

Livelihood Factors And Resource Use Efficiency Among Rural Farm Households In South East, Nigeria

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Abstract

The study examined the influence of livelihood factors on resource use efficiency among rural farm households in South East Nigeria. Multi-stage random sampling technique was used to select 400 farm households. Structured questionnaire was used to collect data from the respondents. Cobb-Douglas stochastic frontier production function was used for data analysis. Results showed that variables that positively contributed to the technical efficiency of rural farm households were: resource conflict, access to forest resources, age and level of education while the contributions of farm size, farm distance, access to extension services, access to credit facilities and membership of co-operative societies were negative. It was recommended that policies that will reform land tenure should be enacted, activation of regular and effective extension services to improve resource use by farm households, basic amenities should be provided by Government for conducive rural farming environment. Also government should revive the activities of Agricultural Development programmes, farmers should be motivated through setting up of stabilized and guaranteed prices of agricultural products to enhance their income. Furthermore, government should give grants and direct commercial banks to increase capital provision to farmers through low interest loans which will boost their productivity.

Keywords: Livelihood, Resource Use, Efficiency, Factors, Farm Household

INTRODUCTION

Resources use efficiency is a very important concept in agricultural productivity, especially in sub-Saharan Africa (SSA). This is because it strengthens the capacity in farming business and entrepreneurship. The scope of production can be expanded and sustained by farmers through efficient use of existing resources (Biam, Okorie and Nwibo 2016). It refers to farmers' level of utilization of farm inputs to produce outputs, employing "the best practice" in the production process so that necessary amount of given inputs is used in producing the "best" level of output (Udoh, 2000). Production efficiency means attainment of production goal without a waste (Ajibefun and Daramola, 2003).

There are four major approaches to measuring efficiency (Battase 1995). These are; the non-parametric programming approach, the parametric programming approach, the deterministic statistical approach and the stochastic frontier approach (Johnston 2004). Among these, the stochastic frontier and non-parametric programming known as Data Envelope Analysis (DEA), are the most popular approaches. The stochastic approach is Preferred for assessing efficiency in agriculture because of inherent stochasticity involved (Ezeh, 2004). Farrel (1957), identified three aspects to resource use efficiency:

technical, allocative or economic efficiencies. Technical efficiency gives a direct observable measurement in agricultural output. It is the physical ratio of farm output and the greater the ratio, the more the magnitude of technical efficiency (Etim and Okon, 2013). On the other hand, allocative efficiency is a measure of the degree of success in achieving the best combination of different inputs in producing a specific level of output considering the relative prices of these inputs. Maximum efficiency is attained when it becomes impossible to reshuffle given resource combination without decreasing total output (Umoh, 2006). Economic efficiency is the ability of farmers to maximize project and described as the product of technical and allocative efficiency. It indicates the costs per unit of output for a firm which perfectly attains both technical and price efficiencies (Adeniji, 1988). However, only technical efficiency was considered in this study. Majority of farmers in developing countries are resources poor (Biam,okorie and Nwibo,2016).The report of Chauvin and Malangu (2012) shows that average productivity in SSA fall far below global averages, irrespective of crop in question. An average SSA farmer produces only one ton of cereals per hectare-less than half a fifth of an American farmer's output translating to about less that USDI per day, and

it is a key factor in rural poverty (Rosen and Sharpouri, 2012). Also, labour productivity and income from agriculture are very low compared to world averages, usually within USD2 per day and about 60% of their incomes are spent on food (Enwerem and Ohajanya, 2012). This calls for concern especially when compared with the estimates of the World Resources Institute [WRI] (2014) which shows that besides high staple food importation, SSA requires 360 percent as much as food production in 2050 as in 2006 to feed its population.

Livelihood in sub-Saharan Africa is generally poor, rural and insecure (Food and Agricultural Organization [FAO], 2015; World Bank Group, 2015) with severe implication on their resources use efficiency. In the region farmers lack requisite skills and manpower, access to commercial markets for their produce, credit facilities, affordable improved inputs and sufficient services needed for optimum agricultural production (Nkondze, Masuku and Manyantsi, 2013). This affects their ability to improve their level of resources use efficiency through efficient and effective use of the factors of production (farmland, water and labour) and agricultural inputs (fertilizers, seeds and capital equipments) (Iheke and Nwankwo 2016).

Increasing farmers' resource use efficiency would require a proper understanding of their livelihood. According to the Institute of Development Studies [IDS] (1996), a livelihood comprises of the compatibilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shock, maintain or enhance its capabilities and assets, while not undermining its natural resource base (United Nations Developments Programme) [UNDP], 1999). The sustainable livelihood (SL) provides a holistic framework for understanding the livelihood of the poor, and therefore most effective in helping them to improve their opportunities in life (Sukendra, 2010). Sustainable livelihood framework SLF shows the dynamic interrelation among the various capabilities,

assets and activities required for a means of living. Such outcomes could increase resource use efficiency and productivity of farmers. This study therefore investigated the effect of livelihood factors on resource use efficiency of small scale farmers in South east Nigeria.

MATERIAL AND METHODS

Area of Study

The study was carried out in South – East Nigeria. The area comprises of Abia, Anambra, Ebonyi, Enugu and Imo States with an estimated population of 16.32 million (NPC, 2006). The zone is located between latitude 7°30'N and 8° 30'N North longitude 5° 40'E and 6°45' East of Greenwich meridian on a landmass of 16,000 square mile (400,000 km²). Two seasons season can be distinguished; the rainy from May to October and the dry season from November to April. Relative humidity is usually high (>75%). Annual rainfall ranges from 1,40mm to 2,500mm. Temperature during the rainy season is between 27.0 - 34. 0° C (maximum) and 18.0- 21.0° C (minimum). Soil in the zone ranges from well drained sandy loam to clay loam textured top soil with a PH of 5-7 ranging between 0.5 and 15%

Sampling Technique and Method Of Data Collection

A multi stage random sampling technique was the selection of Enugu and Ebonyi States from the State in the Zone. The second stage was the random selection of two agricultural zones making four zones. In the third stage, two (2) local Government areas were selected from each agricultural zone randomly giving eight (8) LGAs, four for each state. Subsequently, five (5) farming communities were randomly selected from each of the eight LGAs, giving a total of Forty (40) farming communities. Finally, ten (10) farm households were selected randomly from the list of households in each of the sampled communities, giving a total of 400 farm households for the study. Data were collected with the aid of well structured questionnaire.

Table 1. List Of Sampled States, Agricultural Zones, Local Government Area And Communities

STATE	AGRICULTURAL ZONES	LGAs	COMMUNITIES
Ebonyi	Ebonyi North	Ohaukwu Izzi	Umuakpu, Okposhi Eshi Ekwashi, Amoffia, Emezaka Ngbalukwu, Igbeagu, Agbaja, Ndeze, Ezza-Inyimagu Nkpoghoru, Akpoha, Ozizza, Amasiri, Unwana Ishiagu, Kpohokpoho, Akaeze, Okava Ogwo, Ihe nta
	Ebonyi South	Afikpo North Ivo	
Enugu	Enugu Ezike	Igbo Eze North Igbo Eze South	Umuogbo, Amachala, Nkpunato, Ogrute, Igogoro, Ibeagwa, Iheaka, Ovoke-Agu, Unadu, Onicha Mbulubu, Ihuokpara Ugbawka Idodo, Amagunze Ozalla, Agbani, Obe, Amuri, Obuofia.
	Agbani Zone	Nkanu East Nkanu West	

Source: Field Survey 2019

Method of Data Analysis

Maximum Livelihood Estimate (MLE) using CobbDouglas stochastic frontier production function (SFPF) was used to determine the effect of livelihood factors on resources use efficiency of farmers. The model is expressed as;

$$\ln Y_i = \beta_0 + \sum \beta_i \ln(X_i) + (V_i - U_i) \quad (1.1)$$

Where:

β_i = parameters estimate of X_i

Y_i = farmers' output from cassava production (₦)

X_1 = total used in cassava production (man/days)

X_2 = cost of planting materials

X_3 = value of capital inputs

X_4 = value of agrochemicals used

X_5 = farm size

$V_{i(s)}$ = random errors that are assumed to be independently and identically distributed as $N(0, \sigma^2)$ random variables.

$U_{i(s)}$ = non -negative variables associated with technical inefficiency effect. The are assumed to be independently distributed among themselves and between the $V_{i(s)}$ such that U_i is defined by the truncation of the $N(U_i, \sigma)$ distributed and is specified in Equation below.

$$U_i = \delta_0 + \delta_i Z_i \quad (1.2)$$

Where

U_i = technical inefficiency

δ_i = parameter estimates

X_1 = occurrence of resource conflict (number of times there have been conflict in your community over the use of natural or communal resources in the last 5 years)

X_2 = occurrences of natural disasters (number of natural disasters that have occurred in your community e.g. floods, erosions, etc. in the last 5 years).

X_3 = access to land/farm size (ha)

X_4 = access to drinking water (distance of home to source of drinking water in km)

X_5 = access to forest resources (distance of home to the forest in km)

X_6 = distance of farm from home (km)

X_7 = distance of market from home (km)

X_8 = access to health care centre in community (1 if access, 0 otherwise)

X_9 = access to agricultural extension services (number of visits from agricultural extension officers in the last 5 years)

X_{10} = membership of cooperative society (number of cooperative societies belonged to)

X_{11} = marital status (1 if married, 0 otherwise)

X_{12} = farm income (₦)

X_{13} = non-farm income (₦)

X_{14} = local remittances (total remittances received from relatives from within the country in the last 5years in (₦)

X_{15} = access to credit facilities (amount of loan received in the last 5years in ₦)

X_{16} = age (years)

X_{17} = household size (number)

X_{18} = level of education (years)

X_{19} = farming experience (years)

RESULT AND DISCUSSIONS

Livelihood factors that affect the Technical efficiency of the Rural farm Households.

The livelihood factors that contributed to the technical efficiency of the farmers is shown in table 2.

Table 2; Maximum Livelihood Estimate Of The Frontier Production Function Of The Rural Farm Households

Variables	Parameter	Coefficient	t-ratio
Technical inefficiency model			
Constant	δ_0	0.382 (0.015)	3.638***
Resource conflicts	δ_1	0.127 (0.053)	2.396 **
Natural disasters	δ_2	0.316 (0.238)	1.328
Farm size	δ_3	-0.085 (0.042)	-2.024**
Access to drinking water	δ_4	1.027 (1.076)	0.954
Access to forest resource	δ_5	0.126 (0.064)	1.969*
Farm distance	δ_6	-0.023	1.917*

		(0.012)	
Market distance	δ_7	0.101 (0.115)	0.878
Access to health care centre	δ_8	2.345 (1.554)	1.509
Access to extension service	δ_9	-1.829 (0.467)	-3.916***
Membership of cooperative			
Societies	δ_{10}	-0.073 (0.029)	-2.517**
Marital status	δ_{11}	1.026 (0.914)	1.123
Farm income	δ_{12}	-0.187 (0.132)	1.417
Non-farm income	δ_{13}	0.036 (0.082)	0.439
Local remittances	δ_{14}	-2.902 (1.866)	1.555
Access to credit facilities	δ_{15}	-0.047 (0.024)	-1.958*
Age	δ_{16}	0.074 (0.036)	2.056**
Household size	δ_{17}	-0.028 (0.090)	0.311
Level of education	δ_{18}	0.051 (0.020)	2.550***
Farm experience	δ_{19}	0.973 (0.682)	1.427

Key: ***, **, * - significant at 1%, 5% and 10% respectively. Figures in parenthesis represent standard errors.

Source: Field Survey, 2016

Livelihood Factors That Affect the Technical Efficiency of the Rural Farm Households

The livelihood factors that contributed to the technical efficiency of the cassava farmers were shown in Table 2. The table shows that resource conflicts, farm size, access to forest resource, farm distance and access to extension services contributed significantly to the technical efficiency of the rural farm households. Other factors that made significant contributions to the farmers' technical efficiency included: membership of cooperative societies, access to credit facilities, age and level of education. These factors are discussed as follows:

Resource Conflicts

Resource conflict made negative and significant ($p < 0.05$) contributions to the technical efficiency of the farmers. Consequently, a decline in the incidence of resource conflicts raises their technical efficiency, while an increase in resource conflict incidence decreases their technical efficiency. Its coefficient of 0.127 implies that on the average, a unit decrease in the incidence of resource conflict

increases the technical efficiency of the farmers by about 12.7%. There is a rising trend of insecurity in rural areas over the ownership, control and use of natural resources for non- agricultural purposes. Also, in recent times, times farming communities have been serially attacked by Fulani herdsmen not only in Southeast, but in virtual every part of the country. These may have contributed to the significant effect of resource conflict on the technical efficiency of the farmers.

Farm Size

The contribution of farm size to the technical efficiency of the farmers were significant ($p < 0.05$) and positive. This implies that farm size directly affected the technical efficiency of the farmers. Its coefficient of 0.085 infers that on the average, a unit increase in the size of farmland will increase the technical efficiency of the farmers by about 8.5%. This result is consistent with Ojo (2012).

Anyaeqbunam et al (2016) stated that increased access to and ownership of land motivates farmers to invest

and use capital intensive technique that are less labourious but more productive, without hindrances.

Access to Forest Resources

Access to forest resources made significant ($p < 0.10$) and negative contributions to the technical efficiency of the farmers. Its coefficient of 0.126 implies that on the average, a unit decrease in farmers' access to forest resources increases their technical efficiency by about 12.6%. Forest resources constitute a major source of livelihoods for many rural dwellers, who are mostly at little or no costs.

Farm Distance

The contributions of farm distance to the technical efficiency of the farmers were significant ($p < 0.01$) and positive. This implies that the farther away the farms are from the farmers' homes, the more efficient the farmer's become. Its coefficient of 0.023 implies that on the average, a unit increase in farm distance increases the technical efficiency of the farmers by about 2.3%. Most of the time, farms that are in far distance and locations are less cultivated than farms that are closer to farmers' home. Consequently, such farms lie fallow for longer times which makes them very fertile resulting in increased productivity. Similarly also, farms in farther distance tend to be less fragmented than farms closer to home because such locations are less developed, hence with less demand on land or non-agricultural purposes.

Access to extension services

Access to extension services made significant ($p < 0.1$) and positive contributions to the technical efficiency of the rural farm households. Extension service plays a pivotal role in bridging the gap between research (innovations) and practices, and therefore serves as a gate way of changing and improving the mode of carrying out farm operations and activities, which help to increase the efficiency of farmers. Extension contact with farmers enhances the acquisition of innovations, knowledge, skills and technology by the farmers to boost their productivity (Tanko & Olowogbaji, 2009). Its coefficient of 1.829 implies that on the average, for every unit increase in access to extension services, the technical inefficiency of the cassava farmers decrease by about 1.829 times. This result is in consonance with Anyaegbunam et al. (2016).

Membership of Cooperative Society

The contributions of farmers' membership of cooperative society to their technical efficiency were significant ($p < 0.05$) and positive i.e. farmers' membership of cooperative society increased their technical efficiency. Its coefficient of 0.073, implies that on the average, a unit increase in the farmers' membership of cooperative society increases their technical efficiency by about 7.3%. Farmers are

generally poor, and as such cooperative society affords them the opportunity to come together, pulling their resources, talents and time towards achieving a common goal, which, left to them individually would be impossible. Also, the formation of cooperative societies by farmers makes it easier for government, donor agencies, extension agents to reach them with new skills, technique and innovations in agriculture, which will help to boost their farm productivity and technical efficiency.

Access to Credit Facilities

Access to credit facilities had significant ($p < 0.05$) and positive effect on the technical efficiency of the farmers i.e. access to credit to facilities increases the farmers' technical efficiency. Its coefficient of 0.047 implies that on the average, a unit increase in access to credit facilities leads to about 4.7% increase in the technical efficiency of the farmers. Every farm activity and operation requires a budget. The budget gets bigger if it involves innovative, modern and improved techniques and input. These improved techniques and input yield higher from output. However, most of the times, farmers are not able to finance such modern improved technologies, without credit facilities. Ojo (2012) reported that access to credit facilities enhances farmers' ability to access farm inputs which, on their own, they could not afford, thereby improving their productivity.

Age

The contributions of age to the technical efficiency of the farmers were significant ($p < 0.05$) and negative i.e. the technical efficiency of the farmers decreases as their age increases. Its coefficient of 0.074 implies that on the average, a unit increase in the age of the farmers leads to about 7.4% decrease in their technical efficiency. According to Anyaegbunam et al (2016), aging farmers would be less energetic to work bearing in mind that agricultural production in sub-saharan Africa is highly labour intensive and subsistent.

Level of Education

The level of education of the farmers had significant ($p < 0.01$) and negative effects on their technical efficiency i.e. increased access to formal education decreases the technical efficiency of the farmers. Its coefficient of 0.051 implies that on the average, a unit increase in the level of education of the rural farm household results to about 5.1% decrease in their technical efficiency. The result is surprisingly awkward because it is a given that increased access to education enhances farmers' ability to adopt agricultural innovations, which impacts positively on their productivity and efficiency. According to Muhammad-Lawal et al. (2009), agriculture is seen as an occupation of the poor, the less educated and the never-do-wells. These make it difficult for members of the society with

high formal level of education to freely and wholeheartedly embrace agriculture and farming as a profession.

CONCLUSION AND RECOMMENDATION

The livelihood condition of the farm household is poor, rural and insecure. Their primary livelihood activity is agriculture and natural resources, which is under the threat of inefficient resource use and low productivity. The farmers' efficiency in the allocation of farm resources was affected by their livelihood conditions.

Creating a conducive livelihood condition for efficient resource-use is vital in embracing the entrepreneurship capacity development of the rural farming business. The following recommendations were made:

1. Government should evolve policies that will reform land tenure system (LTS) and the land use act (LUA) of 1978, to ensure increased access to land for small-scale farming.
2. Government should revive and increase the activities of Agricultural Development Programme (ADP) and Agricultural Cooperative Society (ACS) through increased and adequate budgetary allocations. This will increase farmers' access to extension services and membership of cooperative society, which are viable media for the dissemination agricultural innovations, grants, aids and support.
3. Government should direct commercial banks (CBs) and microfinance banks (MBs) to give certain proportion of their loans to small scale farmers with minimal collateral requirements. This will increase farmers' access to capital and credit facilities, which will boost their productivity.

LIMITATIONS

The challenges in the study were related to the data collection. They included;

- i. The farmers did not have easy recall of the information being sought from them for lack of record keeping of their farming activities. There were repeated questions, illustrations and interactions.
- ii. Farmers were unwilling to provide information on their livelihood and farming activities. They were suspicious of the reason for the enquiry. However, they were convinced with increased assurances that the research was purely for academic purposes.
- iii. The study imposed a lot financial constraints on the researcher because it was not sponsored, neither did it enjoy any grant. It was carried out through the support and goodwill of friends and associates.

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