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Land Access, Land Use Conflict and Smallholder Commercialization in Southwest Nigeria

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Abstract

This study examined the effect of land access and land use conflict on crop commercialization of smallholder farmers in Southwest Nigeria. A multistage sampling technique was used in selecting 300 respondents and primary data were collected using structured questionnaire. Data were analyzed using descriptive statistics, Land Market Index (LMI), Land Use Conflict Index (LUCI), Crop Commercialization Index (CCI) and Tobit regression model. Majority (95.3%) of the farmers were male, natives (81.3%), and married (97.3%) with an average household size of 9 persons. Also, 69.3% had formal education and an average of 24 years of farming experience. Majority (78.0%) of the farmers had their total landholding through non-market means (inheritance, borrowed and gift), 14.0% acquired their total landholding through market means (purchase, rent and lease), and the mean LMI was 0.16(±0.35), showing farmers had access to 16% of farmlands through market participation. Farmers were coping with conflict on majority (90.4%) of their landholdings and 95.2% of conflicts could be attributed to competition for natural resources, especially farmer-herder clashes (94.2%). The mean LUCI was 0.91(±0.27), implying farmers experienced conflicts on 91% of farmlands. Mean commercialization of maize, cassava and yam were 84.19%(±16.0), 84.01%(±16.67) and 61.42%(±24.83), respectively, indicating that the crops driving commercialization were maize and cassava. Tobit regression results indicated that farm size, presence of local market and LMI significantly ($P<0.01$) increase commercialization. In conclusion, extent of land market participation significantly increases commercialization while land use conflict reduces crop commercialization, although not significantly. Policy efforts should be intensified with a view to facilitating land access by farming households through market participation, and also reducing or resolving all arable land use and related resource use conflict.

Keywords: Agricultural Land Market; Land use conflict; Commercialization; Smallholder farmers

Introduction

In this millennium, topmost in the priority list of the global community is to meet the food need of her growing population, a quintessential requirement for survival. Evidently, this global concern is in tandem with the major disruptions in the various socioeconomic variables. And hence, the wake of the current happenings and critical trends in food system vis-a-vis its security, calls for actionable plans and sustainable practices in handling both the endogenous and exogenous indices that affect food commonwealth. More often, these obvious disruptions in food systems is attributed to overstretch in the available resources as well as the looming threat of overpopulation, climate change, and etcetera. Of all these multifarious and resource gap affecting food production, land as one of the factors of production plays a vital role in production [1].

Looking at the impact of the agricultural sector in the light of its impulsive contribution to national development and economic relevance, agricultural sector plays a pivotal role in the economic growth and development of Nigeria [2]. In fact, agriculture remains an integral part of Nigerian economy. Statistically, 40% of the total annual Gross Domestic Product (GDP) of the country is realized from Agriculture; the same caters for about 80% of the dietary needs of the country, account for about 70% of the country's non-oil export, and a track record of employing over 55% of the total labour force [3,4].

Obviously, land use is not limited to agricultural uses, thereby necessitating the various shades of competition for its utilization. In context, humans use land for various purposes; material, social, economic and cultural use. These growing needs of land for other purposes impugn on land integrity to maintain its natural state, leading to an overall reduction in forest density and biodiversity. This happens when land is subjected to intense uses such as construction, mining and so on, a concept Nkolika, et al. [5] referred to as "development attractors". Overly, there arises a potential shunt in the availability of land resources for agricultural production purpose. To this end, various modifications of land resources ensue which oftentimes are not without a damaging effect on the environment, and on the reverse, impede food production, endanger food security, and deprive rural households.

More so, land constitutes primary instrument for agricultural production and an essential asset for rural households for the provision of basic livelihood [6]. In Nigeria, farming remains the mainstay of rural economy with practicably smallholder farming accounting for about 84% of the overall agricultural production [7]. According to Yusuf (2014) [3], the smallholders represents a staggering 75% of rural dwellers in the country, corroborating studies that posited most African countries to be dominated by small scale farmers who largely cultivate fragmented land [8].

Agricultural land, to rural households, refers to arable land portion that is suitable for crop cultivation, livestock production, pasture and grazing lands, agroforestry, and other agricultural uses [9].

Having established that land remains one critical factor that is indigenous to food system in this clime, inaccessibility of this land for agricultural purposes over time, results in a drastic reduction in the level of food production and extends to low marketable surplus, which eventually affects food security. On the contrast, the food demand to food supply ratio is increasingly alarming especially in this current dispensation characterized by overwhelming population growth. Incidentally, this baffling population growth rate is mounting pressure on the available land without underscoring the socioeconomic implications [10]. The factors of specifications, multifarious uses of land and its limitedness, have necessitated that various shades of competition for its utilization must ensue. This competition often degenerates into conflict of varying forms and intensity. Factors that are potential triggers for this land use conflict which includes but not limited to migration, population pressure, urbanization and agricultural commercialization [10].

Generally, there has been prevalence of conflict in Nigeria, especially the persistent headlong between herdsmen and farmers [2]. The reason is not farfetched; the daring consequence of climate change is steering competitions for the available resources which are limited. This has thus brought up tension for the survival of the fittest. Reports of fierce duels between farmers and herdsmen are the major captions in headlines with degenerating cases of conflicts which often times lead to destruction of properties, crops, and in worst case scenarios, loss of lives [11]. This is a major setback on crop commercialization as the constant uproar and conflict scare is impacting negatively on the participation of farmers, affecting the level of smallholder production and commercialization. No doubt that the continued conflagrations have impacted negatively on the security of farmers and their production, and on a broader scope, uncertainties weave around the political stability of the country, the economic development and national unity [12].

With the rising challenge on food security, coupled with an impending pressure mounted on the available natural resources, it is however essential to create a sustainable pathway to ensure that food is available, accessible and affordable for the Nigerian population to achieve the sustainable Development Goal (SDG) 1 of zero hunger. It is important to examine the means of land access and extent of land use conflict, and their effects on crop commercialization of smallholder farmers in Southwest Nigeria. The specific objectives of this paper are to:

I. Identify the various modes of access to arable farmland
II. Assess the extent of conflict on agricultural land
III. Assess the extent of crop commercialization by smallholder farmers
IV. Determine the effects of land access and land use conflict on household crop commercialization

Empirical Review

Abegunde, et al. [11] examined the socioeconomic implications of land conflict, especially as it relates to agriculture in Nigeria. Primary data from the Southwest region of Nigeria were used to explore the prevalence and pattern of

land conflict, analyse its determinants and assess its effect on agricultural production. Descriptive statistics, probit and multiple regression analytical techniques were used for data analysis. Reports of conflicts on plots were between 1983 and 2017, with most of the incidences (94.5%) occurring in recent years (2003–2017). Two patterns of land conflicts were identified in the study area: Farmer–Farmer (11%) and Farmer–Pastoralist (89%), showing that the majority of the conflicts were between farmers and pastoralists. There was evidence of significant negative impact of land conflicts on crop production and farmers' income; a reduction of 49% in crop production and as much as 74% reduction in income of farmers.

Alawode, et al. [13] assessed the potential of land markets to improve the access of crop farming households to land and the resultant effect on crop commercialization in Southwest Nigeria. Findings show that majority (74%) of the farmers acquired their farm plots through inheritance and was substantiated by a result of land market index of 0, while purchase and rent (48.3% each) were the most patronized form of land acquisition through transaction. The crop driving commercialization in the study area was maize, with crop commercialization index of 72%. Results further show that participation in land market (land access) had significant positive effect on crop commercialization; the crop commercialization index for farming households participating in land market is expected to be 5% higher than that of the farming households which are not participating. It was concluded that crop commercialization increases with participation in land market and therefore, there should be formulation of policies which will give room for flexibility in land redistribution that will make farmers have better access to land.

Amusan, et al. [12] explored the prospects of the legislative intervention through the Grazing Bill as an option for mitigating future incidences of violence in his work on "Climate change, pastoral migration, resource governance and security: The Grazing Bill solution to farmer-herder conflict in Nigeria". This paper examined the implications of the proposed Grazing Bill for managing farmer-herder conflict. It was argued that frameworks which downplay the country's diversity will further aggravate conflicts and insecurity in the fragile federation. The paper therefore advocates for sedentary system of cattle ranching.

Alawode, et al. [14] examined land use and land access through market among farming households, and the effects of land use and land market on food security status of farming households in Oyo State, Nigeria. Results show that 70.5% of the farmers participated in land market, and mean land market index of 0.6 shows that on the average, 60% of total farm size were acquired through land market. On the average, farmers cultivated approximately 3 plots, and about 70.5% of farmers felt tenure insecure on at least one of their farm plots. About 67% of the farming households were food insecure while only 33% were food secure. Farmers' age, education, tenure security, number of farm plots, soil type, fertility and slope of farm plot, household income, total farm size, and household size had significant effect on farmers' participation in land market.

Adebajo, et al. [15] examined conflict management and farmers' production level in Oke-Ogun Area of Oyo State, Nigeria. Results showed that 72.65% of the farmers in core conflict area (CCA) and outside conflict area (OCA) (69.22%) were in the age category of 18-45 years. Farming was the main livelihood of respondents in CCA (83.76%) and OCA (77.88%). Prominent reason adduced to conflict was competition for natural resources (86.42%). Farmers in CCA recorded lower mean production level for maize-62.3tons, yam-1,152tons and cassava-1,232tons in contrast to higher mean production levels recorded for maize-310.5tons, yam-3,505tons and cassava-11,185.6 tons recorded by farmers in OCA. Results of t-test showed a significant difference in crops production level between CCA and OCA at $p<0.05$. It was concluded that conflict management employed by farmers had negative influence on farmers' production level. Farmers should avail themselves of training opportunities on conflict management and resolution in order to ensure peaceful co-existence among themselves, which is a factor for increase in production.

Musa, et al. [16] assessed conflict between herdsmen and farmers in Guma local government area of Benue State, Nigeria. A total of 160 heads of farming households and 40 herdsmen from areas that have experienced farmer-herders conflict were purposively selected. Data were collected using questionnaire, field observation and reports from Benue State Agricultural and Rural Development Authority. Data collected were analyzed using percentage, frequent count and Likert scale. The role of traditional rulers, destruction of crops/farmland, contamination of water, and harassment of herdsmen by host communities were the major causes of conflict between farmers and herdsmen. Displacement of both farmers and herdsmen, loss of lives and properties and decrease in output were the major effects of farmer-herders conflicts in the area. Yogbo town was the most affected in the area with estimated cost of property destroyed of ₦43.8million, 30 people killed and 32 people injured. Conflict was a setback to the development of agricultural sector, therefore, creation of grazing reserves will make herders shift from traditional method of animal husbandry to modern methods.

Solagberu [17] studied land use conflict between farmers and herdsmen, examining the implication for agricultural

and rural development in Kwara State, Nigeria. A four-stage cluster random sampling procedure was used. Coping strategies by respondents were measured with 20 items on a 4-point Likert scale and the influence of respondents' socio economic characteristics on their coping strategies was analysed with Probit model. Results showed that loss of material resources were more widespread among farmers. Income loss had the highest relative frequency (91%) among farmers, followed by loss of yield (85%), household resources (23.5%) and stored products (23%). It was concluded that conflict between arable crop farmers and cattle herdsmen over the use of agricultural land is still pervasive in Nigeria, portends grave consequences for rural development, and has great potential to affect various aspects of rural life. The conflicts has far reaching economic, production and socio-psychological effects on the households of most respondents.

Research Methodology

Study Area

This study was carried out in Southwest Nigeria. Southwest Nigeria has six states; Oyo, Lagos, Ogun, Ondo, Osun and Ekiti. It is located on Longitude 8° 40.5166'E and Latitude 9° 4.9199'N. The climate is tropical with notably dry and wet seasons with relatively high humidity which favours the cultivation of crops like maize, cassava, yam, rice, plantain, cocoa, palm produce, cashew, and wheat, among others. The region is largely agrarian in nature, and land use conflicts have been reported in the region [2], and in recent times, issues related to agricultural land access and farmer-herder clash have also been reported [11].

Sampling Method

A multistage sampling procedure was used in this study. The first stage was a purposive selection of 3 States (Oyo, Osun and Ondo) on the basis of high levels of food production and reports of land use conflicts [15]. The second stage was the random selection of 10 Local Government Areas (LGAs) from the 3 selected States. The main farming communities in each LGA were selected. The last stage was the random selection 10 farming households from each of the 10 LGAs in the 3 states, giving a total of 300 farming households.

Analytical Methods

The methods of analysis used in this study include descriptive statistics, land market index (LMI), land use conflict index (LUCI), crop commercialization index (CCI) and Tobit model. Descriptive statistics were used to identify the various modes of access to arable farmland (objective 1). These modes of land access were grouped into non-market based and market based means of land access.

Land Market Index

Land market index (LMI) was used to assess the extent to which crop farmers participated in land market to gain access to land. LMI is defined by:

$$LMI_h = \frac{\text{Area of land obtained through market by all farming households}}{\text{Total land size held by all farmimg households}}$$

$$LMCI_h = \frac{\text{Area of land of all farming households that is under conflict}}{\text{Total land size held by all farming households}}$$

LMI ranges from between 0 and 1,
Where LMI_i= Land market index for farming household i
Where LMI_h= Mean land market index for all farming households (Mean LMI)
LMI = 1, if all plots of land held by crop farmers are acquired through market
LMI = 0, if none of the plots of land held is acquired through market [13]

Land Use Conflict Index (LUCI)

Land use conflict index (LUCI) was used to assess the extent of conflict on agricultural land (objective 2). LUCI is defined as:

$$LUCI_i = \frac{\text{Area of land of farming household i that is under conflict}}{\text{Total land size held by farming household i}}$$

$$LUCI_h = \frac{\text{Area of land of all farming households that is under conflict}}{\text{Total land size held by all farming household}}$$

LUCI ranges from between 0 and 1,
Where $LUCI_i$= Land use conflict index for farming household i
Where $LUCI_h$= Land use conflict index for all farming households (mean LUCI)
LUCI = 1 if farming household experienced conflict on all the plots of land held
LUCI = 0, if farming household has never experienced conflict on any of the plots of land held

Commercialization Index

This was used to assess the extent of crop commercialization by smallholder farmers (objective 3).

Household commercialization index (HCI): This determines household specific level of commercialization [18,19]. The index measures the ratio of the gross value of crop sales by household *i* in year *j* to the gross value of all crops produced by the same household *i* in the same year *j* expressed as a percentage:

$$HCI_i = \left[\frac{\text{Gross Values of Crops Sold}_{hhiyearj}}{\text{Gross Values of all Crops Produced}_{hhiyearj}}\right] * 100$$

$$HCI_h = \left[\frac{\text{Gross Values of Crops Sold by all farming households}_{iyearj}}{\text{Gross Values of all Crops Produced by all farming households}_{yearj}}\right] * 100$$

HCI_i= Commercialization index by household i
HCI_i= Commercialization index by all households (mean HCI)
HCI measures the extent to which household crop production is market oriented.
HCI_i ranges between 0 and 100
HCI_i = 0, subsistence household (no sales of produce)
HCI_i= 1, full commercialization by household (sales of all produce)

Crop Commercialization Index (CCI)

This determines crop specific level of commercialization among smallholder farmers. The 3 most important crops cultivated by smallholders were considered in the analysis. These include maize, cassava and yam.
CCI for different crops are given as:

$$CCI_m = \frac{\text{Gross value of maize sales}_{\text{in year j}}}{\text{Gross value of maize production}_{\text{in year j}}} X100$$

$$CCI_c = \frac{\text{Gross value of cassava sales}_{\text{in year j}}}{\text{Gross value of cassava production}_{\text{in year j}}} X100$$

$$CCI_y = \frac{\text{Gross value of yam sales}_{\text{in year j}}}{\text{Gross value of yam production}_{\text{in year j}}} X100$$

CCI_m = crop commercialization index for maize
CCI_c = crop commercialization index for cassava
CCI_y = crop commercialization index for yam
CCI ranges between 0 and 100
Where CCI = 100 if farmer sells all his output.
CCI = 0 if farmer consumed all the crop output
CCI = 1 if farmer sells all the crop output [13]

Tobit model

The Tobit regression model was used to determine the effects of agricultural land access and land use conflict on crop commercialization. Agricultural commercialization has been modeled as a two-step analytical approach involving the unobservable decision to commercialize and the observed degree or extent of commercialization [20]. The tobit model was used because the decision to commercialize and the extent of commercialization are considered together. Also, any farming household who does not commercialize was censored at zero.

$$Y_j^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \ldots\ldots + \beta_{12} X_{12} + \in_i$$

Where Y^*_j= (household commercialization index, 0≤HCI≤100)
X_1=Age of household head
X_2= Years of Education
X_3= Years of experience in crop production
X_4= Availability of local market (Yes=1, No=0)
X_5= Farm size (hectares)
X_6=Land Market Index (0≤LMI≤1)
X_7=Unit price of maize (in naira)
X_8=Unit price of cassava (in naira)
X_9=Unit price of Yam (in naira)
X_{10}=Land Use Conflict Index (0≤LUCI≤1)
$X_{11=}$Household Size (number of people living in household)
X_{12}=Sex (1= Male, 0= Female)
ϵ_i= Error term

Results and Discussion

Socioeconomic and Enterprise Characteristics of Respondents

The socio-economic characteristics of respondents are presented in Table 1. The highest proportion (27.3%) of the respondents fell between the age range of 30-39 years. From the results, 67.3% of the respondents fell within the active economic age of 30-59 years and a mean of 45.56 years (±15.03), indicating a high level of engagement in crop production which can encourage commercialization. Results also show that majority (95.3%) were male, married (97.3), having a mean household size of 9.16 (±6.55). Large household sizes could indicate availability of family labour for farming activities, which encourages higher level of production, and therefore commercialization. The other way round, if there are many dependents in the household, large household size could translate to higher levels of consumption, reducing the level of commercialization. Majority (81.3%) of respondents were natives. Being natives can indicate land access by inheritance. From the 69.3% who had formal education, 24.0% had post-secondary education. Famers that are well educated would necessarily commercialize their farm produce to generate income for other household needs.

Results of the enterprise characteristics in Table 2 show that farming was the main occupation of majority (78.7%) of the respondents while 21.3% engaged in off-farm activities. The non-farm occupations of respondents include vocation (28.0%), civil service (15.3%), and trading (6.7%), while 50.0% of the respondents did not engage in any non-farm occupation. Making farming a major occupation could enhance higher level of production which could increase the level of commercialization. On the average, farmers had

24 years of farming experience, held a mean of 2 plots in 2 locations and cultivated 4 crops (diversification). Farmers that cultivate single crops (specialization) are likely to have high level of commercialization of the specific crops that they produce. Those who practice mixed cropping tend to first ensure self-sufficiency in various crops produce before commercialization. Specialization encourages commercialization.

Socioeconomic characteristics	Frequency (n=300)	Percentage
Age		
<30	36	12
30-39	82	27.3
40-49	56	18.7
50-59	64	21.3
≥60	62	20.7
Mean = 45.56 (±15.03)		
Sex		
Female	14	4.7
Male	286	95.3
Marital Status		
Married	292	97.3
Never Married	8	2.7
Household Size		
≤5	86	28.7
10-Jun	140	46.7
15-Nov	46	15.2
16-20	14	4.7
>20	14	4.7
Mean = 9.16 (±6.55)		
Immigrant Status		
Native	244	81.3
Non native	56	18.7
Level of Education		
Non formal	92	30.7
Primary	70	23.3
Secondary	66	22
Post-secondary	72	24

Source: Field Survey, 2019

Table 1: Socio Economic Characteristics.

Enterprise characteristics	Frequency (n=300)	Percentage
Major Occupation		
Farming	236	78.7
Off-farm	64	21.3
Non-Farm Occupation		
Civil Service	46	15.3
Trading	20	6.7
Vocation	84	28
None	150	50
Years of Experience in Production		
≤25	178	59.3
26-50	106	35.3
>50	16	5.4
Mean = 24.34 (±15.64)		
Number of Plots		
2-Jan	168	56
5-Mar	126	42
8-Jun	6	2
Mean = 2.42 (±1.32)		
No of Locations		
≤2	178	59.4
5-Mar	118	39.3
8-Jun	4	1.3
Mean = 2.33 (±1.21)		
Number of Crops Cultivated		
1	8	2.7
4-Feb	178	59.3
7-May	106	35.3
10-Aug	6	2
>10	2	0.7
Mean = 4.21 (±1.71)		

Source: Field survey, 2019

Table 2: Enterprise Characteristics of Respondents.

Farmers' Access to Arable Farmland

The total number of plots owned by all the respondents was 690. The analysis in this section is based on plot population and size of respondents.

Farmers' Plot Characteristics

The characteristics of farmers' plots are presented in Table 3. The results are based on plot population. The total number of plots held by respondents was 690.

Distribution of Plots by Cropping System

Mono-cropping system of farming was adopted by farmers on 47.3% of farm plots, while mixed cropping system was adopted by farmers on more than half (52.7%) of the farm plots, implying that farmers cultivated more than one crop on a particular plot at a time. Planting single crop on a farm plot at a time indicates that farmers tend towards specialization on such crops and this could enhance commercialization.

Distribution of Plots by Land Attributes

Most (51.6%) of the farm plots were level lands, 28.7% of the plots were sloppy, 14.5% of the plots were closer to a nearby stream or water source, 4.9% of the plots were grassland while 0.3% of the plots was in a valley. Arable farmers usually prefer level lands for cultivation. Plots that are near streams could be potential source of conflict with herdsmen who could bring their cattle to drink water from the stream.

Distribution of Plots by Soil Quality

Majority (92.2%) of the plots were fertile, 4.9% of the plots were very fertile while 2.9% of the plots were not fertile. More so, cultural practices were used by farmers to sustain the fertility of majority (80.0%) of the plots while farmers applied fertilizer to sustain the fertility of the soil on 20.0% of the plots. This implies that since most of the plots were fertile and farmers employed cultural practices such as crop rotation, mulching, shifting cultivation, and others, as means of sustaining soil fertility.

Distribution of Plots by Distance to Farmer's Homestead

Most (51.8%) of plots were 2km or less from farmers' homesteads. The mean distance between homesteads and farms was 3.72km (±3.56), implying that farmers were not too far to their farms. This could also have implications for land conflicts. Farms that are close to the farmers are less likely to be involved in conflict because of frequent visits and work on this farm.

Distribution of Plots by Farm Size

Most (47.8%) of the plots were 2 hectares or less. The mean plot size of the farmers was 4.3 (±5.5), implying that on the average, a farmer owns plots of about 4 hectares. Larger sizes of farmlands for active farmers could lead to higher levels of crop production, and this will enhance crop commercialization.

Plot characteristic	Frequent (n=690)	Percentage
Cropping system		
Mono-cropping	326	47.3
Mixed cropping	364	52.7
Land attributes		
Sloppy	198	28.7
Level land	356	51.6
Valley	2	0.3
Grassland	34	4.9
Presence of a nearby stream	100	14.5
Soil quality		
Very fertile	34	4.9
Fertile	636	92.2
Not fertile	20	2.9
Sustaining soil fertility		
Fertilizer	138	20
Cultural practices	552	80
Distance (km)		
≤2.0	358	51.8
2.01-5.0	192	27.8
5.01-10.0	104	15.1
10.01-15.0	28	4.1
>15.0	8	1.2
Mean = 3.72 (±3.56)		
Plot Size (hectares)		
≤2.0	330	47.8
2.01-5.0	204	29.6
5.01-10.0	102	14.8
>10.0	54	7.8
Mean = 4.3 (±5.55)		

Source: Field Survey, 2019

Table 3: Plot Characteristics

Access to Arable Farmland

Distribution of Plots by Means of Acquisition

Based on plot population (n=690), Table 4 shows that access to most (59.7%) of the farmers' plots were through inheritance, implying ownership of farm plots, 8.4% of the plots were borrowed while 11.3% of the plots were acquired through gift. All these means of land access were through non-market based. On the other hand, results show land access through market means; 11.3% by rent, 6.7% by lease and 2.6% by purchase. This implies that farmers had access to farm plots through market and non-market means.

Access to Arable Farmland	Frequency	Percent (%)
Means of Acquisition		
Lease	46	6.7
Inheritance	412	59.7
Borrowed	58	8.4
Purchased	18	2.6
Rent	78	11.3
Gift	78	11.3
Total	690	100
Land Market Index		
0	234	78
0.01-0.25	16	5.3
0.26-0.50	6	2
0.51-0.75	0	0
0.76-0.99	2	0.7
1	42	14
Total	300	100
Mean (S.D)= 0.16 (±0.35)		

Source: Field Survey, 2019

Table 4: Access to Arable Farmland.

Based on the farmers' population (n=300), Table 4 shows that majority (78.0%) of crop farmers had LMI of 0, implying that access to their total landholding was by non-market means (inheritance, borrowed and gift). On the other hand, 14.0% of the farmers had LMI of 1, meaning that access to their total landholding was through market means (purchase, rent and lease). The mean LMI was 0.16(±0.35), implying that on the average, farmers had access to 16% of the total landholding through market means. This result is similar to the findings of Alawode *et al.* [13] in a study on land market participation of farming households in southwestern Nigeria. Increased land access by farmers for cultivation of crops is expected to enhance increased production which could enhance increased commercialization.

Extent of Conflict on Agricultural Land

Land use conflict on plots of farming households: On the basis of number of plots (n=690), results in Table 5 show that farmers were coping with one form of conflict or the other on majority (90.4%) of their plots. Only 9.6% of the total plots were free from any form of conflicts as at the time of data collection.

Agents of conflict on farm plots: Majority (94.2%) of conflict incidence on plots could be traced to farmer-herder clash. This is consistent with the findings of Abegunde *et al.* [11] and Alawode [2] who reported that pastoralist-crop farmers' conflict is the most predominant type of resource use conflict. Conflicts with other family members and other farmers constituted 2.9% and 2.6%, respectively.

Causes of conflict on farm plots: Results show that 95.2% of conflicts on farm plots could be attributed to competition for natural resources. This is in consonance with the work of Blench [21] who reported that competition over scarce ecological resources has reached its peak in recent times owing to possible impacts of climate change. On the other hand, 3.2% of conflicts on farm plots were due to disputes over boundaries, 1.0% was due to inheritance, and 0.6% could be traced to transactions on land. This implies that most land transactions were successful with a minimum incidence of conflict between land owners and tenants, showing that land market can effectively facilitate access to land for landless farmers.

Conflict resolution on plots: About half (50.3%) of conflicts on plots were resolved, while 49.7% of conflicts on plots were unresolved. This is an indication that appropriate conflict management measures must be adopted by parties involved in conflict in order to abate its consequences.

Parties responsible for conflict resolution: Majority (51.0%) of conflict issues were resolved by law enforcement agencies like the police and Civil Defense Corps, 37.5% of conflict issues were resolved by village heads, 7.3% by family heads while the remaining 4.2% were resolved at farmers' meetings. Farmers preferred law enforcement agencies to resolve cases of conflicts caused by pastoralists due to their intervention in ensuring that defaulters pay a commensurate compensation for the damage caused on the farm. However, farmers decried a high level of corruption in the system thereby accounting for a high percentage of unresolved conflict cases.

Land Use Conflict Index (LUCI): Based on farmers' population (n=300), results show that majority (86.0%) of the farmers experienced conflicts on their total landholding (LUCI=1) while 7.3% of the farmers never experienced conflict on any of their plots (LUCI=0). The mean LUCI was 0.91(±0.27), implying that on the average, 91% of landholding by the farmers were affected by conflict.

Land use conflict variable	Frequency	Percent (%)
Conflict on Plot		
Yes	624	90.4
No	66	9.6
Total	690	100
Party involved		
Family	18	2.9
Pastoralist	588	94.2
Other Farmers	16	2.6
Fisherman	2	0.3
Total	624	100
Cause of conflict		
Land transaction	4	0.6
Competition for natural resources	594	95.2
Disputes over boundaries	20	3.2
Inheritance	6	1
Total	624	100
Resolution of conflict		
Yes	314	50.3
No	310	49.7
Total	624	100
Party responsible in resolution		
Village head	234	37.5
Farmers' meeting	26	4.2
Family head	46	7.3
Police/Civil defense	318	51
Total	624	100
Land Use Conflict Index		
0	22	7.3
0.01-0.25	0	0
0.26-0.5	2	0.7
0.51-0.75	12	4
0.76-0.99	6	2
1	258	86
Total	300	100
Mean (S.D) = 0.91 (±0.27)		

Source: Field Survey, 2019

Table 5: Land use conflict distribution

Crop Commercialization among Farming Households

Crop Commercialization Indices: Different proportions of farmers cultivated the 3 main crops (maize, cassava and yam) considered in this study. These crops are among the staples that are highly demanded, due to their multidimensional usefulness and contribution to daily nutritional requirement. Crops that are of high nutritional value are attractive to cattle and could be a potential source of conflict as herds get attracted to the crops while grazing.

Results in Table 6 show that majority (76.9%) of the farmers sold between 75.01-99.99% of the total maize produced, and a mean commercialization index of 84.19% (±16.0) imply that on the average, farmers sold 84% of the total maize produced. Alawode *et al.* [6] also found that majority (76.9%) of farmers in Southwestern Nigeria commercialized maize up to 75-99%. For cassava, most (53.9%) of the farmers also sold between 75.01-99.99% of the total produced, and the mean commercialization index of cassava was 84.01% (±16.67), indicating that on the average, farmers sold 84% of the total cassava produced. Most (33.9%) of farmers sold between 50.01-75% of total yam produced, and the mean commercialization index of yam was 61.42% (±24.83), implying that on the average, farmers sold 61% of the total yam produced. From the results, the crops driving commercialization in the study area were maize and cassava. They are usually planted as single crops or intercropped. Yam was the least commercialized of the three crops because it is largely consumed by farmers, and in other instances, it is used as gifts. It was gathered that, once cattle herds are allowed to graze yam plot, especially after the vegetative stage, it significantly reduces yam output. Famers also reported that Fulani herdsmen often uproot yam from their heaps to feed their cattle, thereby reducing its output.

Household Commercialization Index: From Table 6, results show that most (66.7%) of the farming household sold between 75.01-99.99% of their total farm produce while 2.0% practiced full crop commercialization.

The mean crop commercialization index was 78.81% (±15.92), indicating that on the average, farmers sold 79% of the total crop produced. By implications, households in southwest Nigeria have moved from purely subsistence agriculture but have not achieved full commercialization due to household food consumption as the farmers also utilize household labour. However, the level of crop commercialization among households was high, especially for maize and cassava, and also yam (more than half of the total produce sold).

CCI	Maize (n= 286)	Cassava (n= 252)	Yam (n= 236)	Household (n= 294)
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
0	2 (0.7)	2 (0.8)	18 (7.6)	2 (0.7)
0.01-25.0	2 (0.7)	0 (0)	2 (0.9)	0 (0)
25.01-50.0	18 (6.3)	16 (6.4)	60 (25.4)	20 (6.8)
50.01-75.0	38 (13.3)	44 (17.5)	80 (33.9)	70 (23.8)
75.01-99.99	220 (76.9)	136 (53.9)	70 (29.7)	196 (66.7)
100	6 (2.1)	54 (21.4)	6 (2.5)	6 (2.0)
Mean(±S.D)	CCI_m=84.19(±16.0)	CCI_c=84.01(±16.67)	CCI_y=61.42(±24.83)	CCI_y=78.81(±15.92)

Source: Field survey, 2019

CCI_m=crop commercialization index for maize

CCI_c=crop commercialization index for cassava

CCI_y=crop commercialization index for yam

HCI=Household Commercialization Index

Table 6: Commercialization indices among farming households

Effects of Land Access and Land Use Conflict on Household Crop Commercialization

Table 7 shows the tobit regression results on the effects of land acquisition and land use conflict on household crop commercialization. The model has a good fit with chi square value of 49.23088 which is significant at $p<0.01$.

Effect of Land Access on the Level of Commercialization

Farm size was found to be significant at 1% and positively related to the level of crop commercialization. One hectare increase in farm size increases the likelihood of crop commercialization by 33%. This implies that the larger the size of farmland utilized by farming households, the greater the production capacity, which eventually converts to a higher volume of output offered for sale.

The extent of participation in land market (LMI) by farmers had significant positive effect on crop commercialization at 5%, indicating an increased level of crop commercialization with higher level of participation in land market. According to the results, the crop commercialization indices for farming households participating in land market was 8.41 times higher than that of the farming households who did not participate in land market.

Effect of Land Use Conflict on the Level of Commercialization

Land use conflict index had negative effect on crop commercialization although not significant. Based on the results, the crop commercialization indices of farming households who did not have conflict incidence on their farmland was 4.22 times higher than of farming households who are coping with one form of conflict or the other. Meanwhile, results show that only 9.6% of farmlands were free from conflict (Table 5) and the farmers coping with conflict were commercializing. The more reason why land use conflict index was not significant.

Other Significant Socio-economic Variables

Results show that age of farmer had significant negative effect on the level of crop commercialization at 10%, implying a decreased level of commercialization with increase in age.

The number of years spent by farmers in school and experience in crop production had significant positive effects on commercialization at 5%, implying increased level of commercialization with literacy level and farming experience.

An additional year in schooling and crop production experience increase household crop commercialization by 53.8% and 27.4%, respectively. In the same vein, the presence of local market had significant positive effect on commercialization at 1%, indicating that the presence of local market increases commercialization index by 42.9%. Also, unit price of maize had positive significant effect on the level of commercialization at 5%, increasing the level of commercialization by 0.05%.

HCI	Coefficient	Std. Error	Z	p-value
Constant	0. 485576***	0.1624	2.991	0.0028
Age	−0.229039*	0.1297	−1.766	0.0774
Years of Education	0.538525**	0.2205	2.442	0.0146
Years of experience in crop production	0.274752**	0.1325	2.073	0.0381
Local Market availability	0.429214***	0.1237	3.470	0.0005
Farm size	0.325320***	0.0894	3.638	0.0003
Land Market Index	8.41140**	3.8912	2.162	0.0306
Unit price of Maize	−0.000542**	0.0002	−2.456	0.0140
Unit price of Cassava	5.13612e-05	4.676e-05	1.098	0.2720
Unit price of Yam	−0.000163	0.0001	−1.330	0.1836
Land Use Conflict Index	−4.222170	4.3565	−0.969	0.3325
Household size	−0.271023	0.1899	−1.427	0.1535
Sex	−3.919500	6.3295	−0.619	0.5358

Source: Data Analysis, 2019

Dependent variable: Household Commercialization Index; Chi-square(12)-49.23088; p-value-1.91e-06; Log-likelihood-420.3299 Sigma-11.858 (0.806836)

*Note: ***, **, * represent significance at 1%, 5% and 10% respectively.*

Table 7: Tobit Regression Results on Effect of Land Access and Land Use Conflict On the Level of Household Crop Commercialization.

Conclusion

Farming households had access to land through market and non-market means. Although farmers had access to arable farmlands more through inheritance which denotes ownership, conflict on farmlands was alarming as many farmers were coping with conflicts on their farm plots, mainly due to farmer-herder clashes. The level of crop commercialization among households was high, especially for maize and cassava, and moderately for yam. Therefore, the crops driving commercialization in the study area were maize and cassava. Even though land access through market means was low, the extent of land market participation (LMI) increases the extent of household crop commercialization (HCI). Also, land use conflict reduces the level of household crop commercialization, though not significantly because farmers had high commercialization orientation; farmers produced more than is needed for subsistence, that is, they sold farm produce inspite of conflict. Land use conflict was high, mainly due to competition for natural resources between farmers and herders, and many of the conflicts on plots were unresolved. Policy efforts should be intensified with a view to facilitating land access by farming households through market participation, and reducing or resolving all arable land use and related resource use conflict; specifying clear boundaries for peaceful coexistence among groups, as well as enacting stringent laws and penalties to serve as deterrents.

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