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TECHNICAL EFFICIENCY OF RICE FARMERS IN ILESA AGRICULTURAL ZONE OF OSUN STATE

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ABSTRACT: *This study examined the technical efficiency of rice farmers in llesa Agricultural zone of Osun State. Sixty (60) farmers were randomly selected in the area. Both primary and secondary data were used for the study. The primary data were collected with the aid of well structured questionnaire. The data were analyzed using frequency counts, percentage and stochastic frontier model to measure the technical efficiency and its determinants. The stochastic production frontier result showed all the parameter estimates of the mean least estimates are statistically significant at 1% with the exception of transportation and fertilizer. The estimated technical efficiency of sampled respondents range from 0.40 to 1.00 with a mean of 0.83. This implies that on the average, rice production in the study area is about 83% of the potential frontier production level given present state of technology and input. This indicated that there is room for improvement in rice production in the study area.*

KEYWORDS: Technical Efficiency, Rice Farmers, Ladoke Akintola

INTRODUCTION

In Nigeria just liked any other developing country of the world, Agriculture is the mainstay of the economy. It employs about 75% of the workforce in Nigeria. Technical efficiency is define as the ability of making use of implement or mechanized skills to bring about measure of a farms success in producing maximum output for a given set of inputs. :

There are two types of rice cultivation, swamp rice (lowland rice) and upland rice. Upland rice is planted on well-drained soils in the humid forest zone far from the major urban market Local upland rice cultivars have evolved independently from low land types in response to stresses from acid, infertile soils, and from a variety of weeds and diseases. Rice is mainly grown in rainfall upland, rainfed lowland hydromorphic and lowland swamp ecologies in 31 rice growing countries in Sub-Saharan Africa.

In some countries, the per capita consumption is estimated at more than l00kg/year. Demand for rice production is increasing and greater production is needed to feed more people and reduce costly imports. A few countries, Nigeria. For example have banned rice importation as a means of encouraging local production. The rainfed lowland, (hydomorphic ecology also

offers a great potential for increased rice production in Africa because the rice plant has adequate moisture in the root zone for at least a major lands are available for rice cultivation).

The earlier cultivation or organization of Oryza sativa in Nigeria was about 1890 when upland varieties were introduced to the high forest zone of western Nigeria. Shallow swamp varieties from Guyana Srilanka were established in the smaller tributaries of several rivers where they rapidly replace the swamp varieties or red rice. Oryza glaberima. The most extensively grown varieties. It is now mostly confined to the world most important cereals for human consumption, emphasis on its consumption in the country has shifted its rather ceremonial status to a staple food. Rice is consumed in the form of nodle, puffered puff rice. Fermentation sweat rice and snack foods made by extrusion cooking (Mercien et al., 1989). It is used as a source of oil for developing countries by researchers.

Rice growing environment in Nigeria are usually classified into four rice ecosystem: rainfall upland, rainfall lowland, deep water and mangrove swamp. The mangrove swamp is the least important in terms of area, accounting for less than 1% of total rice area. Another 8%of the rice are is generally estimated to fall in deep water environment. Rice is important cereal for human consumption, as it provide 23% of global human per capita energy and 16% of per capital protein (Julinao, 1985). Rice protein contains high lysine and contain amino add, it is important in making bear, rice wine and vinegar. Rice oil extracted from the bran is rich in vitamin E.

The objective of the study is to analyse the technical efficiency of rice farmers and identify its determinants in Ilesa Agricultural determinants zone of Osun Slate, Nigeria.

The hypothesis is stated in null forms as follow;

H_{01}: There is no significant relationship between technical efficiency and the level of production of rice farmers in the study area.

Materials and Methods

The study was carried out in Ilesa Agricultural zone of Osun State. There are six local government areas in the zone namely Ilesa East, Ilesa West, Oriade, Atakumosa West, Atakumosa East and Obokun. The first two are urban while the others are rural areas. The rice farmers are more concentrated in the rural areas of the zone. Ilesa, one of Osun State major town is bordered in the north by Igbomina Kingdoms, in the West by Ife and Osogbo in the South by Ondo and in the East by Ekiti. Ilesa is located on latitude $7^0 38^c$ N and longitude $4^0 75^c$ N (Ilesa Town Planning Authority, 2001). The population of the area is 168, 321 according to 1991 population census. The major crops grown in the area is rice.

Sampling Technique

A multi-stage random sampling technique was used to select the respondents. The primary data collected includes the farm size, household size, rice yield, input used, varieties of rice grown, farm implements used for production. The cost of the implement and their life spans as well as problems of rice production and other relevant information relation to this study were collected.

Data Analysis

The data collected were subjected to stochastic frontier model which was used to measure technical efficiency of respondents. Empirical estimation of efficiency is normally done with the methodology of stochastic frontier production function.

Model Specification

In this study a separate stochastic frontier production proposed by Battese and Coeli (1995) and the efficiency of the A.D.P. rice farmers empirical model of the stochastic production was specified as;

$$\text{In } Yij = \beta_0 + \beta_i LnXij + \beta_2 LnX_2ij + \beta_3 LnX_3ij + \beta_4 LnX_4ij + \beta_5 LnX_5ij$$

$$\beta_6 LnX_6ij + Vij - Uij \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where subscript i and j refers to the jth observation of the farmer respectively and

Y = Total quantity of rice (kg)

X_1 = Quantity of seed used (kg)

X_2 = Total quantity of labour used (Manday)

X_3 = Cost of Transportation (Naira)

X_4 = Quantity of herbicide

X_5 = Quantity of fertilizer (kg)

Vij = Is a random error term independently and identically distributed have a normal distribution with mean zero and variance δ^2 intended to capture event beyond the control of farmers.

Uij = Is a non negative random technical efficiency, effects associated with the technical efficiency of production of farmers involved. It is assumed to arise from a normal distribution with mean Uij and variance δ^2 which is truncated at zero.

Determination of Efficiency

It is assumed that the technical inefficiency measure by the mode of the truncated normal distribution (i.e Uij) is the function of socio economic factors (Yao and LiU, 1998) as given in equation (2)

$$Uij = + a0 + a_1 Z_1ij + a_2 Z_2ij + a_3 Z_3ij + a_4 Z_4ij + a_5 Z_5ij + a_6 Z_6ij \ldots\ldots.(2)$$

Where Uij = Technical inefficiency of the ith farmer and jth observation of the farmer.

Z_0 = Constant

Z_1 = Rate of Extension Agent visit

Z_2 = Weed control system

Z_3 = Year of experience

Z_4 = Source of credit.

The β and α coefficient are unknown parameters that was estimated by the method of maximum likelihood, using computer programme FRONTIER version 4.1 (Coelli 1994).

The variables included in this model as the determinants of technical efficiency included in this model as the determinants of technical efficiency was indicated by possible effects of farmer's personal characteristics and farming conditions on technical efficiency. This help in coming out with recommendation on how government policy formulation can be used to influence these variables as to enhance the technical efficiency of the farmers.

Result and Discussion

Socio-Economic characteristics of rice farmers

Table 1 show that 98.3% of the farmers were male while only 1.7% of the farmers were female, the higher proportions of the respondents were male, and indicating that rice production was dominated by male in the study area. Majority of the respondents fell in the age range of 30-50years, which could be classified as the active and productive age. It was revealed that 98.3% were married. This showed how responsible the respondents were to their various families. Educationally, the study revealed that 35% of the respondents had primary education while 30% had secondary education, 11.7% had tertiary education and 23.3% of the farmers do not have any formal education. This implies that the rate of adoption of innovation is expected to be high in the study area, this is a pointer to the fact that to make profit in rice farming, little education would be required majority of the farmers 58.3% have been in rice production for 5-8yerars fell between 9-12 years have more experience on the production than others because they have spent years in the farm which may lead them to high production in their output.

The study reveals that 35% of the farmers got their credit from cooperative, 36.7% got it through personal saving while 13.3% of the farmers got their credit from bank and 15% of the farmers got their credit from relatives.

Table 1: Socio-Economic Characteristics of Rice Farmers.

Socio economic	**Characteristics**	**Frequency**	**percentage**
Sex	Male Female	59 1	98.3 1.7
Age/years	30-40 41-50 51-60	17 26 13 4	28.3 43.3 21.7 6.7
Marital status	Single Married	1 59	1.7 98.3
Education	Non formal education Primary school Secondary school Tertiary education	14 21 18 7	23.3 35 30 11.7

Experience	1-4years 5-8years 9-12years	9 35 15	15 58.3 26.7
Source of credit	Co-operative Personal saving Bank Relative	21 22 8 9	35 36.7 13.3 15

Source: Field Survey, 2006

Table 2: present the ordinary least square (OLS) and maximum likelihood estimates of the production function parameters. The OLS function provides estimates of the average production, while ML model yield estimates of the stochastic production frontier. There is an improvement in significant level MLE compared to the average function. All the parameters estimates of the ML estimates are statistically significant at 1% with the exception transport of (β_4) and fertilizer (β_6). The regression coefficients in Cobb-Douglas production function are production elastic and their sum indicates return to scale. The estimate of return to scale was much higher in the MLE than average production function and significantly different from unity. This indicating an increasing returns to scale which implies that an increase in the use of the selected variables would result in more than proportionate increase in the production of rice.

The value of sigma (15.96) is significantly different from zero indicating a good fit and correctness of the distribution assumption specified. The variance of ratio (Gamma) which measures the effects of technical inefficiency in the variation of observed output.

$Y = \frac{\gamma^2}{1+\lambda} = \frac{d^2}{d^2}$ has a value of 0.31 which means that 31 percent of the total

Variation in the output is due to technical inefficiency that is 31% of the differences between the observed and maximum production frontier outputs were due to differences in farmers. Level of technical efficiency and not related to random variable.

Table 2: OLS and MLE Estimates

Variables (OLS)	**Coefficient**	**t-ratio**
Constant β_0	23.84	
Farm size β_1	0.23	0.12
Seed β_2	0.06	1.02
Labour β_3	0.25	0.48
Transportation β_4	0.01	0.36
Herbicide β_5	0.94	1.66
Fertilizer β_6	0.01	0.43
Return to scale	1.50	0.54

Variable (efficiency model)	**Coefficient MLE**	**t-ratio**
Constant β_0	26.69	11.74
Farm size β_1	6.50	54.17
Seed β_2	0.24	1.02

Labour β_3	0.25	0.48
Transportation β_4	0.01	0.36
Herbicide β_5	0.94	1.66
Fertilizer β_6	0.01	0.43
Return to scale	6.88	3.44
Sigma	25.47	25.46

Source: Field survey 2006

CONCLUSION AND POLICY RECOMMENDATIONS

On the basis of finding of this study it was drawn that majority of the farmers are male and married, most of the respondent have formal education at least primary school education, except in a few cases where majority of them possessed secondary education while some had non-formal education. The level of literacy is high among respondents as more than 70% of them had one form of education or the other; the result stochastic frontier revealed that rice farmers in the study area are not technically efficient.

In view of the findings of the study, the following recommendations are made for effective agricultural extension and increase local production of rice in Nigeria. Agricultural extension officers should continue to maintain frequent and regular contacts with the farmers, materials necessary should be made available at the right time and at subsidized rate, this will prevent discontinuance. Government should not relent in its efforts at mass literacy among the farming population. Education should be emphasized for farmers since their level of education will go along way to affect adoption of innovation. The farmers should organize agricultural co-operatives so as to have access to credit and marketing facilities. Again, extension agents should be made to take farm visit seriously.

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