, the amount of purchasing fertilizer varies depending on size of the farm land, 17.7% purchase 100-1000(N), 30.3% and 15.1% of the respondent purchase fertilizer amounting to 2000-10000(N), and 11,000-20,000(N), respectively, while 7.7% and 3.8% purchase 21,000-30,000(N), and 31,000(N), above, 26.3% does not purchase fertilizer. The mean value of the respondent purchasing fertilizer is 9830.51%, 21.3% of the respondent are having contact with visit of the extension agent, while 78.8% did not, this implies that crop farmer in the study area did not have contact with the extension agent, 91.3% of the farmer wait for rain for their source of irrigation while only 8.8% of farmer in the study area used irrigation system of supplying water to the farmer, 58.7% of the farmer earn 80,000-200,000(N) output/season, 25.0% earn 250,000-400,000(N) output/season, while 16.3% earn 460,000 and above, 93.75% of the respondent cultivated farm less than 5 hectare, while only 6.25% of the respondent cultivated farm size between 5.0-10.0 hectares, small size of the farm land is as a result by which land is availablsse to farmer in the study area. Bamire and Manyaga (2003) also attributed the decline to population growth and the consequent pressure from completing demand for land over times; which have resulted in cultivable land being withdrawn from its traditional agricultural uses, reduction in land man ratio and average size of farmland.

Table 2. Crop combinations practiced by the respondent on pattern of land used

Variable	Frequency (N=80)	Percentage (%)
Sole cropping	0	0.0
Two cropping combination	5	6.3
Three cropping combination	29	36.3
Four cropping combination	36	45.0
Five cropping combination	10	12.5

Source: Field survey, 2018.

Table 2 Shows the type of crop diversification combination practiced by respondent in the study, it was revealed that 6.3% of the farmer practiced two cropping combination, 36.3% practiced three cropping combination, four cropping combination were practiced by 45% of the farmer, while 12.5% practiced five cropping combination, this implies that majority (100%) of the farmer practice more than one cropping combination however, majority of them 45.0% and 36.3% practiced four cropping and three cropping combination, which shows the extent to which crop diversification is been practiced by the farmers, this is in line with work of Raufu and Adetunji (2012). Small scale farmer depending on small piece of land practice continuous farming and having no alternative sources of employment and income Oyekale (2007) due to increasing or continual growth of population would always try to produce the maximum output on their farm land by cultivating as many crops as possible in other to meet their various needs.

Table 3. Type of crop diversification practiced by the respondent on the pattern of land used

Variable	Frequency (N=80)	Percentage (%)
Crop		
Potato	2	2.5
Cassava	73	91.3
Maize	69	86.3
Yam	32	40.0
Cowpea	5	6.3
Pepper	23	28.7
Okra	2	2.5
Plantain	6	7.5
Groundnut	4	5.0
Cocoyam	14	17.5
Vegetable	39	48.8
Tomato	15	18.8
Melon	6	7.5
Rice	1	1.3
Pineapple	1	1.3

Source: Field survey, 2018.

Table 3, shows the different type of crops been diversified and cultivated by the farmer in the study area. 2.5% of the respondent cultivated potatoes, 91.3% planted cassava, maize was cultivated by 86.3%, 40% plant yam, only 6.3% planted cowpea, 28.7% planted pepper, 2.5% pant okra, 7.5% planted plantain, groundnut was planted by 5.0%, 17.5% of the crop farmer planted cocoyam, 48.8% planted vegetables, 18.8% planted tomato,7.5% planted melon, while 1.3and 1.3 planted rice and pineapple respectively.

This implies that majority of crop farmer plant cassava, maize, and vegetable in high amount, with prominent crop combination as maize/cassava, maize/cassava/yam are the commonest crop grown in the study area.

Table 4 shows the type of land management practices adopted by the farmers in the study area, it revealed that 95.0% of the farmer adopted manual method of land management system, this explain that majority of the farmer in the study area only depend on the manual method of farming activities, this could be due to the cultural norms, of the farmer in the study area.67.5% the use of fertilizer, in their believe to improve the soil fertility before planting, 65% of the farmer adopted the use of improve varieties, 61.2% adopted the practice of crop rotation, 50% practices bush fallow, while 21.3% adopted the cultivation of cover crop, 93.7% adopted spacing, 92.5% adopted ploughing and ridging, 75% adopted the application of insecticide and pesticide, 96.2 % of the crop farmer observed the planting time, while 72.5% apply chemical for weeding.

Table 4. Land management practices adopted by the respondents

Variable	Frequency (N=80)	Percentage (%)
Manual clearing		
Not adopted	4	5.0
Adopted	76	95.0
Mechanical clearing		
Not adopted	60	75.0
Adopted	20	25.0
Fertilizer application		
Not adopted	26	32.5
Adopted	54	67.5
Improved varieties		
Not adopted	28	35.0
Adopted	52	65.0
Crop rotation		
Not adopted	31	38.8
Adopted	49	62.2
Bush fallow		
Not adopted	40	50.0
Adopted	40	50.0
Planting of cover crop		
Not adopted	63	78.7
Adopted	17	21.3
Application of spacing		
Not adopted	5	6.3
Adopted	75	93.7
Ploughing and ridging		
Not adopted	6	7.5
Adopted	74	92.5
Application of pesticide and insecticide		
Not adopted	20	25.0
Adopted	60	75.0
Planting time		
Not adopted	3	3.8
Adopted	77	96.2
Chemical for weed		
Not adopted	22	27.5
Adopted	58	72.5

Source: Field survey, 2018.

Table 5. Problems faced by the respondent on pattern of land used

Variable	Frequency (N=80)	Percentage (%)
Problem		
Topography of land	3	3.8
No credit facilities	4	5.0
Inadequate storage facilities	2	2.5
Inadequate rainfall and weather	8	10.0
High cost of rent and machinery	6	7.5
Infestation of pest and disease	34	42.5
Lack of soil nutrient	5	6.3
High cost of input (insecticide, fertilizer)	6	7.5
Loss of land to building	7	8.6
Low return and yield of crop	5	6.3

Source: Field survey, 2018.

Table 5, explains the problems encounter on pattern of land use on crop diversification by respondent in the study area. It was revealed that 3.8% of the crop farmer are likely to experience unfavorable topography of farm land, 5.0% of the farmer have no access to credit facilities which can help in enhancing and improving the farming system, 2.5% have no adequate storage facilities for storing their farm produce thereby causing reduction in output, the study further revealed that only 10% of the respondent experience drought, 7.5% of high cost of machinery, crop farmer having large farmland were unable to improve their farming due to the high cost of machinery. 42.5% of the respondent was facing the challenges of diseases and pest infestation on their farm land, 6.3% of farmer experience lack of soil nutrient; this can be due to continuous use of farmland, 7.5% of famer are unable to purchase some farm input like insecticide, pesticide and fertilizer due to high cost, 2.5% of farmer experience loss of farm land to building, 6.3% farmer experience low return from the land. Ashfaq *et al*., (2008); Mesfin *et al*., (2011) also found that presence of own agricultural equipment such as tractor increases the probability of crop diversification.

Table 6. Determinant of Land Management Use diversification

Variable	Beta	Standard Error	T-Value
Constant	3.870	0.490	7.893
Age(X_1)	-0.023***	0.0009	-2.549
Gender (X_2)	0.447**	0.220	2.032
Educational (X_3)	0.023	0.085	0.271
Farming Experience (X_4)	0.018**	0.009	2.042
Farm Size (X_5)	0.258***	0.056	4.573
Source of farm land (X_6)	0.070	0.064	1.097
Source of Capital (X_7)	-0.107	0.08	1.209
R^2	0.40		

Source: Authors Computation, 2018.

Note: (**) and (***) mean significant of 5% and 1% respectively.

The Regression table 6 of the determinant of land management use diversification revealed that farmer experience and gender were significant at 5% and has a positive relationship to the pattern of land use diversification. This implies that the more the year of experience and increase in male gender in the study area. The likelihood that land use diversification will be enhanced through the cropping system of more than three cropping combinations, farm size used by farmer was significant at 1% and positively signed, this shows that the more the farm size used or expand in cropping the better the crop diversification will be enhance by the farmer, through the practice of two to four cropping combinations, also Age of farmers was signed at 1% and negatively signed, this shows that, the more aged the farmer becomes the less the land use diversification on cropping system will be enhance, this could be due to the aging or old age of the farmers to be able to combine various cropping combination of about two to four crops together, because of the intensive labour that could be involved.

R^2 was 0.40% indicating that the model specified can only explain 40% in the combination of variable used; while 60% can be explain by the error term.

However, it was however concluded that Age of farmers, Gender, Year of farming experience and farm size were the major determinants of pattern of land use diversification on cropping system in the study area.

It was therefore recommended that:

• Government should also seek to the provision and availability of land and it policy among farmers.

• Farmer should therefore be encouraged to practices organic manure farming system and the appropriate use of land in cropping combination system, the planting of legume crops with other crop which will modify and enhance the soil fertility.

• An Effort should be made by the government to encourage the visit of the extensions agent in the study area in other to disseminate to the farmer on current issue related to adaptation of land use and diversification of crop.

• Successful farmer should organize themselves in group and put resources together for the purchase of mechanical implement for the enhancement of land management practices.

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