Journal of Agriculture and Food Sciences
Volume 17 Number 2, October 2019 pp 74 - 85 .

DETERMINANTS OF PRODUCTIVITY OF FARMLAND IN IMO STATE

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ABSTRACT

The study analysed the determinants of productivity of farmland in Imo State, Nigeria. Primary data were collected using a set of structured questionnaires from 60 food crop farmers who were selected through purposive and random sampling techniques. Data were analysed using descriptive statistics and econometric tools. The results showed that majority of the respondents were young in their active years, with a mean age of 45 years, married, mostly females, had mean level education of 8 years and mostly farming as their major occupation. The results also showed that the food crop farmers had adequate labour force of a mean 7 persons per household and cultivated an average farm size of 1.06 hectares. The result of the productivity of farmland was 4.03, which showed high productivity. From the results also, the exponential function is the lead equation. The study concluded that farmlands in Imo state are productive and are determined by farm size, location, distance, quantity of fertilizer used, type of soil and duration of tenancy. The study advocated for food crop farmers to form a cooperative to enable them pool their resources together for gaining larger farmlands, fertilizer and other farm inputs.

Keywords: Farmland, Determinants, Productivity, Imo state.

https://dx.doi.org/10.4314/jafs.v17i2.7

INTRODUCTION

Land is a factor of production and a critical input in agricultural production (Raufu, 2010). The criticality is imposed by its availability, accessibility, quality and quantity. In Nigeria, the quality factor stands out as major determinants of land productivity. Land is an important resource for the livelihood of the poor in Nigeria; a typical village recognizes land in its entirety. Land has been described as all forms of natural resources with which a particular country has been endowed with, which are used in production (Onyebinama, 2000). It refers to those resources

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over which people have the power of disposal and which may be used to yield income. Land also supports other factors of production according to (Anyanwuocha, 2011).

Farmland productivity is the ability of farmland to produce a measured plant production by considering field and laboratory diagnostic techniques and it does not necessary correspond to actual grain yield (Wu, Shao, & Zou, 2008). For a long time, the productivity of farmland has been measured by practical grain yield or soil fertility determinants, which could not reflect well the exact farmland productivity situation (Wu *et.al*, 2011). According to Berihu *et al*., 92015), the productivity of farmland is determined by the measure of farm output considering the quantity of input used and other factors that improve productivity of farmland.

Farmland is a land specifically used for agricultural purposes in the raising of crops or livestock. Agricultural farmland refers to arable land, under permanent crops, and under permanent pastures according to (World Bank, 2014). Arable land includes land as defined by the FAO as land under temporary crops or pastures, and land temporary fallowed. Land abandoned due to shifting cultivation is excluded. Land under permanent crops which takes a long period of time to be replanted after each harvest, such crops like cocoa, coffee and rubber. Farmland is the fundamental resources for the rural area residents to increase their agricultural productivity. Importance of existing adequate farmland to produce the require food supply for the world population is unquestionable; therefore, without land availability it is impossible to produce agricultural productivity (Berihu., Bihon., Betalhem & Mewcha, 2015).

Soil infertility and farmland degradation have been considered as some of the major constraints facing agricultural productivity. In an effort to meet the food need of increasing population in the area, agricultural farmlands have been subjected to overuse such as continuous cultivation, bush burning and other anthropogenic activities (Onwudike, 2010). With rapid population growth and enforcement of land tenure systems, fragmentation of land becomes rampant, which reduces agricultural productivity (Eze, Okonkwo, Orebiyi & Kadiri, 2003). A suitable farmland is put under pressure of continuous cropping while marginal suitable and unsuitable farmlands, that is farmland that are not arable but have continued to lose their fertility (Ehirim., Odurukwe., Ajero & Emenyonu, 2006). Suitable farmlands are arable land used for crop production. Marginal suitable lands are lands that have little agricultural uses, this is because of poor soil quality, if the land is subjected to continuous use, and the productivity of the farmland will be reduced. Unsuitable farmland is land not meant for crop production and the productivity cannot be determined by the input output on the farmland (Baxter & Kirby, 2017).

Productivity assessment in the agricultural sector is very important to improvement of the economic well-being of the entire country (Alabi, 2005). The predominant decline in agricultural productivity has translated into gross deficitof the sector to meet the increasing food demand and by extension led to perennial food shortages, soaring food prices and massive importation (Imodu, 2005; Onyenweaku & Nwaru, 2005). Tanko., Onyenweaku and Nwosu (2006) affirmed that Nigeria's food deficient situation has been worsened by declining farm productivity owing

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to inefficient production techniques, poor resource base and declining soil fertility and others. The extent of natural disasters is having a more dramatic effect on the productivity level of food crop farmers (Delaney & Elizabeth, 2000). In line with these challenges and other challenges, the study tends to look at the objectives; to describe the socio-economic characteristics of the farmers, determine the productivity of farmland and to estimate the determinants of productivity of farmland in the study area.

MATERIALS AND METHOD

The study was conducted in Imo State of Nigeria. Imo state lies between latitudes $5^0 45^1$N and $6^0 35^1$N of the equator and longitudes 6^0 35^1E and 7^0 28^1E of the Greenwich meridian. Imo State covers an area of about 5,067. 20 km^2, with a current population of about 5,408,800 (NPC, 2016) and population density of about 725km^2 (Ministry of Land Owerri, 2014). The state has three agricultural zones (Orlu, Owerri and Okigwe agricultural zones). The state has 27 Local Government Areas (Imo ADP, 2014). The major occupation of the people is farming and are known to produce arable crops such as yam, maize, cassava, cocoyam and other aspect of farming.

A purposive and random sampling methods were used to select the food crop farmers. This because of the dominant activity of farming. The first stage involved the selection of five Local Government Areas from the three agricultural zones. These Local Government Areas were purposively selected based on their level of involvement in farming activities. In the second stage, two communities were selected from the five Local Government Areas at random, making a total of ten communities that were sampled.

Finally, in the last stage, six farmers were drawn from each of the ten communities; therefore, a total of sixty farmers were used for the study and this formed the sample size.

Descriptive statistics were used to describe the socio-economic characteristics of the farmers; productivity model was used to achieve the productivity of farmland. The model was specified as follows:

$$PF_L = \frac{Y}{X} \quad \ldots \quad (1)$$

Where,

PF_L = Productivity of farmland

Y = Total value of farm output (₦)

X = Total value of farm inputs on land (₦)

Decision rule:

As PF_L approaches 1 ($PF_L \geq 0.65$), the productivity of farmland is high.

If PF_L falls between 0.5 and 0.64, the productivity of farmland is low. (Olowu & Olajide, 2004).

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The Ordinary Least Multiple regression analysis model was used to describe the determinants of productivity of farmland. The model was specified as follows:

$PF_L = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8)$ … (2).

Where:

PF_L = Productivity of farmland (Y/X)

X_1 = Farm size (hectare)

X_2 = Location (1= rural, otherwise = 0)

X_3 = Distance (km)

X_4 = Quantity of fertilizer applied (kg)

X_5 = Access to Credit (1 = access, otherwise =0)

X_6 = Labour supply (man days)

X_7 = Type of soil (loam = 1, otherwise= 0)

X_8= Duration of tenancy (years)

The productivity of farmland is determined by estimating the ratio of the total value of output(Y) and total value of input(X).

It is expected *a priori* that the coefficient of $X_1, X_2, X_3, X_4, X_6, X_8 > 0$; $X_7, X_5 < 0$

RESULTS AND DISCUSSION

The socio-economic characteristics of the farmers are presented in Table 1. Table 1 shows the socio-economic characteristics of the farmers. From the results in Table 1, the mean age of the respondents in the study area is 45 years, implying that majority of the food crop farmers are young, capable of determining the productivity of farmland. This agreed with the findings of Onubuogu *et al,* (2013) who reported that farmers within the ages of 41 to 50 years are still active, could withstand the stress involved in farm production and capable of improving farm productivity.

Table 1 further shows that majority (68.3%) of the food crop farmers are married, implying that in rural communities, farming activities is mostly dominated by married persons who employ all farmland improvement techniques to ensure increased farmland productivity. This agreed with the findings of Henri – Ukoha *et al* (2015) that married people are mostly involved in farming activities.

The Table also shows that 70 percent of the food crop farmers are females while 30 percent are males. This implies that in the study area, farming activities are women dominated.

The results also show that the mean levels of education among the farmers in the study are is eight years level of education. This means that the food crop farmers have an improved level of

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education and are aware the importance of education to enhance the chances of increasing productivity by adopting modern techniques to productivity. The result also agreed with Ehirim *et.al,* (2017) who stated that improved level of education brings about positive changes in knowledge, attitude and skills through research and extension. Educational attainment does not only raise agricultural productivity but also enhance farmer's ability to understand and evaluate information on new techniques that could boost their farming.

Table 1 also shows that the mean household size of the food crop farmers in the study area is seven persons per household. This showed that an average household in the study area has an adequate labour force for production activities and this can actually help in reduction in the high cost of hired labour per man days. This supported the finding of Igwe *et al,* (2011) who reported that the average farmer has household size of about five to seven members. This is desirable and of great importance to rural household as they rely more on their family members than hired labourers in their farming activities.

The results also show that the average farm size cultivated by the farmers in the study area is 1.06hectares. This implies that the farmers in the study area operated in a small scale. This could be attributed to the land tenure system in the study area. This makes them operate at subsistent level. This supported the finding of Nwaiwu *et al* (2013) who posited that in South East, the farmers operated in small scale and farm on land between 0.1 – 5.99 hectares.

Productivity of Farmland

The productivity of farmland is presented in Table 2.

Table 2 shows that the productivity of farmland was 4.03. This implies that, the farmland in the study area was high in productivity. Despite the size of farmland, the farmer with their level of education were able to apply good land management practices that enables them increase the productivity of their farmland even when they rarely use inorganic fertilizers. This agreed with the findings of Ohajianya et al., (2016) that productivity of farmland increased from 1.35 to 2.25 as a result of proper management practices the farmers introduced.

Determinants of Productivity of Farmland

The results of the multiple regression analysis is presented in Table 3

The results showed the exponential functional form provided the lead equation on the basis of having the highest value of coefficient of multiple determination (R^2), highest numbers of significant variables, highest F-value and in conformity with *a priori* expectations.

The value of coefficient of multiple determination (R^2) was 0.69, which implied that 69% of the variation of the determinants of productivity of farmland in the study area were accounted for by the explanatory variables in the model. Variables such as farm size, location, quantity of fertilizer, type of soil, and duration of tenancy were significant at 1%, 5% and 10% respectively.

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The coefficient of farm size was significant at five percent and positively related to the productivity of farmland. This implies that productivity of farmland depends on the size of the farmland. The larger the farm size, the more output is harvested, farmers with smaller farm size experiences low turnout of output. This corroborates the findings of Ibok *et.al*, (2014) who stated that the larger the farm size, the more likely to produce more from the farmland.

The coefficient of location was significant at 10% and positively related to the productivity of farmland. This implies that farmlands located in the rural areas are more productive than the one located in the urban areas. Urban lands are peculiar to land pollution which is a problem to productivity of the land unlike rural land which receives more land improvements such as shifting cultivation, bush fallowing, crop rotation and many more which help the productivity of rural farmland. According to Anyiam (2019), farmland located in arid areas are susceptible to heat and have low productivity unlike farmland in the humid region where there is rain fall to increase the productivity of farmland.

The coefficient of quantity of fertilizer used was significant at five percent and negatively related to productivity of farmland. This shows that farmers in the study area rarely make use of inorganic fertilizer. The result suggests that farmers in the area have alternative use of fertilizer which make chemical fertilizers underutilized. This is in contrast with the findings of (Iheke & Amaechi, 2015) that productivity of land is positively related to the quantity of fertilizer used in the farmland.

The coefficient of type of soil was significant at 10% and positively related to the productivity of farmland. Soil is directly influences the productivity of farmland. Farmland with soil rich in soil organic matters increased land productivity. Raji and Omotesho (2006), the greatest threat of sustaining agricultural productivity in Nigeria farming communities is the declining productivity of soil caused by loss of soil fertility through the erosion of top soil brought about by appropriate land use practices.

The coefficient of duration of tenancy was significant at 10% and positively related to the productivity of farmland. Land is a fixed factor of production, farmland with longer duration of tenancy is subjected to land improvement practices to increase the productivity of such farmland. The longer the farmland holding the more the fertility of the land is improved in relation to productivity.

CONCLUSION AND RECOMMENDATION

From the study, the food crop farmers are mostly young female farmers with formal education. The determinants of productivity of farmland in the study area include farm size, location, quantity of fertilizer, type of soil, and duration of tenancy. The study also concluded that the farmlands in the study area are productive. Based on the findings, it was recommended that farmers should be encouraged to form cooperatives so as to pool their resources together to acquire larger farmlands, fertilizer and other farm inputs.

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APPENDIXES

Table 1 Socio-economics Characteristics of the Respondents.

Age (year)	Frequency	Percentage (%)
20 – 39	18	30
40 – 59	37	61.7
60 – 79	5	8.3
Mean	45	
Marital Status		
Married	41	68.30
Single	10	16.70
Widow	6	10.00
Widower	3	5.00
Sex		
Male	18	30
Female	42	70
Level of Education(years)		
0 – 6	18	30
7 – 13	28	63.3
14 – 20	4	6.7
Mean	8	
Household Size(numbers)		
1 – 5	19	31.7
6 – 10	41	68.3
Mean	7	
Farm Size(hectare)		
0.6 – 1.0	41	68.3
1.1 – 1.5	10	16.7
1.6 – 2.0	6	10.0
2.1 – 2.5	3	5.0
Mean	1.06	

Source: Field Survey Data, 2019

Table 2 Productivity of Farmland in the Study Area

Total value of Farm output (₦)	Total value of farm inputs on land (₦)	Productivity of farmland
141499.4	35085.56	4.03

Field Survey Data, 2019

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Table 3 Determinants of Productivity of Farmland in the study area

Explanatory Variables	Linear Function	Exponential Function +	Semi-log Function	Double-log Function
Constant	3.168	1.065	5.940	1.631
	(3.934)	(8.287)	(0.451)	(0.775)
Farm size	0.127	0.073	-1.096	-0.064
	(2.635)**	(2.393)**	(-0.783)	(-0.456)
Location	0.170	0.051	0.494	0.083
	(0.882)	(1.974)*	(0.493)	(0.823)
Distance	-0.010	-0.003	0.197	0.052
	(-0.553)	(-1.814)*	(0.181)	(0.472)
Quantity of fertilizer used	-0.001	-0.004	-1.008	-0.441
	(-2.054)**	(-2.217)**	(-0.711)	(-3.084)***
Access to credit	0.340	0.050	1.690	0.204
	(0.695)	(0.636)	(1.838)*	(0.978)
Labour use	8.386E-006	8.009E-008	0.184	0.112
	(1.078)	(0.065)	(0.144)	(0.865)
Type of soil	0.028	0.063	0.087	0.068
	(0.079)	(1.893)*	(0.063)	(0.487)
Duration	0.006	0.001	0.155	-0.033
of Tenancy	(1.901)*	(1.816)*	(0.574)	(-1.202)
R^2	0.45	0.69	0.41	0.405
R^{-2}	0.36	0.49	0.25	0.47
F-ratio	0.768	2.586***	0.276	1.788*

Field Survey Data 2019; Values in parentheses are t- ratio

***= significant at 1%, **=significant at 5% and *= significant at 10% + = Lead equation