



## MARKET ACCESS AND AGRICULTURAL PRODUCTIVITY AMONG SMALLHOLDER FARMERS IN SOUTHWEST NIGERIA

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### ABSTRACT

Market access has been noted to be one of the major factors which affect agricultural productivity and the performance of smallholder farmers in developing countries. This study examines smallholder farmers' access to input and output markets and the factors that affect agricultural productivity. A total of three hundred and thirty-six 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 obtained. The smallholder farms in the study area are characterized by a wide range of diverse crops usually produced on non-uniform fragmented plots. Average age of the farmers was 48.12 years with mean farming experience of 24.97 years. More than sixty percent (64.88%) of the farmers had a minimum of secondary education. This implies a relatively high level of literacy among the farmers. Using proxies which include distance to physical markets and good roads, results of analysis indicate that market access significantly influence agricultural productivity. Other factors such as farmers' education, farming experience, use of fertilizer and level of commercialization also significantly affect agricultural productivity. For the enhancement of agricultural productivity, it is recommended that obstacles to easy market (input and output) access be drastically reduced, and where possible, be totally removed by appropriate agencies.

**KEY WORDS:** Smallholder, rural infrastructure, market access

### INTRODUCTION

Smallholder farmers operate on an average farm size of 1.6 hectares 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 as a result of 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 (International Fund for Agricultural Development (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 Lapar and Pandey (1999) who used the distance from farmers' homestead to nearest road to proxy 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 10km 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 to be one of the major factors which influence agricultural productivity (Madon, 2014; Yu and Guo, 2015) and the performance of smallholder agriculture (Adegbi, 2012). This study therefore examines access to input and output markets and the factors that affect agricultural productivity among smallholder farmers in Ekiti state, southwest Nigeria.

### MATERIAL AND METHODS

**Study area:** The study was carried out in Ekiti state, located in south western Nigeria (between longitudes 40° 51' and N 50°451' East of the Greenwich meridian and latitudes 70° 151' and 80°51' North of the equator). The state has a total land area of about 6,353km<sup>2</sup> and a population density of 380/km<sup>2</sup>. It enjoys a tropical climate with two seasons – rainy season (April – October) and dry season (November – March). Ekiti state is administratively made up of sixteen Local Government Areas (LGAs). In relation to agriculture, the state is divided into three Agricultural Development Programme (ADP) zones. Zones I and II comprise of five LGAs each while zone III comprises of six LGAs.

**Sampling procedure and data collection:** With the use of multi-stage sampling technique, a total of three hundred and thirty-six (336) crop farmers were selected across the three Agricultural Development Programme (ADP) zones in Ekiti state. Two Local Government Areas (LGAs) were randomly selected from each of the three ADP zones. Twenty-eight farmers were randomly selected from each of two communities that were randomly selected from each LGA.

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 assess the relationship between farmers' agricultural productivity and certain variables such as market access and farmers' demographic characteristics. 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) used (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 are raised at homestead. Thus, only crops are considered in the determination of productivity in this study. Following Lerman (2005) and Harris *et al* (2016), this study adopts the partial factor productivity measure using aggregated value per farm area in hectares. This is expressed as;

$$\frac{\text{Gross value of crop quantity harvested}}{\text{Area planted or harvested}}$$

In order to get the real picture of agricultural productivity in this study, 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:**  $Y = f(X_1, X_2, X_3, \dots, X_8)$

Where Y = farmers' agricultural productivity

X<sub>1</sub> = age of farmer (years)

X<sub>2</sub> = farmer's level of education

X<sub>3</sub> = household size

X<sub>4</sub> = farming experience (years)

X<sub>5</sub> = farmland ownership

X<sub>6</sub> = distance from farm to nearest tarred road (Km)

X<sub>7</sub> = mean distance to output market (Km)

X<sub>8</sub> = Use of fertilizer on farm

X<sub>9</sub> = level of commercialization

### RESULTS AND DISCUSSION

Three hundred and thirty-six farmers were interviewed for the study out of which 22.62% were females and 77.38% were males. With an average age of 48.12 years, most (84.53%) of the farmers were between the age of thirty and sixty-four. From these figures (Table 1), it is observed that the farming population is averagely within the active productive age group taken to be between twenty-five and fifty-five years (Houriet-Segard and Pasteels, 2011).

**TABLE 1:** Socioeconomic characteristics of farmers

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

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' experience in their various farming enterprises. More than half (64.88%) of the farmers were literate while only 6.55% had no form of formal education.

The smallholder farms in the study area are characterized by a wide range of diverse crops usually produced on non-uniform fragmented plots. 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. Prominent crops cultivated by farmers in the study area include cassava (cultivated by 69.64%), yam (cultivated by 62.50%), rice (cultivated by 60.70%), maize (cultivated by 51.79%), cocoa (cultivated by 45.24%), plantain (cultivated by 21.43) and tomato/pepper (cultivated by 13.69%). Some farmers also cultivated tree crops such as cocoa, 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%).

Access to farm inputs: More than half (62.50%) of the farmers used fertilizers (organic and inorganic) on their farms. According to the result, 46.67% of them reported

that fertilizers were available and can be obtained when needed but however at high prices as responded by 73.33% of them. 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, family and social cooperative groups. 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.

Physical access to markets: Distances to the various input and output markets (Table 2) were regarded as very far by most of the farmers and costs of transportation were reported to be high. Using the distance to market as proxy for market access, these farmers can be regarded as having no access to input (agro-chemical, fertilizer and seed) market since distance to these markets exceed 10km (Tembo and Simtowe, 2009). 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 but to make use of these few vehicles with little or no bargaining power over the fares. Costs of transportation of farm inputs and outputs are thus high. Transportation of farm produce to market was through commercial vehicles by 73.45% of the farmers while 22.75% used commercial motorcycles.

**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

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 signified high transportation cost as a major constraint limiting the efficiency of plantain marketing. This however, could be 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. Average percentage costs of transporting produce from farm to local commodity market are shown in Table 3.

**TABLE 3:** Average cost of transporting farm produce to market

Farm produce	Transportation as % of total production cost
Maize	32.1
Cassava	27.3
Yam	43.7
Tomatoes	24.1
Green vegetables	35.0

Farmer cooperative/group: It has been noted that farmer organizations can encourage market access (Chirwa *et al.*, 2005). It is also expected that these 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 of such groups from where only 29.73% reported to have benefited through collective action to access the market for farm inputs.

Access to output market: Majority (97.04%) of the farmers reported that lack of modern storage facilities for unsold harvested produce, especially perishable produce 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 modern storage facilities will provide opportunity for farmers to keep their farm produce until the off-season period when they can sell at very profitable prices. In relation to cassava, 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 are 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 tomatoes and or pepper transported their produce to community market for sale on market days.

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. Results of analysis are presented in Table 4.

TABLE 4: Parameter estimates of regression model

Variables	Coefficient	t	P> (t)
Farmers' age	-5.7226	-0.79	0.429
Farmers' formal education	33.665	4.50	0.000
Household size	9.3843	1.66	0.099
Farming experience	16.5310	3.39	0.001
Farmland ownership	-24.0715	-1.19	0.235
Commercialization level	3.4324	1.86	0.064
Farm-output market distance	-16.706	-2.00	0.048
Farm-tarred road distance	-3.6631	-1.11	0.269
Use of fertilizer on farm	317.968	4.74	0.000
Constant		1.23	0.221
R <sup>2</sup>	0.3495		
Prob > F	0.0000		

From the regression result, it can be seen that farmers' education, farming experience, household size, commercialization level, use of fertilizer on farm and farm-output market distance are factors that significantly affect farmers' agricultural productivity in the study area. The effect of farmers' age on productivity is negative but not significant. However, the lower productivity due to increase in age is compensated for by farming experience. The more experience gained in their farming enterprises, the more productive the farmers become. Obasi *et al.* (2013) also found a significant positive effect of farming experience on productivity among farmers in Eastern Nigeria. The level of education of farmers had a significant positive effect on productivity. This is similar to the finding of Reimers and Klasen (2011) who showed from the data of ninety-five developing and middle-income countries that education has a highly significant, positive effect on agricultural 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 on productivity, this implies that the more people there are in the household, the more effective division of labour will be among household members. Consequently, with each member contributing his own quota of production, there will be better overall productivity.

It is interesting to note that distance to output market had significant effect on productivity. The further the output market is, the lower the agricultural productivity. 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 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. Results from this study further shows that the level of participation of farmers in output market (commercialization) had positive significant

effect on productivity. This is similar to Ochieng *et al* (2016) who found a positive effect of commercialization on productivity. The more market-oriented a farmer is, the higher the proportion of farm output he will offer for sale. The use of fertilizers on the farm contribute significantly to higher productivity among the farmers. Results indicate that a unit increase in fertilizer used on the farm will give an average productivity increase of 317, *ceteris paribus*. Farmers' access to fertilizers is therefore very crucial to productivity increase in agriculture, particularly in the study area.

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 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 (Magingxa and Kamara, 2003) who noted that rural Africans have difficulty accessing profitable markets where they can obtain agricultural inputs and sell their farm produce. 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 examined smallholder farmers' access to input and output markets and the factors which affect agricultural productivity. The study was carried out in twelve communities located in southwest Nigeria. Results of analysis indicate that market access significantly influence agricultural productivity. On the average, farmers in the study area can be regarded as having no access to input markets since they have to travel a minimum of 10km to the market. Other factors such as farmers' education, farming experience, and level of commercialization also significantly affect farmers' agricultural productivity.

It is important that farmers be able to obtain necessary inputs at the appropriate time for timely utilization to produce desired output which should also be marketed promptly. For any strategic agricultural development, market access is a key issue that must be addressed. Hindrances to easy market access should be reduced to the barest minimum, if not totally removed for improved agricultural productivity. These hindrances include lack of appropriate storage facilities for perishable farm produce so that farmers can decide when to sell their farm produce and not sell through compulsion due to lack of ability to store during glut. In addition, it is important for appropriate machinery to be put in place so that basic rural infrastructure such as roads are in good condition for easy 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 as it will eventually affect agricultural productivity in a positive dimension.

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