

AGRICULTURAL PRODUCTIVITY AND ACCESS TO MARKET AMONG FARMERS IN EKITI STATE, NIGERIA

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ABSTRACT

Agricultural productivity and the performance of smallholder agriculture in developing countries have been noted to be affected by access to markets. This study examined the access of smallholder farmers to input and output markets and the factors that affect agricultural productivity. A total of 336 smallholder farmers were selected in Ekiti State through multi-stage sampling technique. Data were obtained through the administration of structured questionnaire while descriptive statistics and Ordinary Least Square regression were used to analyze the data. The smallholder farms in the study area were characterized by non-uniform fragmented plots. Average age of the farmers was 48.12 years with mean farming experience of 24.97 years. Using proxies which include distance to physical markets and good roads, results of analysis showed that poor market access had significant ($p = 5\%$) negative influence on agricultural productivity ($t = -2.0$). Access to infrastructure particularly good rural roads also had significant effect on agricultural productivity. Other factors such as farmers' formal education ($t = 4.50$), farming experience ($t = 3.39$) and commercialization level ($t = 1.86$) also significantly affect farmers' agricultural productivity. For the enhancement of access to markets and agricultural productivity, it was recommended that rural infrastructure such as good roads be put in place by appropriate agencies.

Key words: smallholder, rural infrastructure, market access, agriculture

INTRODUCTION

Smallholder farmers operate on an average farm size of 1.6 ha in Africa (Hazell, 2016) and have been noted to be the main food producers in developing countries where they produce most (60-80%) of the food consumed (Rapsomanikis, 2015). Although smallholder farms are observed to be diverse and heterogeneous (Tittonell *et al.*, 2011), the farmers have been acknowledged to be key to global food security and nutrition as they provide up to eighty percent of the food supply in Asia and Sub-Saharan Africa (Riesgo *et al.*, 2016). These farmers play a crucial role in the attainment of sustainable food and nutrition security through the local production of a wide range of diverse nutritious food crops (Fermont and Benson, 2011; Dioula *et al.*, 2013).

A good level of agricultural productivity is essential for the attainment of set agricultural goals. It is important to pay due attention to agricultural productivity as this affects agricultural growth which in turn affects food security, poverty reduction and economic growth. At the level of the smallholder, agricultural productivity is measured in terms of the value of output for a given level of inputs (FARA, 2006). Improved agricultural productivity can be due to many factors which include use of improved technologies, adequate access to good infrastructure and well-functioning markets (FARA, 2006).

Markets are very important in the livelihoods of rural people, particularly smallholder farmers (Tittonell *et al.*, 2011). This is because the livelihoods of most rural people are directly dependent on their access to and involvement in a variety of markets. It is certain that increased farm yields would not lead to increase in farm incomes if farmers cannot access markets at the right time (Madon, 2014). Market access is a latent concept generally presented using an array of variables and proxies. Different dimensions of market access have been identified (IFAD, 2003) and these may be highly commodity-specific (Chamberlin and Jayne, 2013). These dimensions include physical access to market which takes into account distances and costs; and structure of the market which takes into account the asymmetry of relations between farmers, market intermediaries and consumers.

Several authors who have used various variables and proxies to represent market access include Lapan and Pandey (1999) who used the distance from farmers' homestead to nearest road as proxy for market access; Kamara (2004) did not use physical distances but used the 'time taken to the market' as proxy for market access. Tembo and Simtowe (2009) explained market accessibility using distance to the nearest tarred road and distance to the market from homestead. Rural households that travelled 10

km or more to reach the nearest market were categorized as having no market access. Donaldson and Hornbeck (2016) measured counties' market access using cost of transportation through the construction of a network database of railroads and waterways and calculating lowest-cost county-to-county freight routes. Yu and Guo (2015) as well as Koppmair *et al.* (2017) denoted access to major/district markets by farm households with walking hours to the market. Thus, it is obvious that there is no one-size-fits-all approach to the measurement of market access across regions within countries and across countries as the variables which determine market access could be very different.

Inadequate access to market by smallholder farmers has been identified as one of the major constraints affecting their participation in local, regional and global markets (Rola-Rubzen and Hardaker, 2006; Ohen *et al.*, 2013; Riesgo *et al.*, 2016). Also, market access has been noted as one of the major factors which influence agricultural productivity (Madon, 2014; Yu and Guo, 2015) and the performance of smallholder agriculture (Adegbedi, 2012). This study therefore examined access to input and output markets and the factors that affect agricultural productivity among smallholder farmers in Ekiti State, Southwest Nigeria.

MATERIALS AND METHODS

Study Area

The study was carried out in Ekiti State, located in south western Nigeria. The state has a total land area of about 6,353 km² and a population density of 380 km⁻². It enjoys a tropical climate with two seasons – rainy season (Apr.-Oct.) and dry season (Nov.-Mar.). Ekiti State is administratively made up of 16 Local Government Areas (LGAs). In relation to agriculture, the State is divided into three Agricultural Development Programme (ADP) zones. Of the 16 LGAs, Zones I and II comprise five LGAs each, while zone III comprises six LGAs.

Sampling Procedure and Data Collection

With the use of multi-stage sampling technique, a total of 336 crop farmers were selected across the three ADP zones in Ekiti State. In stage one, two LGAs were randomly selected from each of the three ADP zones. Stage two was the random selection of two communities from each of the selected LGA while stage three was the selection of twenty-eight farmers from each community. Data were collected from farmers through Focus Group Discussions (FGD) and personal interview schedules using structured questionnaire. Data were collected on variables such as major inputs used by farmers, sources of the inputs, crops produced by the farmers, farm output, the inherent potentials and constraints relating to access to input and output markets by the smallholder farmers.

Methods of Data Analysis

Descriptive statistics such as percentages and means were used to describe farmers' characteristics while Ordinary Least Square regression analysis was employed to determine the effect of market access and farmers' demographic characteristics on agricultural productivity. One method by which productivity can be measured is the partial productivity method such as partial productivity of land expressed as total value of farm output produced per unit of input (land) as adopted by Harris *et al.* (2016). Lerman (2005), in calculating the aggregated value of output included both crops and livestock products. The farmers in this study however cultivate only crops on their farmlands while their livestock were raised at homestead. Thus, only crops were considered in the determination of productivity in this study. Following Lerman (2005) and Harris *et al.* (2016), this study adopted the partial factor productivity measure using aggregated production value per farm area in hectares. This is expressed as:

$$Y = \frac{\sum \text{Gross value of crop quantity harvested}}{\sum \text{Area planted or harvested.}}$$

In order to get the real picture of agricultural productivity, all the crops produced by each farmer were valued and divided by the area of land cultivated. To single out one crop will not give the true picture since these farmers do not practice mono-cropping.

Model specification: $Y = f(X_1, X_2, X_3, \dots, X_9)$;

where is farmers' agricultural productivity, X_1 is age of farmer (years), X_2 is farmer's level of education (0 = none, 1 = primary, 2 = secondary, 3 = tertiary), X_3 is household size (number of people), X_4 is farming experience (years), X_5 is farmland ownership (personal = 1, otherwise 0), X_6 is distance from farm to nearest tarred road (km), X_7 is mean distance to output market (km), X_8 is use of fertilizer on farm (No = 0, Yes = 1), and X_9 is level of commercialization (%).

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

Out of the 336 farmers who were interviewed for the study, 22.62% were females and 77.38% were males. This indicates that farming practices in the study area were male-dominated just as in the study of Oyekale *et al.* (2017) conducted in Osun State in which 78.75 were male farmers while the rest were females. With an average age of 48.12 years, most (84.53%) of the farmers were between the age of 30 and 64. From the result in Table 1, it can be observed that the farming population is averagely within the active productive age group generally taken to be between 25 and 55 years. This finding is in line with Houriet-Segard and Pasteels (2011).

Table 1: Distribution of farmers according to Socioeconomic variables and farm characteristics

Variables		Frequency	%	Mean
Sex	Female	76	22.62	
	Male	260	77.38	
Age (years)	Below 30	12	3.57	48.12
	30-54	194	57.74	
	55-64	90	26.79	
	65 and above	40	11.90	
Farming experience (years)	Below 10	32	9.53	24.97
	10-29	212	63.09	
	30 and over	92	27.38	
Household size				7.42
Education	None	22	6.55	
	Primary	96	28.57	
	Secondary	140	41.67	
	Tertiary	78	23.21	
Use of fertilizers	Yes	210	62.50	
	No	126	37.50	
Major crops grown	Cassava	234	69.64	
	Yam	210	62.50	
	Rice	204	60.70	
	Maize	174	51.79	
	Cocoa	152	45.24	
Farm ownership	Personal	207	61.61	
	Non-personal	129	38.39	

Source: Field survey data

Ninety per cent (90.47%) of the farmers had been farming for a minimum of ten years which implies that 90.47% of the farmers sampled had at least ten years of experience in their various farming enterprises. Farmers' experience is expected to influence their ability to make effective farm management decisions. Thus, the more the experience, the more effective their decisions are expected to be in their farming enterprise. In addition, long years of farming can be a gauge of the farmers' commitment to agriculture. More than half (64.88%) of the farmers were literate while only 6.55% had no form of formal education.

Respondents' Farm Characteristics

The smallholder farms in the study area were characterized by a wide range of diverse crops usually produced on non-uniform fragmented plots. Prominent crops cultivated by farmers in the study area include cassava, yam, rice, maize and cocoa. Other crops were plantain (cultivated by 21.43) and tomato/pepper (cultivated by 13.69%). Some farmers also cultivated tree crops such as cashew, citrus and oil palm. At homestead, farmers also raised animals, prominent among which are goats (raised by 46.43%), chickens (raised by 43.45%), pigs (raised by 6.55%) and fish (raised by 3.57%). This is similar to the finding of Kakwagh *et al.* (2011) who observed significant subdivisions of farm holdings by farmers in the middle-belt of Nigeria into several scattered plots on which multiple crops were cultivated. In addition, Fermont and Benson (2011) noted that smallholder farmers in Uganda intercrop their farm plots with a wide range of crops. Cultivation of diverse crops on farmlands and farm fragmentation are major characteristics of smallholder farms generally in Africa.

Access to Farm Inputs

More than half (62.50%) of the farmers used fertilizers (organic and inorganic) on their farms. According to these farmers who applied fertilizers on their farm plots, fertilizers were available and can be obtained when needed (46.67%) but at high prices (73.33%). Agro-chemicals such as herbicides and insecticides were reported by 80.00% of these farmers to be available from marketers but also at high prices. Prominent sources of credit for farming activities were friends (47.02%), family (38.99%) and social cooperative groups (13.99%). Although there were commodity-based cooperatives and farmers' groups in all of the sampled communities, 15.91% of the farmers belonged to none of the groups while 84.09% of the farmers were members of such groups from where only 29.73% reported to have benefited through collective access to market for farm inputs.

In Table 2, the distances to various input and output markets were regarded as very far by most of the farmers and costs of transportation were found to be high. The availability of few commercial vehicles travelling to and fro farmers' communities at high fares was attributed to the bad conditions of the roads. This, however, leaves the farmers with no other option than to make use of these few vehicles with little or no bargaining power over the fares. Costs of transportation of farm inputs and outputs were thus high. Transportation of farm produce to market was through commercial vehicles by 73.45% of the farmers while 22.75% used commercial motorcycles.

The combination of factors such as few commercial vehicles commuting farmers' communities and the bad conditions of the roads were reported to contribute to the high transportation costs for agricultural produce. This is similar to the finding of Adeoye *et al.* (2013) whose study revealed that 87.5% of plantain marketers in southwest Nigeria reported high transportation cost as a major constraint limiting the efficient marketing of plantain. This was however attributed to the poor conditions of rural and sub-urban road networks in the region. Yu and Guo (2015) also noted that market access and participation by farmers are limited by factors/conditions which include high transportation costs and long travel times as a result of inadequate road infrastructure, bad road conditions and long distances.

Membership of Farmer Cooperative/Group

It is expected that farmer groups would help to facilitate the access of farmers to such things as credit, inputs, output markets, technical training and market information. Individual farmers have different interests and expectations from farmer associations which they desire to play certain roles in their agricultural activities and livelihoods. Although there were commodity-based cooperatives and farmers' groups in all of the sampled communities, 84.09% of the farmers were members

Table 2: Farmers' physical access to markets

Markets	Average distance from farm (km)
Agro-chemical market	10.54
Fertilizer market	10.22
Seed market	11.02
Local commodity market	6.55

of such groups from where only 29.73% reported to have benefited through collective action to access the market for farm inputs. This corroborates the result of Chirwa *et al.* (2005) who noted that farmer organizations encourage market access.

Access to Output Market

About half (55.56%) of the farmers sold their cassava tubers at farm-gate. It was reported by the farmers that it was more profitable for them to sell at farm-gate as they did not have to bear any transportation cost. Other cassava farmers (44.44%) transported their harvested cassava roots to community markets where they were sold on market days, which is traditionally every five days. Yam was sold at farm-gate by 23.08% of the farmers while 15.38% who believed more profits are obtained from sale in urban markets, transported their harvested yam tubers to urban markets for sale. However, 61.54% of the farmers transported their yam tubers to community markets for sale. Half of the farmers who cultivated maize sold their maize at farm-gate while another half sold theirs at the community market. Farmers who cultivated cocoa sold their produce as dried cocoa beans. Most of these cocoa farmers sold their dried cocoa beans through their cooperative group which helps with weighing and storage until the produce is sold. All farmers involved in the cultivation of leafy vegetables, tomatoes and or pepper transported their produce to community market for sale on market days.

Constraints to Market Access

High cost of transportation was a common constraint to 96.13% of the farmers. Majority (97.04%) of them reported that lack of modern facilities for storing unsold harvested produce, especially perishable ones such as green vegetables, peppers and tomatoes, make it compulsory for them to sell all such produce once harvested even when there is a glut, usually at a loss. Access to good modern storage facilities will provide opportunity for farmers to keep their farm produce until periods when the market is competitive enough for profitable prices (Eze *et al.*, 2010).

Factors which Influence Agricultural Productivity

In order to examine some of the factors which affect agricultural productivity, the multivariate regression analysis was carried out with farmers' agricultural productivity being the dependent variable.

From Table 3, it can be seen that farming experience had positive effect on agricultural productivity at 1% significant level. The more experience gained in their farming enterprises, the more productive the farmers become as a result of more effective management decisions. The result of this study indicates that an increase in farming experience by one year will lead to 16.53 units increase in productivity. The level of education of farmers had a significant positive effect on productivity at 1% significant level. An increase in education by one level will lead to 33.66 units increase in productivity. Since education helps in enlightening the mind, it is expected that the more educated farmers will generally be better adopters of improved technologies which lead to higher productivity. With regards to household size which had significant positive effect (at 10% significant level) on productivity, this implies that the more people there are in a household, the more effective division of labour will be among members of the household. Consequently, with each member of the household contributing his own quota of production, there will be better overall productivity.

It is interesting to note that distance to output market had significant negative effect (at 5% significant level) on productivity. The further the output market by 1 km, the lower is the agricultural productivity by 16.71 units. This could be attributed to be as a result of more time, more energy and higher cost involved in travelling longer distances. This underscores the importance of accessible rural infrastructure. It is expected that good all-weather road infrastructure will make transportation of goods and services much easier through shorter travel time and lower cost. Thus, the more access the farmers have to the market, the better is the agricultural productivity. This corroborates FARA (2006) who noted that investment in infrastructure such as rural feeder roads would result in large agricultural growth effects.

Table 3: Parameter estimates of regression model ($R^2 = 0.3495$; prob. of obtaining the estimated F-stat. or greater, Prob. > F 0.0000)

Variables	Coefficient	t-statistics of estimated parameters (t)	p-value associated with the t-statistics
Farmers' age	-5.722	-0.79	0.429
Farmers' formal education	33.665	4.50***	0.000
Household size	9.384	1.66*	0.099
Farming experience	16.531	3.39***	0.001
Farmland ownership	-24.071	-1.19	0.235
Commercialization level	3.432	1.86*	0.064
Farm-output market distance	-16.706	-2.00**	0.048
Farm-tarred road distance	-3.663	-1.11	0.269
Use of fertilizer on farm	317.968	4.74***	0.000
Constant		1.23	0.221

* - significant at 10% level, ** - significant at 5% level, *** - significant at 1% level

The level of participation of farmers in output market (commercialization level) had positive significant effect on productivity. This is the proportion of the total farm output that is offered for sale. The more market-oriented a farmer is by one percent, the higher the productivity will be by 3.43 units. The use of fertilizers (significant at 1% level) on the farm contributed significantly to higher productivity (317.96 units) among the farmers.

Agricultural productivity from the perception of the farmers in this study is the ability to produce more with less inputs and is determined by several factors which from their perspective include lack of technical know-how on new better-performing crop varieties, the condition of rural roads that are mostly bad, lack of storage facilities and other infrastructure which affect their terms of trade, lack of credit, lack of access to important inputs and low knowledge of market requirements. This is similar to the finding of Bekele *et al.* (2010) who noted that rural African farmers have difficulty accessing input and output markets and also generally lack the capacity to make use of information about demand and supply conditions. Appropriate improvements in these factors and facilities will contribute to the improvement of farmers' market information knowledge, reduction of farmers' transaction costs, market access and thus contribute to higher farmers' income and productivity.

CONCLUSION

This study indicated that market access significantly influenced agricultural productivity. Other factors such as farmers' education, farming experience, household size, and commercialization level also affected farmers' productivity. For any strategic agricultural development, the following are recommended:

- i. Access to market is a key issue that must be addressed. Thus, hindrances to easy market access should be reduced to the barest minimum, if not totally removed for improved agricultural productivity. These will include appropriate machinery to be put in place so that basic rural infrastructure such as roads are in good condition throughout the year for convenient and inexpensive transportation to and fro input and output markets. This will reduce travel-time and cost of transportation that will be of great benefit to the farmers in many ways which will eventually affect agricultural productivity in a positive dimension.
- ii. Since education enhanced productivity of the farmers in the study area, improved agricultural technologies would be easily understood, appreciated and likely adopted by farmers. Farmers can therefore be encouraged and educated on the effective use of improved technologies through extension education channels. If there is access to market, farmers will be encouraged to increase production with the application of improved technologies obtained through education for improved productivity and an overall agricultural development.

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