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Agricultural Commercialization: Effect on Food Security among Smallholder Farming Households in Southwestern Nigeria

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Abstract: ***Agricultural commercialization has several effects on farm households' life conditions. This study therefore, examined the current level of crop commercialization and its effect on food security among smallholder farming households. Primary data were collected from 373 selected smallholder farm households in the study area with the aid of well structured questionnaire using multistage sampling procedure. Analysis was done using descriptive statistics, Household Commercialization Index (HCI) and logit regression model. The study indicated that average HCI was 0.83. Farmers with low, medium and high HCI were 6.44%, 9.65% and 83.91% respectively. The empirical results show that age, level of education, farm size, farm income, access to extension services, access to credit, off farm income and crop commercialization had a significant and positive relationship effect on food security at household level. The study concludes that crop commercialization has a positive influence on food security.***

Keywords: Agriculture, Smallholder, Farming households, Commercialization, Food security

1. Introduction

As in most other developing countries, subsistence agriculture on small plots of land is a way of life for the vast majority of Nigerian farmers; however, there is gradual transformation from subsistence type of farming/agriculture to commercialized agriculture taking place all over the country. Agricultural commercialization refers to the process of increasing the proportion of agricultural production that is sold by farmers (Pradhan *et al.,* 2010). Furthermore transition from subsistence to commercial agriculture is often referred to as the commercialization of agriculture (Kurosaki, 2003). Much hope is generally put on the process of commercialization of smallholder producers for achieving higher agricultural productivity, higher incomes, reduction of poverty and improving food security (Dahiru *et al.,* 2011).

Many countries and international development agencies give due concern to intensification and commercialization of smallholder farming as a means of achieving poverty reduction and food insecurity and thus have reflected it in their official policies. In Nigeria, the government has promoted the increasing commercialization of agricultural production through its different schemes, policies and programmes. Thus, agricultural sector is often seen as important for reducing poverty and food security. Inclusive growth in agriculture contributes more to reducing poverty and increasing calorie intake than growth in other sector. In recognition of the importance of the agricultural sector in Nigeria, the government has initiated and endorsed many national and international programmes, projects and policies aimed at rapidly growing the sector and reducing poverty (NBS/CADP, 2010).

Commercialization of agricultural products has several effects on farmers' life conditions. Therefore, concerns about detrimental and undesirable outcomes of staple food commercialization, on welfare and food security of low-income farmers' households, still persevere and affect interventions policies in developing countries (von Braun, 1994). The major challenge now in Nigeria is the inability of the smallholder farmers and other rural farmers to benefit from commercialization by participating in the market. However, the current reality shows that commercialization of smallholder farming is not yet high enough to enable farmers benefit from increased income and the farmers are not yet out of the subsistence-oriented agriculture (Mahelet, 2007). Market imperfections and high transaction costs have hindered smallholder farmers from exploiting the welfare outcomes of commercialization (Key *et al.,* 2000).

The problem of food insecurity especially during the hungry period among farming households in Nigeria is long standing (Obamiro *et al.,* 2003). This is because rural households in Nigeria face a high level of income variability (access to food variability) due to factors beyond their control such as poor storage and infrastructure facilities couple with poverty that make them particularly vulnerable to shocks such as seasonal changes in food production.

Modernization and commercialization of the smallholder agricultural sector provides the stimulus and impetus to reducing food insecurity in developing countries. This has been a subject of considerable focus among policy-makers and development specialists not only at the level of farming households but also at the level of national and international policies (Omamo, 1998). Moreover, little is understood about the impact of smallholder commercialization on poverty and household food security to inform macro-economic policy change and ensure that agricultural growth brings about widespread positive benefits. The challenge facing Nigeria is to eradicate poverty and attain food security, agricultural competitiveness, and the sustainable management of the environment through accelerated commercialization and investment in Nigeria's agriculture (Manyong *et al.,* 2005). In order to provide empirical evidences of these issues the objectives of this study are: (i) to examine the socio economic characteristics of smallholder farming households (ii) to assess the current level of crop commercialization among smallholder farming households (iii) examine the

effect of crop commercialization on food security of smallholder farming households

2. Materials and Methods

2.1 Study area

This study was carried out in the South-Western, Nigeria. Southwest is one of the six geo-political zones in Nigeria. This zone comprises of six states namely: Lagos, Oyo, Ogun, Ondo, Osun and Ekiti States. It falls on latitude 6^0 to the north and latitude 4^0 to the South, while it is marked by longitude 4^0 4 to the West and 6^0 to the East The dry season lasts from November to March while the wet seasons starts from April and ends in October. Southwest Nigeria covers approximately 12 percent of Nigeria's total land mass and the vegetation is typically rainforest. The total population is 27,581,992 as at 2006 and the people are predominantly farmers. The climate in the zone favours the cultivation of crops like maize, yam, cassava, millet, rice, plantain, cocoa, kola nut, coffee, cashew, palm produce (NPC, 2006)

2.2 Sampling Procedure

A cross-sectional primary data was collected using a structured questionnaire administrated to farm households. A multi-stage sampling technique was employed for this study. The first stage was a random selection of two states from the zone; Ogun and Oyo state were selected. The second stage was proportionate to size sampling of Local Governments Areas (LGAs) from the selected state. Based on the proportionate factor nine (9) and fourteen (14) LGAs were selected from Ogun and Oyo states respectively. The third stage was a random selection of three villages in each of the LGAs selected. The last stage was a proportionate to size sampling households in the selected villages. A total number of 173 and 200 households were selected from Ogun and Osun states respectively.

2.3 Data Analysis

Descriptive statistics such as frequency distribution, percentage and mean were used to assess the socioeconomic characteristics of farming households. Household commercialization index (HCI) was used to assess the level of crop commercialization among smallholder farming households in the study area. Household Commercialization Index for total agricultural production is given as:

$$HCI_i = \left[\frac{\text{Gross value of crop sales}_{hhi,\ year\ j}}{\text{Gross value of all crop production}_{hh\,i,\ year\ j}} \right] *100$$

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.

Logit model was used to determine the effect of crop commercialization on household food security. The binary (dummy) variable developed from the relative food security index was used as the outcome variable, from which households whose per capita monthly food expenditure fall below food security line (2/3 of the mean per capita food expenditure of all households) were designated as food insecure while households whose mean per capita monthly food expenditure equals or is greater than food security line were food secure. While the variables relating to crop commercialization were set as predictor variables. The model is specified below:

$$P_i = F(Z_i) = \frac{1}{1+e^{-(\alpha+\sum\beta iXi)}}$$

Where: Pi = the probability that an individual is being food secure given Xi
Xi = a vector of explanatory variables
α & β = regression parameters to be estimated.
e = the base of the natural logarithm
The dependent variable (P_i) = (Food secure=1, Food insecure=0)

The Explanatory Variables are stated below:
X_1 = age of household head (Years)
X_2 = marital status (married =1; otherwise = 0)
X_3 =gender of the household head (male =1; otherwise= 0)
$X_{4=}$ education of household head (years)
X_5 =annual farm income (Naira)
X_6 = family labour (Number)
X_7 = status of land ownership (owned =1; otherwise=0)
X_8 = size of the total cultivated farm land (Hectares)
X_9 = membership of Association (member =1; otherwise= 0)
X_{10} = farming experience of household head (Years)
X_{11} = household head access to credit (yes =1; otherwise= 1)
X_{12} = access to extension services (yes =1; otherwise = 0)
X_{13} = Extent of farm commercialization. (Percentage)
X_{14} = annual income from off farm activities (Naira)

3. Results and Discussion

Socio-economic and Demographic Characteristics of Farming Households

As shown in Table 1, the proportion of male-headed households was higher than that of female-headed households. The male-headed households constitute 90.59% of the total population. While 9.41% were Females household heads. This connotes a typical Nigerian farming system especially in the western region where men are predominantly farmers. This is substantiated by the study conducted by Adenegan *et al.* (2012). The mean age of household head is 51years and this shows that majority of the household head are still in their active stage and can perform farm activities efficiently. Majority (52.55%) of the household heads fell within the age category 46-60 years. This age range is where the respondents are still very active on the farm.

Majority (36.73%) of household heads had primary school level of education. Majority of the respondents were married and they constitute about 92.49% of the total number of the respondents. The average household size was observed to be 6. Majority (32.98%) of the farm household head had between 11-20 years of farming experience. The average farming experience of household heads was 6years. Nigeria is known to be a nation of small farmers who often operate on fragmented farmlands. The mean landholding of a

household head is 3.8 hectares. Majority (79.36%) had access to extension services also about 91.69% had access to market information. However, greater proportions of the farmers (62.47%) do not have access to credit, this was a major constraints faced by the household heads. The mean household farm income is ₦398,708.5 and the minimum and maximum household incomes are ₦45,000 and ₦1,074,000 respectively, it was also found that many farming households in the study area were also engaged in diversified income-generating activities, involving both farming and non-farming activities. The average off-farm income was ₦98,354.80 ranging from 0 to ₦300,000. The mean household monthly food expenditure is ₦7,681.67 and the minimum and maximum household monthly food expenditure were ₦2,677.50 and ₦18,375 respectively. Also the average household monthly non-food expenditure was ₦29818.90 ranging from 8000 to ₦83,500.

Table 1a: Socio- Economic Characteristics of Farm Households

Variable	*Frequency*	*Percentage*
Gender		
• Male	337	90.59
• Female	35	9.41
Age		
• < 30	7	1.88
• 30-45	99	26.54
• 46-60	196	52.55
• 61-75	63	16.89
•• > 75	8	2.14
Mean 51		
Education Level		
• No formal edu.	49	13.14
• Primary	137	36.73
• Secondary	132	35.39
• Tertiary	55	14.75
Marital status		
• Single	14	3.75
• Married	345	92.49
•Widowed	14	3.75
Farming Experience		
• 1-10	33	8.85
• 11-20	123	32.98
• 21-30	106	28.42
• 31-40	59	15.82
• >40	52	13.94
Mean 6		
Access to credit		
• Yes	233	37.53
• No	140	62.47
Farm size (Hectare)		
• <1	18	4.83
• 1- 3.0	177	47.45
•3.01 – 5.0	119	31.90
•5.01 – 7.0	19	5.09
•7.01- 9.0	11	2.95
•>9	29	7.77
Mean 3.8		
Extension Services		
• Yes	296	79.36
• No	77	20.64
Household size		
• 1-5	116	31.10
• 6-10	244	65.42
• 11-15	12	35.39
• > 15	1	14.75
Mean 6		

Source: Field Survey, 2015

Table 1b: Socio- Economic Characteristics of Farm Households

Qualitative Variable	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Household Farm Income (Naira)	398708.55	242466.16	45000	1074000
Household Off -Farm Income (Naira)	98354.80	57194.42	0	300000
Household Monthly Food Expenditure (Naira)	7681.67	3028.84	2677.50	18375
Household Monthly Non-Food Expenditure (Naira	29818.90	14173.27	8000	83500

Source: Field Survey, 2015

Level of Crop Commercialization among Smallholder Farming Households

As indicated in Table 2, the index of household food crop commercialization level was found to be high at about 74.87%. This was further categories into three groups' namely low, medium and high level of commercialization. The assessment of the current level of crop commercialization among the households using the results of commercialization index, show that 6.43% of the household heads operated at low commercialization level, 9.65% operated on a medium scale, while 83.91% of the household heads operated at high commercialization level. The food crop farm households sold on the average about 83% of its output with total sales that ranged from 8.52% to 97.60%.

Table 2: Crop Commercialization Level among Smallholder Farming Households

Degree of Commercialization	Frequency	Percentage
Low (<=25%)	24	6.44
Medium (25 – 50%)	36	9.65
High (51 – 100%)	313	83.91
Total	373	100
Household Commercialization Index	83.27%	
Minimum Commercialization Index	8.52%	
Maximum Commercialization Index	97.6%	

Source: Field Survey, 2015

Effect of Crop Commercialization on Food Security of Smallholder Farming Households

Table 3 shows the result of the logit analysis. The result shows that Chi-square is significant. This indicates that the model has a good fit to the data. Out of the thirteen independent variables used in the model, eight variables were found to be significant in determining the food security status of the farming households. A unit increase in the age of household head will reduce the probability of household to be food secure by 0.60%. This indicates that the productivity of household heads decline as they get older thereby impacting on their food security status. This result is in consonance with Agbola (2004) who claimed that increase in age decreases food security. The level of education was found to have a significant and positive relationship with household food security. This indicates that households with relatively higher educated household heads are more likely to

be food secure than those of household head with relatively lesser education. this is in consonance with the findings of Habtom et al. (2004), who revealed that both educational levels of household heads has a relatively high potential to more than double the number of food secure households in the study area.

Farm size was positive and significantly related to the probability of a household being food secure. Farm size is significant at 1%. The marginal effect of an additional increase in the area under cultivation will increase the probability of the household being food secure by 0.085units. Also this outcome is consistent with the finding from a research conducted by Bogale (2009) in Ethiopia. A unit increase in farming experience of household head increases the probability of household to be food secure by 0.006units. This result is expected because a more experienced farmer is likely to have higher productivity and hence be able to provide more food for his household members. Also, all things being equal, an experienced household head is expected to have more insight and ability to diversify his or her production to minimize risk of food shortage and also have adequate knowledge in pest and disease management as well as good knowledge of weather.

Access to extension services is statistically significant at 10% with a positive relationship with the food security status of a household. This implies that households with access to agricultural extension services tend to have less food insecurity than those that did not have such access and vice versa. This is because contact with extension services tends to enhance the chances of a household having access to better crop production techniques, improved inputs, as well as other production incentives that positively affect farm productivity and production and thus household food security status. Access to credit was found to have positive influence on food security status of households. The result of the study implied that household that received credit had greater chances of being food secure compared to those who did not have credit, all things being equal. The value of the marginal effects indicates when a household obtains credit; the probability of that household to be food secure will be increased by 0.183 units. The result of the study is in line with the findings of Pappoe (2011), who found that access to credit improves the food security status of farming households among bio fuel producers in the Central region of Ghana.

The extent of agricultural production commercialization is an income-determining factor that is expected to affect food security. The coefficient of the variable is statistically significant at 10% and exhibits a positive relationship with food security status, suggesting that the higher the extent of commercialization, the higher the probability of food security tends to be, and vice versa. The reason for this result is probably because most of the households produced at a scale primarily meant for market purposes which led to increase in income generated from sales of output. These incomes serve as a means of adding to existing stock meant for home consumption through food purchases from the market and thereby guaranteeing food security. Off farm income was significant at1% with a positive sign indicating that there is a positive relationship between revenue from off farm work and food security. This indicates that income from these off-farm activities was also invested in agriculture to increase production and food availability at the household level.

Table 3: Result of Effect of Crop Commercialization on Food Security among Smallholder Farming Households

Variables	*Coefficient*	*Standard error*	*P>/Z/*	*Marginal Effect*
Age	-0.028**	0.013	0.025	-0.006
Marital status	0.351	0.375	0.035	0.074
Gender	0.041	0.549	0.094	0.009
Level of education	0.0394***	0.130	0.002	0.087
Farm income	7.98E-08	2.82E-07	0.778	1.68E-08
Family labour	0.092	0.208	0.659	0.019
Land ownership	0.107	0.131	0.416	0.022
Farm size	0.405***	0.071	0.000	0.085
Member of association	0.030	0.331	0.929	0.006
Farm experience	0.029*	0.016	0.075	0.006
Access to extension	0.538*	0.293	0.066	0.112
Access to credit	0.917*	0.349	0.009	0.183
Extent of comm.	0.036*	0.009	0.007	0.007
Off farm income	7.55E-06***	1.42E-06	0.000	1.59E-06
Constant	1.205	1.659	0.468	
log likelihood -117.52 LR chi^2 (14) 143.08 Prob>chi^2 0.000 Pseudo R^2 0.3270				
Note: ***, ** and * are significance level at 1%, 5%, and 10% respectively.				

Source: Field Survey, 2015

4. Conclusion and Recommendations

Literature on commercialization of smallholder agriculture in Nigeria rarely focuses on food security. This study attempt to fill this gap of knowledge in the commercialization literature and also serve as foundation for future researchers to build on. Specifically, the study estimated and analyzed the level of farm household total agricultural commercialization and how crop commercialization interacts with food security through influencing households' food consumption expenditure level. The degree of crop commercialization among the smallholder farmers was found to be comparatively high. Agricultural commercialization at the household level significantly and positively influenced the food security status of smallholder farm households, through increase in income generated from sales of output, which is use to purchases food items from the market in addition to the existing stock of food items meant for home consumption thereby ensuring food security. It was recommended that Government should improve access to credit and go beyond creation of intervention fund but that the conditions attached should be flexible to ensure easy access to smallholder farmers. Also farm household should be orientated to use the proceeds from commercialization to increase or diversify their food basket. The promotion of off-farm activities as alternative livelihood options should be pursued by farm household to improve the household food security situation in the study area. Lastly, it is imperative to formulate new agricultural policies to promote commercialization of crops which can help in attaining food security.

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