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COMMERCIALIZATION OF URBAN FARMING: THE CASE OF VEGETABLE FARMERS IN SOUTHWEST NIGERIA

By

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Abstract

Markets and improved market access are critical for improving urban incomes, particularly in Africa. Despite this, participation of farmers in domestic and regional markets in southwest Nigeria remains low due to a range of constraints. One of the limiting constraints faced by farmers is linked to poor market access. This paper analyses the determinants of commercialization of urban vegetable farming in southwest Nigeria. Primary data were collected for the purpose of this study using structured questionnaire. A multi-stage sampling technique was employed for the study. Oyo and Lagos states were randomly selected from the six states in the southwest Nigeria. The next stage was random selection of two urban Local Government Areas from the selected states. Two hundred and thirty (230) vegetable farmers were randomly selected from both states. The data were analysed using descriptive statistics and Tobit model. Mean age and household size of farmers in the area was 41.9 years and six members respectively. Vegetable farmers are smallholders with average farm size of 0.05ha. Average market participation index of urban vegetable farmers was 0.73. Result of Tobit regression showed that age, age squared, farm size, membership of association, years of education, distance to market, heterogeneity index, cost of fertilizer, cost of chemicals and decision making index influenced extent of commercialization. Social capital significantly affects market participation. The study recommends that governments, non-governmental organizations and other development partners should take a pro-active role in facilitating the formation of smallholder vegetable farmer's organizations and linking then to markets.

Keywords: Urban vegetable farming, Commercialization, Social capital, Southwest Nigeria

1. Introduction

Agriculture has been subject to considerable state interest and intervention over the past half century in many parts of the world, perhaps more than any economic sector (Robinson, 1989; Gardner, 1990). Agriculture continues to be a strategic sector in the development of most low-income nations. It employs about 40% of the active labour force globally. In sub-Saharan Africa, Asia and the Pacific, the agriculture-dependent population is over 60%, while in Latin America and high income economies the proportions are estimated at 18% and 4%, respectively (World Bank, 2006). Close to two thirds of the natural wealth in low-income countries is embodied in crop and pasture land. The agricultural sector employs 70% of the national labour force through forward and backward industrial linkages, thus providing food and incomes to individuals and households.

Despite Nigeria's rich agricultural resource endowment, however,the agricultural sector has been growing at a very low rate. Less than 50% of the country's cultivable agricultural land is under cultivation. Most of this land are cultivated by smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields. The smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, and inadequate research and extension services. In response to the dwindling performance of agriculture in the country, governments have, over the decades, initiated numerous policies and programs aimed at restoring the agricultural sector to its pride of place in the economy. But no significant success has been achieved due to the several persistent constraints inhibiting the performance of the sector (Manyong *et al,* 2005).

Furthermore, rapid population growth and urbanization in developing countries like Nigeria imply high demand for food and require urgent supply response to prevent widespread famine, especially among low income consumers (Pingali *et al*, 2006). Urban farming is the growing of plants and raising of animals for food and other uses within cities and peri-urban areas as well as, related activities like the production, delivery of inputs , processing and marketing of products (urban agricultural magazine, 2001). The benefit of urban farming is hinged on availability of productive land and water resources for this economic group. Vegetables as a group of horticultural crops are important for their contribution as an income support to a large proportion of the rural households. However, enhancing vegetable farmers to reach markets and actively engage in the markets is a key challenge influencing vegetable production in many african countries including Nigeria (Heinemann, 2002; Bongiwe and Masklu, 2012). A very effective way of enhancing urban consumers food security is to improve the efficiency of all activities that bring food into cities and distribute within urban areas- assembling, handling, sorting, packaging, storing, transportation, processing, wholesaling, retailing, and cooking for sale. In south west zone of Nigeria, (Lagos and Ibadan), local

authorities can do a great deal to enhance market participation of low income urban consumers by supporting the development of efficient private sector food marketing system.

Commercialization is the movement from a subsistence production to a market-based system of production. It involves raising the cash earnings of small-scale, agricultural related enterprises. Increasing the unit of output, raising the value added or both, producing for domestic and foreign markets leads to commercialization. It can be conceptualized from both input and output side. According to Von Braun *et al*, 1994), the degree of participation in the output market is the conventional way to measure commercialization which is employed in this study.

However, commercialization is contingent upon the availability of both input and output markets, agro-climatic conditions and risks; infrastructure, community and household resource and asset endowments; the development of local commodity, input, laws and institutions (Pender *et al*., 2006). It is a complex and dynamic process involving several dimensions related to technology, markets, finance, institutions, infrastructure and social structure. Nonetheless, past efforts to improve smallholder farmers' access to markets through market reforms have largely been ineffective. Consequently, majority of African smallholder farmers still produce largely for subsistence needs, producing small marketable surpluses and faces thin markets. Such markets are characterized by low activity, low volumes and non-competitiveness (Obare *et al*, 2006). The farmers face difficulties in transporting their produce to the markets which often force them to sell at the farm gate. Similarly, lack of coordination among smallholder farmers limit their ability to bargain for higher prices, have access to information and credit, hence, dampen the incentives to commercialize and expand production (Makhura *et al*, 2001; World Bank, 2002; Kydd and Dorward, 2003; Dorward *et al*, 2005; Poulton *et al*, 2006; Pender and Alemu, 2007).

Marketing of vegetables requires great care in all the stages of production before it gets to the final consumer, that is, from the harvesting, processing, sorting, packaging, packing, transportation, to the actual sale of the commodity to ensure utmost quality. It then becomes imperative to shed more light on the marketing of vegetables and how collective action as well as some other factors could influence market participation. Therefore, this study analyses determinants of commercialization among urban vegetable farmers.

2. Methodology

2.1 Area of Study

The south-western (SW) part of Nigeria represents a geographical area covering between latitude 60 to the North and latitude 4o to the south. It is marked by longitude 40 to the West and 60 to the East and has a land area of approximately 114,271 km^2 representing 12% of the country's land mass and comprises six states: Ekiti, Oyo, Osun, Ogun, Ondo and Lagos. The total population is 27,581,992 and predominantly agrarian and more than 96% of the population is Yoruba (NPC, 2006). The region is bounded in the North by Kogi and Kwara States, in the South by Atlantic Ocean, in the West by Republic of Benin and in the East by Edo and Delta States. Figure 1 shows the map of southwest States, Nigeria.

Agriculture is the dominant economic activity and main source of employment in the states providing employment and income for more than 75.0 per cent of the population. The people are predominantly farmers, while women engage in food processing and trading in addition to farming. The states have distinct wet and dry seasons, which characterize their humid tropical climate, with the dry season extending from November to March. The mean annual rainfall is 1480mm with a mean monthly temperature range of 18º -24º C during the rainy season and 30º -35º C during the dry season. The climate in the zone favours the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, kolanut, coffee, palm produce, cashew,vegetables and so on (NPC, 2006).

2.2 Sources of Data and Sampling Procedure:

Primary data were collected for the purpose of this study using structured questionnaire. Data were collected on socio-economic characteristics, membership of associations, participation in the local level institution activities vegetable production and marketing as well as costs and returns to vegetable production.

The Multi-stage sampling technique was used in selecting respondents. The first stage of the sampling procedure was the random selection of Oyo and Lagos states from southwest Nigeria. The next stage was the random selection of two urban LGAs from the two selected states. Finally, a total of two hundred and thirty (230) vegetable farmers were randomly selected from both State.

2.3 Analytical Tools and Models

This study employed a number of analytical tools based on the objectives of the study. The tools include descriptive statistics and tobit analysis.

2.3.1 Descriptive Statistics: Descriptive statistics such as tables, frequencies, mean and percentages were used for socio-economic and social capital variables.

2.3.2 Tobit Model

Tobit model was used to determine the extent of level of participation of urban vegetable farmers. However, this study analysed the intensity of market participation, in order to determine factors that influence the degree of commercialization among vegetable farmers in southwest Nigeria. The Tobit modelis sprcified below:

$$Y^* = \beta_i X_i + \mu_i$$

Where, Yi* =, $MPI = \frac{\sum_{k=1}^{k} \overline{P}_k s_{ik}}{\sum_{k=1}^{k} \overline{P}_k Q_{ik}}$; Market participation index (MPI) is defined as the proportion of the value of crop sales to total value of crop production; s_{ik} is quantity of output *k* sold by household *i* evaluated at an average price (P_k), Q_{ik} is total quantity of output *k* produced by household *i* (von Braun *et a*l, 1994); β_i is the vector of parameters to be estimated; X_i is the set of explanatory variables and μ is the error term. A Zero value of Yi* is observed when a household has no surplus to sell but has excess demand on the commodity.

The Explanatory variables include:

Household Characteristics:

X_1 = Sex

X_2 = Age of household head (years)

X_3 =Age squared of household head (Years)

X_4 = years of education

X_5 = Marital status

X_6 = Household size

X_7 = Farm Size

X_8 = Cost of planting materials (Naira)

X_9 =fertilizer cost (Naira)

X_{10} =Labour cost (Naira)

X_{11} =chemical cost (Naira)

Social capital Variable

S_1 = Membership of co-operative (yes =1; 0 otherwise)

S_1= Meeting attendance index of households to associations (%)

S_2 = Decision making Index (%)

S_6 = Heterogeneity index of associations (%)

Table 1: A Priori expectation of the Exogenous Variables affecting the Extent of Participation of Urban Vegetable Farmers.

Variables	**Description**	**Expected signs**	**Literature**
Sex	Dummy	+	Cunningham *et al*, 2008
Age of household head	Continuous	–	Ehui *et al*, 2009
Age squared of household head	Continuous	+	Ehui *et al*, 2009
Year of education	Continuous	+	Makhura *et al*, 2001; Gebremedhin and Jaleta, 2010
Marital status	Dummy	±	Makhura *et al*, 2001
Household size	Continuous	–	Alene *et al*, 2008
Farm size	Continuous	+	Straberg *et al*,1999; Gebremedhin and Jaleta, 2010; Martey *et al*, 2012
Cost of planting materials	Continuous	–	

Fertilizer cost	Continuous	-	
Labour cost	Continuous	-	Dyer *et al*, 2006
Chemical cost	Continuous	-	
Membership of Association	Dummy	+	Wbmbugu *et al*, 2009
Meeting attendance index of households to associations	Continuous	+	Wbmbugu *et al*, 2009
Decision making Index	Continuous	+	Grootaert,1999; Wbmbugu *et al*, 2009
Heterogeneity index of associations	Continuous	-	Nagarajan *et al*, 1999

3.0 Results and Discussion

3.1 The Socio-economic/Demographic Characteristics of Respondents

The socio-economic characteristics normally have effects on commercialization, social capital and welfare of the households in the study area. Descriptive analysis of selected socio-economic and demographic variables used in the study is presented in Table 2. The male respondents constitute the larger percentage in vegetable farming with 65.22% which shows that more males were involved in urban vegetable farming. The age of the household heads shows that majority of the respondents (79.13%) were below 51 years of age while the mean age was 41.90 years therefore can be regarded as active, agile and with more energy to dissipate and concentrate on productive effort. The average household size was 6 for the respondents. The proportion of the married respondents in the study area was 79.57% while the rest were unmarried (divorced, widowed and single). The average farm size for the respondents was 0.05ha. This implies that vegetable farmers are smallholders. The results of the educational status shows that many (44.78%) of the household heads had secondary education while 20%, 25.65% and 9.57% had no formal, primary and tertiary education respectively. The mean market participation index stands at 0.73. This implies that participation is very high among urban vegetable farmers. Majority (95%) of these farmers sold thier output at the farm gate while only about 5% of them participated in the urban market.

Table 2: **Socio-Economic Characteristics of the Respondents**

Variable		Frequency	Percentage
Gender	Male	150	65.22
	Female	80	34.78
Age	0-30	48	20.87
	31- 40	70	30.43
	41- 50	64	27.83
	51- 60	28	12.17
	>60	20	8.70
Mean	41.9		
Standard Deviation(S.D)	12.46		
Marital status	Married	183	79.57
	Single	47	20.43
Education	No formal	46	20.00
	Primary	59	25.65
	Secondary	103	44.78
	Post secondary	22	9.57
Household size	1-5	110	47.83
	6-10	100	43.48
	>10	20	8.70
Mean	5.86		
S.D	2.57		
Farm size	<0.01	40	17.39
	0.01-0.09	157	68.26
	>0.09	33	14.35
Mean	0 .053524		
S.D	0 .036146		
Market Participation Index Mean= 0.73 S.D = 0 .32			
Output Market Type			
Farm gate		219	95.22
Urban market		11	4.78
Regional market		0	0

3.2 Social Capital Dimensions of the Respondents

Table 3 shows the activities of households in local level institutions. Majority (76.5%) of the respondents belong to the farmers' association. Heterogeneity index of household in

associations shows that 59.13% of the respondents fell within the 21-40% heterogeneity subgroup while 8.70%, 6.96% and 25.22% were in 41-60%, 61-80 % and greater than 80% subgroups respectively. The average heterogeneity index was 50.96% implying associations is moderately diverse.

In terms of meeting attendance, most households (63.91%) had 1-20% meeting attendance. 9.13%, 6.09% and 20.87% had 21-40%, 41-60% and 61-80% meeting attendance respectively. The mean meeting attendance was 80.29% implying that the farmers attend meetings frequently. This indicates the importance attached to regular meetings in the study area.

Decision making index is moderate among vegetable farming households with an average of 50.44%. This implies that the farmers participate in one of the two decisions affecting the associations. The distribution of households into the various decision making categories shows that 9.57%, 29.13%, 30.87%, 23.48% and 6.96% of the households were within the 1-20% , 21-40%, 41-60% and greater than 60 % decision making index respectively.

Table 3: Social Capital Dimensions of the Respondents

Social capital variables	**Frequency**	**Percentage**
Membership of association		
Member	176	76.5
Not	54	23.5
Heterogeneity index % 21-40	 20	 8.70
41-60	16	6.96
61-80	136	59.13
>80	58	25.22
Mean	50.96	
SD	15.50	
Meeting Index (%)		
1-20	21	9.13
21-40	14	6.09
41-60	48	20.87
>60	147	63.91
Mean	80.29	
SD	27.05	
Decision Making Index %		
1-20	22	9.57
21-40	67	29.13

41-60	71	30.87
61-80	54	23.48
>80	16	6.96
Mean	50.44	
SD	21.97	

3.3 Determinants of Commercialization of Urban Vegetable Farmers

The result of the determinants of the level of commercialization by vegetable-farming households in the study area is shown in Table 4. The result of the Tobit regression model shows that the log likelihood is -126.49 and significant at 1% level. This indicates that the model has a good fit to the data. The result shows that out of the 17 explanatory variables included in the model, only ten variables were found to significantly influence level of market participation. These are age, age squared, farm size, membership of association, years of education, distance to market, heterogeneity index, cost of fertilizer, cost of chemicals and decision making index. A positive sign on a parameter indicates that the higher the value of the variable, the higher the level of market participation and vice-versa.

The regression results indicate that the coefficient of age is significant and positive for age while it is negative for age squared. This result implies that at intermediate ages, market participation increases with age but decreases as household head advances in age. An additional year to the age of household head would increase likelihood of market participation by 0.51%. The justification for this could be that older households may have acquired better experience on crop selection and market interactions through time. According to Simonyan *et al* (2009) education would significantly enhance farmers' ability to make accurate and meaningful decisions. Year of education positively influenced market participation. A unit increase in the year of education of the vegetable farmers increased commercialization of their farm produce by 0.38%. The implication is that as the household head increases his year of education, his participation in the market increases which invariably increases commercialization. Urban vegetable farmers that are educated are in better position to know the different market channels where their produce can be sold at better price to increase their income. The finding supports that of Gebremedhin and Jaleta (2010) and Ogbe (2010) that level of education raises human capital and increases their level of managerial abilities which is an incentive for commercialization.

The farm size significantly affected level of market participation. This means that as the urban vegetable households increase their farm holding, the level of commercialization increases. The result shows that, a unit increase in the farm size will increase level of participation by 0.47%. This result agrees with Martey *et al* (2012), who opined that farm size influences the level of agricultural commercialization. Distance of the urban vegetable farm to market has a significant but negative influence on level of commercialization. The negative size means that with a unit increase in distance, the probability to sell or participate in market will reduce. Conversely, it means with a unit decrease in distance, households closer to market outlets

were more likely to participate in marketing activities than households living farther to outlet. One percent increase in the market distance will reduce commercialization by 0.70 %. The result supports Gebremedhin and Jaleta (2010) and Gani and Adeoti (2011) that decrease in market distance increases market participation.

The results of the influence of social capital indexes on market participation have both negative and positive impact. Membership in farmer organizations/groups positively and significantly affect market participation. The result showed that farmer who is a member of a local institution his/her market participation increased by 0.16%. Also, a unit increase in the index of diversity of producer organization increased the level of commercialization by 0.09%. Heterogeneity index measures the level of diversity of the urban farming household heads in their local association. Heterogeneity index of the urban farming household heads had likelihood of market participation of 0.09%. This finding is in line with Nagarajan *et al* (1999) who find that more heterogeneous producer organizations were therefore more likely to perform better probably due to diversity in ideas and complementarity of skills. Membership heterogeneity increases information problems and ensures members have conflict interest. In the same vein, a unit increase in household participation in decision making in their association increases market participation by 0.54% , hence, active participation in decision making process increases market participation. This finding is in agreement with Grootaert (1999), Shiferaw *et al* (2006) and Wambugu (2009). Conversely, both cost of chemical and fertilizer negatively and significanly affect market participation. This shows the low levels of adoption of productivity enhancing inputs such as fertilizers, chemicals and improved seeds, which limits their ability to produce surpluses for the market as observed in the low volumes they produced (122kg/season) and the amount sold (106kg/season).

Table 4: Estimates of Tobit Regression for the Determinants of Level of Market Participation

Variables	Coefficient	Standard Error	T-Value	Marginal Effect
Age	0.50988	0.2575	1.98**	0.50898
Sex	0.30621	0 .2285	1.34	0.30620
Age squared	-0.52631	0 .2645	-1.99**	-0.52629
Marital status	2.6944	8.7713	0.49	2.69441
Household size	-0.5552	1.4611	-0.38	-0.5546
Years of education	0.3881	0.1687	2.30**	0.3881
Farm size	0.4725	0.2526	1.87*	0.4725
Cost of planting material	-0.1376	0.8113	-0.17	-0.1356
Cost of labour	0.0007	0.0014	0.52	0.0007
Cost of fertilizer	-0.7605	0.2056	-3.70***	-0.7603

Cost of chemical	-0.3262	0.0664	4.-91***	-0.3260
Distance to town	-0.0704	0.0429	-1.64	-0.0701
Distance to nearest market	-0.0739	0.0233	-3.18***	-0.07334
Membership of association	0.1641	0 .0314	5.23***	0.16408
Heterogeneity index	-0.0954	0.3193	-2.99***	-0.0953
Meeting index	0.1506	0.1046	1.44	0.1502
Decision index	0.5442	0.1417	-3.84***	0.5441
Constant	-0.9992	0.5877	-1.70*	
Sigma	0.2304	0.0121		
Prob>chi2 Pseudo R2 Log likelihood	0.0000 0.44 -126.49			

4.0 Conclusion, Policy Implications and Reccommendations

Commercialization is affected by many factors. In this paper market participation among urban vegetable farmers is being affected by some socio-economic and social capital factors; age, age squared, farm size, years of education, distance to market, cost of fertilizer, cost of chemicals, membership of co-operative, heterogeneity index and decision making index. Although market participation of this respondents was high but when the low average sales is considered which could be due to effect of low literacy levels (which could impact on their managerial ability on the farm), low per capita land size, distance to market, high cost of chemical and fertilizer. Therefore, In terms of factors that could enhance market participation of urban farmers, the findings shows that land size play a significant role, indicating that innovations that enhance the access to land can be instrumental to raising their ability to exploit market opportunities. However, with diminishing land sizes, it would be more prudent to focus on improving the productivity of land by making organic manure, fertilizer and chemical readily available and cheap to farmers. It is also necessary to upgrade farm-to-market roads and establish more and better equipped retail market centres in the cities in order to reduce transport costs and encourage urban farmers to produce and trade in high-value commodities. Priority issues for urban development should include establishment of more market outlets closer to farms in order to minimize transportation difficulties and wastage.

In addition, improving infrastructure (e.g., access roads) would facilitate faster delivery of farm produce (especially perishable commodities such as vegetables) to urban consumers. It is also imperative to enhance farmers' business skills, for instance by training and encouraging them to produce and sell vegetable in organized groups. This would provide them with

economies of scale for better market search and bargain, as well as enable them to reduce operational costs.

Moreover, the results of this study shows that social capital (measured in terms of membership of cooperative, heterogeneity index and decision making index) affects how well urban farmers participate in output market. Hence, needs for governments, non-governmental organizations and other development partners to take pro-active role in facilitating the formation of smallholder vegetable farmer's organizations and linking them to market.

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