Assessment of Factors Influencing Commercialization of Arable Crops among the selected Smallholder Farmers in Nigeria: A Case Study of Iwo Local Government Area of Osun State

ABSTRACT

The study looked into what prompted certain small-scale arable farmers in Nigeria to market their produces. As commercialization becomes more and more lauded as a model for rural development, many smallholders' capacity to do so is called into doubt. The objective of the study was to analyse the factors influencing the decision of smallholder farmers to commercialize the selected arable crops. Eighty Five smallholder farmers were randomly sampled for this study, which estimated farmers' level of crop commercialization and identified factors contributing to their estimated engagement with markets. Structured questionnaires were used to obtain primary data from farmers, while reports from published materials were also reviewed. The study utilized the household commercialization index (HCI) and multiple regression model as its main analytical tools. It found that Crop production. The result of the commercialization index revealed that, among all crops grown, Cassava had the highest percentage of 54.68% with the lowest value of 6.83% for yam production. The results indicate varying levels of market engagement among smallholder farmers and underscore the need for caution in adopting a rigid commercialization approach.

KEYWORDS: Agriculture, Commercialization, Commercialization Classification index, Multiple Regression, Smallholder farmers

1.0 Introduction

"Agriculture plays critical roles in livelihoods: employment, income growth, food security, poverty alleviation, socio-economic development and environmental sustainability in developing countries" (Shadreck et al., 2013). "The conventional roles of agriculture include producing food for the growing population, producing raw materials for agro-industry, providing labour and market for urban industry, supplying savings for investment and providing export earnings" (Olaoye, 2014).

Onubuogu et al., 2014 argued that "agriculture is predominantly on a smallholder basis in Nigeria and that about 90% of farm holdings are less than two hectares in size". Kristen *et al.,* (2012) added that "these subsistence oriented small holders have the greatest need to commercialize in order to satisfy the growing demand and practice in the resultant income-mediated benefits" (Cheber 2018).

There are many distinct economic, social, and scholarly groupings, and their definitions of commercialization vary. While one group of authors sees commercialization as a necessity to classify farmers according to the amount of produce they produce with an eye on the market (Nwafor and Westhuizen, 2020), the incorporation of farmers into value chains is how some authors define commercialization. (Barrett et al. 2010, Kaminski 2018).

"A survey of numerous commercialization-related studies reveals a close relationship with the stages of value-chain growth. Increased production and sales of surpluses, responding to input and output market signals, the ability to access regional markets, a greater use of modern technology in production, the integration of farmers with agro-processors, and the emergence of effective farmer-based organizations are all part of these stages, as described" by Nwafor (2020) and Addisu (2018).

Prior studies of commercialization focused on a marketable surplus, recent work shows a focus on the level of market interaction, whether for inputs, output, or both (Wiggins et al., 2011; Forsythe et al 2016). So, according to Awotide et al. (2016), commercialization among smallholder agricultural producers denotes a greater or better capacity to participate in both input and output markets. Many factors, including the ability to profit from market needs while boosting household incomes and food security, are at play in increasing smallholder farmers' participation in value chains or in existing and new markets.

According to Osmani and Hossain (2015), a fundamental understanding of smallholder commercialization involves either an increase in the production of food crops and the marketing of surpluses or a focus on the growth of cash crops. Any stance chosen could prevent the farmer from participating in profitable value chains or compromise the security of their household's food supply. It also emphasizes the challenges smallholder farmers face when considering commercialization, which calls for efficient marketplaces, suitable institutional frameworks, and sufficient infrastructure.

Markelova and Mwangi (2010) identified prerequisites for smallholder commercialization that go beyond functional markets, including efficiency and lower costs that take into account potential and intrinsic production costs. As a result of diminishing farms, unequal land sizes, and the establishment of large farms, there is also significant split within the smallholder sector, which calls into question the inclusiveness of the purported economic progress brought on by agricultural commercialization in various African nations. This gap among smallholders serves to emphasize the insufficiency of the commercialization agenda and the recognition among its proponents that a well-targeted social policy intervention could result in more favourable results for particular groups of smallholder farmers.

As a result of curiosity of smallholder farmers for commercialization, smallholder farmers confront challenges since they run across many roadblocks when seeking to access markets (Mgbenka et al., 2016). Smallholder farmers in Nigeria face a number of restrictions and difficulties, such as limited market access, credit scarcity, a lack of institutional support, high transaction costs, inadequate training, and insufficient property rights (Mgbenka et al., 2016; Shiferaw and Muricho 2011). Many of these problems have remedies that often include the disadvantaged smallholders joining together with established farms or taking part in marketing campaigns to take advantage of economies of scale (Mgbenka etal., 2016).

However, established large-scale farmers benefit more from these so-called market orientation methods than poor smallholders (Nwajiuba 2012). However, the significance of the smallholder agricultural sector has been confirmed (Agwu et al. 2013, as it improves rural welfare and food security while also creating jobs in the sector.

“The focus right now is on how these smallholder farmers may increase their competitiveness by taking part in agricultural supply chains commercially and responsibly” (Dunn 2014). “There is currently study being done on how to successfully integrate smallholders into agricultural supply networks. The demand for more study into smallholder commercialization is strengthened by the fact that small-scale farmers' participation in existing supply chains is heavily dependent on marketed agricultural produce” (Mgbenka et al., 2016; Forsythe et al., 2016). This calls for the need to investigate the factors that could influence the decisions of these smallholder farmers to

commercialize. The significance of this study lies in its contribution to our understanding of the drivers of increased crop commercialization within the target group as well as the adverse repercussions of greater market exposure for smallholder farmers. Additionally, recommendations for public and private sector initiatives are offered in an effort to increase food security while boosting the productivity and profitability of the area's smallholder agriculture. In view of the problem mentioned above, the study asked the following research questions; (a) what is the level of commercialization among selected arable crops? **(b)**what are the benefits of crop commercialization to the respondents**?** What factor(s) influence the level of commercialization among these smallholder farmers?

2.0 MATERIALS AND METHODS

The study area was Iwo, Nigeria: Iwo is a city in Osun State which lies on 6miles (10km) north of the Iwo Station on the lagos-kano railways and at intersection off roads from Ibadan, Oyo and Ogbomosho, on a low hill at the edge of savanna and forest. It lies between longitude 4^0 117^0E to 4.183^0 E and Latitude $7^0 38^0$N to 7.633^0 N . The local government area has an estimated population of 191,348 people in 2006 and located on the area 245 km^2(95sq mi). The primary economic activity of people in this area is agriculture with the primary crops being cocoa, yam, corn, cassava and palm oil.

2.1 Sampling and Data Collection

A multistage sampling technique was used for collecting data for this study. The Data collection was based on the 2013 list of registered crop farmers in Iwo local government. The first stage involved the use of simple random technique to select 1 ward from the 15 ward from the ADP list of registered crop farmers in Iwo local government area. The second stage involved random selection of 5 towns from the ward. Third stage involved random selection of 17 Cassava farmers from each of the selected towns. In all, a total of 85 respondents were used for this study. The population was limited only to the registered farmers on the ADP list which is the reason for the lower sample size because there are few fully registered farmers on the list. This implies that the results cannot be generalized to all smallholder farmers within the municipality. The sample of registered farmers used in this study sails from towns including Telemu, Igege, Ogbagba, Ajagba, Ultimate and Bode-Osi.

2.2 Analytical Method

The main literature on which this study relied was (Agwu etal., 2013). The main quantitative measure of interest was the household commercialization index (HCI), which was created to calculate the degree of commercialization among smallholder farmers. A regression model was also used to determine the factors influencing the degree of commercialization. The household commercialization index (HCI), which is measured as a percentage of the gross value of all crops produced by the same household I in the same year (j), assesses the gross value of agricultural sales made by a household in a given year. HCI (i) = Gross value of crop sales hhi year j x 100 Gross value of all crop production hhi year j

The household commercialization index (HCI) was used to determine household specific level of commercialization, as used by Agwu, *et al.,* (2013). 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 produce by the same household I in the year j expressed as a percentage. A value of zero would signify a totally subsistence oriented household and the closer is to 100, the higher the degree of commercialization.

A multiple regression analysis model was utilized to assess the determinants of commercialization of arable crops among the smallholder farmers in Iwo LGA. Following Gujarati and Porter (2009), the multiple regression model is expressed as:

The implicit functions of the four functional forms of multiple regressions are stated as follows:

Linear Function

$Y=F(X_1 \ldots\ldots X_n + U)$

Exponential Fuction

$InY=F(X_1 \ldots\ldots X_{n+} U)$

Double log function

$InY=F(InX_1 \ldots\ldots InX_{n+} U)$

Semi-log function

$Y=F(InX_1 \ldots\ldots InX_{n+} U)$

Where:

Y= Commercialization Index)

In= Natural log

X_1= Age (years)

X_2= Sex (Dummy)

X_3= Years in School (Years)

X_5 = Farming experience (years)

X_6= Farm Size (Hectares)

X_7= Land tenure (Dummy)

X_8= Labor use (Dummy)

X_9= Farm Profit (₦)

X_{10}= Total Output (Kg)

U = Error term.

The function that gave the best fit was selected as the lead equation based on econometric considerations.

2.3 Limitation of the Study

Due to the small fraction of crop farmers who were registered under the ADP zone, the sample size used in the study was smaller (85) compared the expected sample. Additionally, despite the that the study seek the informed consent of the respondents by asking if they would fully partake in filling the questionnaire, they still could not provide answers to some of the questions asked which led to the removal of some of these questions. This resulted in the selection of small number of independent variables for the analysis.

3.0 RESULTS AND DISCUSSION

3.1 The demographic characterization of the respondents

The demographic characterization of the respondents is presented in Table 1. Among the surveyed respondents, 42 percent were female and 58 percent were male; 41% percent of respondents were between 41 and 50 years. Equal percentage (28) had completed high school (Grade 12), and had no formal education respectively. Most of the respondents had between one and five members in their houses; 89% of them had between 0.4 and 4.0 hectares on their farms; majority (31%) had less than 10 years of experience in farming activities; most of these respondents had access to credit and they maade use of hired labour frequently; they obtained their farmlands as a gift; they were all engaged in the production of Cassava, Maize, Oil palm and Yam; and they applied more of inorganic fertilizer as a means to boast their food production.

Table 1: The demographic characterization of the respondents

	Variable	Frequency	Percentage
Gender	Male	49	58
	Female	36	42
Age	<30	10	11.76
	31-40	19	22.35
	41-50	35	41.18
	51-60	13	15.29
	61-70	8	9.41
Education	0	24	28.24
	1-6	18	21.18
	7-12	24	28.24
	13-17	7	8.23
	18& above	12	14.12
Household Size	1-4	43	50.59
	5-7	28	32.94
	8-10	14	16.47
Farm Size	0.4-4.0	76	89.41
	4.1-7.7	3	3.53
	7.8-11.4	5	5.88
	11.5& above	1	1.18
Years of farming experience	<10	27	31.76
	11-20	20	23.53
	21-30	24	28.24
	31-55	14	16.47
Access to credit	Yes	50	58.82
	No	35	41.18

Type of labour used	Family	21	24.71
	Hired	37	43.53
	Both	27	31.76
Land tenure	Inherited	23	27.06
	Purchased	15	17.65
	Leased	5	5.88
	Rent	17	20.00
	Gift	25	29.41
All crops grown			
Cassava	Yes	85	100
Maize	Yes	85	100
Oil palm	Yes	85	100
Yam	Yes	85	100
Fertilizer type	Organic	14	16.47
	Inorganic	65	76.47
	None	6	7.05

3.2 Measure of Crop Commercialization among Respondents

The values of crops produced during the previous cropping season and the amount received for crops sold by respondents was used to determine the commercialization index as shown in Table 2. The unit of gross value of crops according to the respondents was in tonnes. For clarity the study converted this to standard unit of Kilogram. According to Agwu, *et al.,* (1999), "the closer the index is to 100, the higher the degree of commercialization. It is revealed that, cassava has the highest level of commercialization with 54.68%, followed by maize (30.00%), palm oil 8.48% and yam accounted for the lowest level of commercialization (6.83%). This implies there is high level of orientation and awareness of importance of commercialization for cassava production relative to others".

Table 2: Most Commercialized Crop among Respondents

Crops grown	**Gross Value of Crop Sales(Kg)**	**Gross Value of all Crop Sales(Kg)**	**Percentage Ratio**
Cassava	266885.9	488071.8	54.68
Maize	146429.4	488071.8	30.00
Palm oil	41397.65	488071.8	8.48
Yam	33358.82	488071.8	6.83

3.3 Benefits of Crop Commercialization among Respondents

Likert scale was used to gather responses from the respondents while weighted mean score was employed to measure the individual responses and rank them in order of decreasing importance.

The respondents were ranked based on what they perceived as the benefits they realize from their commercialization activities. An increase in the household income ranked first as the most perceived the benefits derived from commercialization, followed by improving farming household welfare, allows for diversification ranked third while enhancement for food security ranked the lowest benefit derived from commercialization.

Table 3: Most Commercialized Crop among Respondents

Benefits	Weighted Mean Score	Rank	Comment
Increase household income	5	1	Strongly Agree
Improving farming household welfare	4.95	2	Strongly Agree
Allows for diversification	4.89	3	Strongly Agree
Increase crop productivity	4.79	4	Strongly Agree
Enhancement of food security	3.61	5	Agree

3.4 The multiple regression analysis estimates of variables Influencing Commercialization

The multiple regression analysis was used, with the household commercialization index as dependent variable, and other identified factors as independent variables. The result from the regression analysis is shown in Table 4.

Linear function was chosen as the lead equation because of the greatest R^2 value of 0.51%, implying that, 51% of the variability in commercialization index can be explained by the estimated independent variables while the remaining 49% is explained by the error term.

The variable indicated in Table 4, whose coefficient was statistically significant as indicated by the t-value at (5% confidence interval), include farm size which indicates that the farm size was a positive driver of commercialization. This result implies that as the farmers have access to more hectares of land, their level of commercialization is likely to increase. This is because they will be able produce crop outputs which will encourage the offering of more of them to the markets. This corroborates with the finding by Alawode and Abegunde (2018) who revealed that access to land had positive

significant effect on commercialization activities. Also, this confirms the finding by Agwu et al. (2013) who found out that the land was a significant driver of commercialization.

Labour use (Hired Labour) was significant at 10% level of significance. By implication, this means that the use of hired labour will positively drive commercialization activities among the smallholder farmers. This is in line with Alemu and Assaye (2022) who revealed that "using hired labour was able to influence rice yield of about 52% farmers positively by increasing the productivity by higher by 0.4t/ ha. They also added that Rice productivity in this locality would have been increased on average by 0.331t/ha for non-users of hired labour if they had applied hired labour in their production processes".

Inorganic fertilizer was also significant at 1% probability level with a positive sign, which indicates that inorganic fertilizer use is a positive driver of commercialization. This result implies that an increase in the use of inorganic fertilizer will increase their possibility of commercialization. This corroborates the finding by Toungos (2019) who compared organic and inorganic fertilizer effect on the growth of Maize, and found out that the crops planted using NPK were tallest and had shorter days to tassel and silk.

Farm profit was significant at 1% probability level with a positive sign which indicates that farm profit is a positive driver of commercialization. This result implies that an increase in the use farm profit will increase their possibility of commercialization. Farmers will be able to purchase and pay for farm inputs needed to expand their crop production. This is consistent with the finding by Agwu et al. (2013) which revealed farm income as a significant factor positively influencing commercialization.

Total output of crops was significant at 1% probability level with a negative sign, which indicates that total output of Cassava is a negative driver of commercialization. This implies that an increase in total output of Cassava realized by farmers will decrease their possibility of commercialization. This may happen due to poor quality of the cassava produce arising from excessive use of fertilizer in their quest to boost their cassava. In the finding of Agwu et al. (2013), total output of crops was not a significant variable that could influence commercialization.

Table 4: Multiple Regression Estimates of Variables Influencing Commercialization (N = 85)

Variables	Linear	Double-log	Semi log	Exponential

Age	-0.0012297	-0.3508307	-0.1966588	-0.0021234
	(-0.51)	(-2.14)**	(-1.97)**	(-0.47)
Sex	0.34931	-0.0277166	-0.0069442	0.0513592
	(0.95)	(-0.42)	(-0.17)	(0.74)
Years in school	0.0040911	0.0113737	0.013505	0.0042304
	(1.47)	(0.42)	(0.82)	(0.80)
Farming	0.0032171	0.2045421	0.1247453	0.0040766
Experience	(1.42)	(2.97)***	(2.98)***	(0.96)
Farm Size	0.0197641	0.2157063	0.119422	0.0322777
	(2.62)**	(3.46)***	(3.15)***	(2.26)**
Land tenure	0.0122848	0.0173104	0.0006905	0.024502
	(0.37)	(0.31)	(0.02)	(0.39)
Labor use	0.0638685	0.0128012	0.0088981	0.1307434
	(1.70)*	(0.19)	(0.21)	(1.84)*
Fertilizer use	0.177099	0.002431	0.012311	0.2916368
	(2.80)***	(1.42)	(1.33)	(2.44)**
Farm profit	0.00000106	0.1045203	0.052424686	0.00000161
	(6.33)***	(6.44)***	(5.32)***	(5.11)***
Total output	-0.00000633	-0.3253403	-0.1717437	0.000000928
	(-5.17)***	(-3.77)***	(-3.27)***	(-4.02)
Constant	0.4766018	3.238372	2.603548	2.00736597
	(3.14)***	(2.80)***	(3.70)***	(-2.43)***
R^2	0.514	0.486	0.420	0.428
Adjusted R^2	0.440	0.401	0.323	0.313

Significant values at the $p < 0.01$ (***), 0.05 (**) and 0.1 (*) levels.

4.0 CONCLUSION AND RECOMMENDATIONS

Due to the anticipated rise in the global population and its implications on food supply and demand, several stakeholders in the African agricultural and rural development sector have continued to explore ways to increase production and boost productivity in order to meet the demands of the continent. There is also a resurgence of interest in Africa's capacity to raise its share of world food production. Given that Rural smallholder agriculture in Nigeria is mostly practiced on communal lands under various forms of land ownership. This study showed that many of the participating farmers had between 0.4 and 4 hectares of land demonstrating the frequency of the small quantity of land that rural farmers use.

While the average index of Cassava commercialization is low at 0.55 even though it is the most commercialized crop among the crops grown: HCI Maize 0.30: , HCI Palm oil 0.08 and HCI Yam 0.07, there is still more to be done to improve the commercialization activities for the identified arable. Farm size, labour use, Inorganic fertilizer, Farm profit, and Total output were factors identified as having influence on the level of arable crop commercialization among the study respondents.

Among those crops on the lower commercialization levels, support measures are required to improve their ability of the farmers to engage with markets for these crops. In several instances, market engagement is not an option for those who have very little to sell, and confirms the excess production or marketable surplus requirement put forward by a group of commercialization advocates. Other social interventions should be considered and are recommended for this category of smallholder farmers. Training and mentorship including other forms of support to new beneficiaries of land restitution is recommended, as it will assist in the drive to increase food security and provide a means of livelihoods for smallholder farmers who are not able to engage actively with formal supply chains.

5.0 Future Research

Based on the limitations in this study, future research should delve more into investigating related topic using larger sample size. Also, future research should also adopt improved data collection methods to ensure that all questions are answered to ensure validity and consistency of results

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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