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ANALYSIS OF PRODUCTION EFFICIENCY OF FOOD CROP FARMERS IN OGUN STATE, NIGERIA

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ABSTRACT
This study analyzed the production efficiency of food crop farmers in Ogun State, Nigeria. Two hundred and forty (240) food crop farmers were sampled in a multistage sampling procedure. The data collected were analyzed using descriptive statistics, budgetary technique and stochastic frontier analysis. The findings showed that most of the food crop farmers are relatively educated and still in their active age. The budgetary result showed that food crop farming is profitable in the study area. The stochastic frontier results (Maximum Likelihood Estimates) revealed that farm output increases with farm size, hired labour, family labour and planting material but decreases with herbicide. Also, technical efficiency of the farmers increases with years of education, farming experience and extension contact but decreases as farmers grow older. The mean technical efficiency, allocative efficiency and economic efficiency of 80 percent, 76 percent and 61 percent, respectively showed that there is room for improvement in technical efficiency by 20 percent, allocative efficiency by 24 percent and economic efficiency by 39 percent with the present technology. Policy option requires the food crop farmers to reduce the use of herbicide. Also, farm expansion is recommended to ensure efficient utilization of resources. Finally, formal education and adult literacy education should be strengthened among farmers as education and extension contact increases the efficiency of the food crop farmers.

Keywords: production efficiency, food crop, stochastic frontier, Nigeria

INTRODUCTION

Economically, human wants are numerous and resources to achieve these wants are scarce. The scarcity of resources is the major factor that makes the improvement in efficiency so important to an economic agent or to a society (Jema, 2008). The conceptualization and measurement of efficiency relies on the specification of a production function which represents the maximum output attainable from the use of a given level of inputs. Three types of production efficiency are identified: the economic efficiency which is a combination of technical efficiency and allocative efficiency, is defined as the capacity of a firm to produce a predetermined quantity of output at a minimum cost for a given level of technology; technical efficiency is the ability of the farmer to produce maximum output from a given level of inputs while allocative efficiency measures the ability of the farmer to use inputs in optimal proportions given input prices (Bravo *et al*., 1997).

A strong and an efficient agricultural sector would enable a country to feed its growing population, generate employment, earn foreign exchange and provide raw materials for industries. The agricultural sector has a multiplier effect on any nation's socio-economic and industrial fabric because of the multifunctional nature of agriculture. This is obvious, since agriculture still employs the larger percentage of the population, contributing 42.1 percent of the real GDP and remains the most viable sector among the oil and non-oil sectors (CBN, 2008).

With its reserves of human and natural resources, Nigeria has the potential to build a prosperous economy and provide for the basic needs of the population (Ogundari and Ojo, 2007). This enormous resource base if well managed could support a vibrant agricultural sector capable of ensuring the supply of raw materials for the industrial sector as well as providing gainful employment for the teeming population.

Nigeria's rich human and material resource endowments give her the potential to become Africa's largest economy and a major player in the global economy (Ajibefun, 2002). When compared with other African and Asian countries, economic development in Nigeria has been disappointing. With GDP of about 45 billion, 32.953 billion and 55.5 billion dollars in 2001, 2002 and 2003, respectively and per capita income of about $300 a year, Nigeria has become one of the poorest countries in the world (Ajibefun, 2002). Having earned about $300 billion from oil exports between the mid-1970s and 2000, her per capita income was disappointingly 20 percent lower than that of 1975 (Ogundari and Ojo, 2007). Inability to tap much of the abundant human and material resources can therefore put the attainment of the Millennium Development Goals by 2015 in jeopardy (Ajibefun, 2002). It was estimated that the annual food supply in Nigeria would have to increase at an average annual rate of 5.9 percent to meet the food demand and reduce food importation significantly (Amaza *et al.*, 2006). It was also reported that the production of food in Nigeria has not increased at the rate that can meet the increasing population. While food production increases at the rate of 2.5 percent food demand increases at the rate of more than 3.5 percent due to the high rate of population growth of

2.83 percent (CBN, 2004). The reality is that Nigeria has not been able to attain self-sufficiency in food production, despite increasing land area put into food production annually. The constraints to the rapid growth of food production seem to mainly be that of low crop yields, and resource-use efficiency attributable to inefficient farm management and inadequate finance to rural farm households.

The efficiency with which food crop farmers use available resources and improved technology is important in agricultural production (Rahji, 2005). This suggests that increased efficiency is associated with the quality of resources used, as well as their quantity and increased resource mobilization and efficient use help to account for productivity increase. Given the low income of the rural farm households who are mostly small-holder cassava farmers, only little can be expected from their savings. Similarly, most financial institutions are reluctant to grant loans to the farmers who form the bulk of rural inhabitants because of the nature of agriculture in Nigeria.

The low agricultural output in Nigeria is revealed, according to Amaza and Olayemi (2002), by the actual yields of major crops compared to the potential yields, implying that there is scope for additional increase of output from the existing hectares of food crops if resources are properly harnessed and efficiently allocated. Amaza and Olayemi (2002) also reported that existing low level of output in food crops production is a reflection of low level of technical efficiency, and that increased output is directly related to high efficiency arising from not only the optimal combination of inputs but also the given state of technology.

No doubt, most food crop farmers in Nigeria are constraint in terms of the necessary inputs to increase their production efficiency. As a consequence, most of the food crop farmers still operate at a subsistence level. As government is awake to addressing the welfare issues affecting the grass root people, high production efficiency among cassava farmers remain the key to realizing these objectives. This motivates this study to examine the performance and the determinants of production efficiency of food crop farmers in Ogun State, Nigeria.

RESEARCH METHODOLOGY

The study area

The study was carried out in Ogun State, South-western Nigeria. The state has 20 local government areas. It lies approximately between latitude 3^{o} 30 N and 4^{o} 30N and longitude 6 ^{o} 30 E and 7 ^{o} 30E. It falls within the humid tropical lowland region with two distinct seasons. The shorter dry season lasts for four months usually from November to February. Average annual rainfall ranges from 1, 200mm in the Northern part to 1,470mm in the Southern part. The monthly temperature ranges from 23^{0}C in July to 32^{0}C in February. The mean daily sunshine hours ranges between 3.8 and 6.8. Relative humidity ranges between 76 percent and 95 percent coinciding with dry and wet season, respectively. The northern part of the state is mainly of derived savannah vegetation while the central part falls in the rainforest belt. The southern part has mangrove swamp vegetation. Ogun State is endowed with fertile soil, making it possible to support the growth of food crops, permanent crops and livestock. The state shares boundary with Republic of Benin in the West, Lagos State and Atlantic Ocean in the South, Ondo State in the East and Oyo State in the North. Ogun State covers a land area of 16,762 sq km with a population of 3, 728, 098 (NPC, 2006). For administrative convenience, the state has been divided into four agricultural zones by the Ogun State Agricultural Development Programme (OGADEP). The zones include Abeokuta, Ijebu-Ode, Ilaro and Ikenne. The zones are further divided into blocks while the blocks are divided into cells.

Sampling procedure

Data for the study were collected using a multistage sampling procedure. The first stage involved the selection of one (1) block known for cassava production from each of the four agricultural zones in the state. The second stage involved a purposive selection of two (2) cells known for high production in cassava from each of the selected blocks in stage one. In the third stage, thirty (30) cassava farmers were randomly selected from each of the cells selected in stage two. These procedures led to a selection of 240 food crop farmers used for the study. The range of data collected covered farmers' specific characteristics as well as inputs and output used in production. Most rural farm households in Nigeria practice mixed farming system and the main food crops grown include cassava, maize, yam, melon, cocoyam and vegetables which are classified as either cassava-based or yam-based farming system depending on whether yam or cassava is the dominant crop. In the study area, cassava is majorly intercropped with maize, and for this reason, cassava-maize farmers were selected as the representatives of food crop farmers. The quantity of outputs of crops was obtained in their local measures and then converted to kilogramme. The output in kilogramme was later converted to Grain Equivalent using the conversion factor by Kormawa (1999). This was done to allow output aggregation as well as allowing for a technical relationship between inputs and outputs to be estimated for the crop mixture.

Analytical techniques

The data collected were analyzed using descriptive statistics (dominant analysis) and econometric methods.

Budgetary analysis

Budgetary analysis was used to analyze the cost and return structure of the food crop farmers.

$$GM = \sum_{i=1}^{n} P_i Q_i - \sum_{j=1}^{m} c_j x_j \qquad (1)$$

Where:

GM = Farm Gross Margin (Naira)
P_i = Unit price of output for crop i (Naira)
Q_i = Quantity of output for crop i (Kg)
C_j = Unit price of the variable input j (naira)
X_j = Quantity of the variable input j
i = Crop and n is the total number of cultivated crops.
j = Variable input and m is the total number of the variable inputs used in the farm enterprise.
Straight line method of depreciation was used to calculate the depreciation cost of farm tools and equipment.

$$\prod = GM - TFC \quad (2)$$

Where

$\prod$ = Net farm profit
GM = Gross margin
TFC = Total fixed cost

The stochastic frontier production and cost functions

The stochastic frontier modeling has been increasingly popular in recent times because of its flexibility and ability to closely link economic concepts with modeling reality. The modeling, estimation and application of stochastic frontier production function to economic analysis assumed prominence in econometrics and applied economic analysis following Farrell's (1957) seminar paper where he introduced a methodology to measure technical, allocative and economic efficiency of a firm (Ogundari and Ojo, 2007).

Over the years, Farrell's methodology had been applied widely, while undergoing many refinement and improvements. One of such improvements is the development of stochastic frontier model which enables one to measure farm level technical, allocative and economic efficiency using maximum likelihood estimate (a corrected form of ordinary least square –COLS). Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977) simultaneously introduced the stochastic frontier production function and since then many modifications had been made to stochastic frontier analysis. Aigner *et al*. (1977) applied the stochastic frontier production function in the analysis of the U.S agricultural data. Battese and Corra (1977) applied the technique to the pastoral zone of eastern Australia. On the other hand, Meeusen and Van den Broeck (1977) applied the technique to the analysis of ten French manufacturing industries. In recent times, empirical analyses have been reported by Battese, Malik and Gil (1996), Ajibefun and Abdulkadri (1999), Ojo (2004), Coelli *et al*. (1998) and Ogundari and Ojo (2007). The model adopted in this study is based on the one proposed by Battese and Coelli (1995) and Battese *et al*. (1996) in which the stochastic frontier specification incorporates models for the technical inefficiency effects and simultaneously estimate all the parameters involved in the production and cost function models.

The Stochastic frontier production function model of Cobb-Douglas functional form was employed to estimate the farm level technical efficiency of the food crop farmers. The Cobb-Douglas functional form was used because it has been used in many empirical studies particularly those relating to developing country agriculture and the functional form meets the requirement of being self-dual i.e., it allows an examination of economic efficiency. The production functional form is specified as:

$$Y_i = f(X_i ; \beta) \exp V_i - \mu_i \quad (3)$$

The technical efficiency of individual farmers is defined in terms of the ratio of observed output (Y_i) to the corresponding frontier output (Y_i*) conditioned on the level of input used by the farmers (Battese and Coeli, 1988). Hence, the technical efficiency (TE_i) of the farmer is expressed as:

$$TE_i = Y_i/Y_i^* = f(X_i;\beta) \exp (V_i - \mu_i) / f(X_i;\beta) \exp V = \exp(-\mu_i) \quad (4)$$

The corresponding cost frontier of Cobb-Douglas functional form which is the basis for estimating the cost efficiency of the farmers is specified as:

$$C_i = h(Q_i ; \alpha) \exp (V_i + \mu_i) \quad (5)$$

Where C_i represents the total input cost of the ith farms, h is the suitable function, pi represents input prices employable by the ith farm in food crop production measured in naira, α is the parameter to be estimated. Vi and μi are defined below. The cost efficiency (CE_i) of individual farmers is defined in terms of the ratio of the predicted minimum cost C_i* to observed cost (C_i). That is:

$$CE_i = C_i^*/C_i = h(Q_i;\alpha) \exp\mu_i / h(Q_i; \alpha) \exp (V_i + \mu_i) = \exp (V_i) \quad (6)$$

The farmer's Allocative efficiency (AE_i) was estimated as the inverse of cost efficiency following (Bravo-Ureta and Pinheiro, 1997, Akinbode, 2010). Thus:

$$AE_i = 1/CE_i \quad (7)$$

The Economic efficiency of the farmers was estimated as the product of technical efficiency and allocative efficiency.

$$EE_i = AE_i * TE_i \quad (8)$$

The production technology of the farmers was specified by the Cobb-Douglas frontier production function defined as follows:

$$\ln Y_i = \beta o + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \beta_6 \ln X_{6i} + V_i - \mu_i \quad (9)$$

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Where:

Y_i = Farm output (Grain equivalent) from farm i
X_{1i} = Farm size (Hectare)
X_{2i} = Hired labour (Man days)
X_{3i} = Family labour (Man days)
X_{4i} = Planting materials (Naira)
X_{5i} = Fertilizer (kg)
X_{6i} = Herbicides (litre)
V_i = Random variability in the production that cannot be influenced by the farmer. V_is are assumed to be independent and identically distributed random errors having normal N ~(0, δ_v^2) distribution and independent of μi
μ_i = deviation from maximum potential output attributed to technical inefficiency. The μ_is are assumed to be non - negative truncation of the half - normal distribution N~ $(\mu, \delta\mu^2)$
β_0 = Intercept
β_1 - β_6 = Production function parameters to be estimated
i = 1, 2, 3,… n farms

The Cobb-Douglas cost frontier function for the food crop farmers is specified as:

$$\ln Ci = \alpha_0 + \alpha_1 \ln Q_i + Vi + \mu i \quad (10)$$

Where:

Ci is total input cost of the ith farms (naira); Q_i is the farm output (grain equivalent). Vi and μi are as defined above. The technical inefficiency effects, μi is defined as:

$$\mu i = \delta_0 + \delta_1 L_1 + \delta_2 L_2 + \delta_3 L_3 + \delta_4 L_4 + \delta_5 L_5 + \delta_6 L_6 \quad (11)$$

μi is inefficiency effect, L_1 is age of the farmer (years), L_2 is educational level of farmer (years), L_3 is farming experience (years), L_4 is household size, L_5 is gender of farm household head (male headed = 1, female head = 0) and L_6 is number of contact with the extension agent within the cropping season. The δ_0 and δi coefficients are un-known parameters to be estimated along with the variance parameters δ^2 and γ .

The variances of the random errors, δ_v^2 and that of the technical and cost inefficiency effects $\delta\mu^2$ and overall variance of the model δ^2 are related. Thus $\delta^2 = \delta v^2 + \delta\mu^2$. The δ^2 indicates the goodness of fit and the correctness of the distributional form assumed for the composite error term. The ratio $\gamma = \delta\mu^2/\delta^{2,}$ measures the total variation of output from the frontier which can be attributed to technical or cost inefficiency. The estimates of all the parameters of the stochastic frontier production function and the inefficiency model were simultaneously obtained using the program FRONTIER version 4.1 (Coelli, 1996).

RESULTS AND DISCUSSIONS

Description of the socio-economic characteristics of food crop farmers

The socio-economic characteristics of food crop farmers are presented in Table-1. The dominant indicator shows that an average food crop farmer is middle aged; the mean age of the farmers was 49 years with 62.5% aged between 35 and 55 years. This implies that majority of the farmers are still in their active age and are therefore expected to be productive, *ceteris paribus*. In terms of gender, the study revealed that 85.8% of the farmers were males. This shows active involvement of men in farming in the study area. The findings also revealed that majority (83.3 percent) of the farmers were married, implying additional responsibility. The implication is that in a traditional rural setting a wife is a good source of family labour in food crop production whose activities begin from decision making on production to processing and marketing of farm produce.

The study also revealed that the mean household size for the cassava-based farm households was approximately 7 persons. Majority (75%) of the farmers had between 6 and 10 household members. This may indicate more members of household are available for farming at the expense of formal education. In addition, most of the farmers are educated, though with low educational level (mean years of education is 9). The mean farming experience was estimated 25 years, with 60% having between 21 and 40 years of experience in farming, implying the farmers are relatively experience. The study also revealed that majority (60.9%) of the food crop farmers met with extension officers once in six months. This shows low extension services to farmers. Extension service to farmers is an important incentive in farm production as it aids information dissemination and adoption of innovation.

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Table-1. Socio-economic characteristics of food crop farmers.

Variables	Dominant indicator	Mean
Age	62.5% between 35 and 55years	49
Gender	85.8% males	
Marital status	83.3% married	
Household size	75% had between 6 and 10 members	7
Education	70.8% had formal education	9years
Farming experience	60% had between 21 and 40 years	25
Extension visit	60.9% were visited once in six month	

Source: Computed from Field Survey Data, 2011

Cost and return to food crop farming

The budgetary analysis for cassava-based farming system is presented in Table-2. The total variable cost per hectare was ₦89, 695 and accounted for 87.72 percent of the total cost of production. Also, the total fixed cost per hectare was estimated at ₦12, 558.60 and accounted for 12.28 percent of the total cost of production. The cost estimates of the cassava-based farming system showed that variable costs constitute the larger proportion of cost of production. In addition, the total revenue (TR), gross margin (GM) and net farm income (NFI) per hectare were estimated at ₦282, 350, ₦192, 655 and ₦180, 096.40, respectively. The net farm income showed that food crop farmers performed in terms of margin between total revenue and total cost.

Table-2. Cost and return structure per hectare for food crop farming.

Variables	Values	Percentage of total cost
Revenue (₦)		
Value of maize (₦)	82,844.00	
Value of cassava (₦)	199,510.00	
Total revenue (₦)	282,354.00	
Variable cost items		
Cost of tractor services (₦)	1,791.70	1.75
Cost of planting materials (₦)	8, 404.00	8.22
Cost of fertilizer (₦)	658.33	0.64
Cost of herbicide (₦)	1, 906.70	1.86
Rent on knapsack sprayer (₦)	175.83	0.17
Labour cost (₦)	70, 446.00	68.90
Transportation cost (₦)	6316.67	6.18
Total variable cost (₦)	89, 695.00	87.72
Gross margin (₦)	192, 655.00	
Fixed cost items		
Depreciation (₦)	3,909.60	3.82
Rent on land (₦)	8, 649.00	8.46
Total fixed cost (₦)	12,558.60	12.28
Total cost (₦)	102, 253.60	100.00
Net farm income (₦)	180, 096.40	

Source: Computed from Field Survey Data, 2011

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Maximum likelihood estimates of the production function of food crop farmers

The Maximum Likelihood Estimates (MLE) of the production function of food crop farmers are presented in Table-3. The variance parameters, sigma-square (δ^2) and gamma (γ) were estimated at 0.992 ($p< 0.01$) and 0.969 ($p<0.01$), respectively. The sigma-square attests to the goodness of fit and correctness of the distributional form assumed for the composite error term while the gamma indicates the systematic influences that are unexplained by the production function and the dominant sources of random errors. This implies that about 96.9 percent of the variation in output of cassava farmers is due to the differences in their technical inefficiency. Thus, inefficiency effects were present and make significant contribution to the efficiency of the cassava farmers. The parameter estimates of the production function showed that farm size ($p<0.01$), hired labour ($p<0.05$), family labour ($p<0.10$) and planting materials ($p<0.10$) had significant influence on output of farmers. The findings showed that the farmers emphasized the use of family and hired labour for production. The contribution of farmers' personal characteristics: age, years of formal education, farming experience, household size, sex and extension contact to farm inefficiency was also examined. The sign of the coefficients of these variables has important policy implications as positive sign implies negative effect on efficiency while negative sign signifies a positive effect on efficiency. While education, farming experience and extension visit had significant positive effect on the efficiency of the cassava farmers, age had significant negative effect on the efficiency of the farmers. This implies that the technical efficiency of the farmers decline as they grow older.

Table-3. Stochastic frontier production function maximum likelihood estimates for food crop farmers.

Variable	Coefficient	Standard error	t-ratio
Production function			
Constant	7.25***	0.816	8.89
Farm size (X_1)	0.74***	0.0845	8.77
Hired labour (X_2)	0.03**	0.0117	2.56
Family labour (X_3)	0.034*	0.0197	1.75
Planting material cost (X_4)	0.186*	0.102	1.82
Fertilizer (X_5)	0.00077	0.00394	0.196
Herbicide (X_6)	-0.005	0.00314	-0.0159
Inefficiency model			
Constant	0.307***	0.0388	7.9
Age (L_1)	0.00257*	0.00117	2.2
Education (L_2)	-0.0128***	0.00399	-3.21
Farming experience (L_3)	-0.119*	0.0626	-1.90
Household size (L_4)	-0.0167	0.0341	-0.489
Sex (L_5)	0.112	0.155	0.725
Frequency of extension visit (L_6)	-0.0196***	0.00192	-10.2
Diagnostic statistics			
Sigma-squared (δ^2)	0.0862***	0.0304	2.83
Gamma (γ)	0.969***	0.0336	29.78

*** implies significant at 1 percent, ** implies significant at 5 percent, * implies significant at 10 percent.
Source: Computed from Field Survey Data, 2011

Elasticity of production and return to scale

The sign of the coefficients of the significant variables showed that farm output is inelastic with respect to change in any of the variables (Table-4). This suggests that one percent increase in farm size, hired labour, family labour and planting material will bring about an increase in output by 0.74, 0.03, 0.034 and 0.186 percent, respectively. The findings showed that cassava farmers operate at decreasing return to scale (Table-4). This implies that the farmers are operating at the rational stage of production (stage 2) where the average physical product is above the marginal physical product.

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Table-4. Elasticity of production and return to scale.

Variable	Elasticity
Farm size	0.74
Hired labour	0.03
Family labour	0.034
Planting material	0.186
Fertilizer	0.00077
Herbicide	-0.005
Return to scale	0.98

Source: Computed from Field Survey Data, 2011.

Maximum likelihood estimates of the stochastic frontier cost function of food crop farmers

The result of the maximum likelihood estimates of the stochastic frontier cost function of the cassava farmers is presented in Table-5. The sigma-square (δ^2) estimate of 0.148 ($p<0.01$) attests to the good fit of the model. Also, the variance ratio, gamma (γ) revealed that inefficiency effects exist among the farmers as shown by the gamma value of 0.94 ($p< 0.01$). This signifies that about 94 per cent of the variation in production cost of cassava farmers is due to differences in their cost inefficiency. The result shows that increase in the output unit will increase the total cost of production. Thus output determines the total cost of production.

Table-5. Maximum likelihood estimates of the stochastic frontier cost function of food crop farmers.

Variable	Coefficient	Standard error	T- ratio
Constant	5.803***	0.277	20.95
Farm output	0.6089***	0.033	18.41
Sigma-squared (δ^2)	0.148***	0.025	5.93
Gamma (γ)	0.943***	0.0368	25.63

Source: Computed from Field Survey Data, 2011.

Production efficiency estimates of food crop farmers

The frequency distribution of Technical efficiency, Allocative efficiency and Economic efficiency Estimates of food crop farmers are presented in Table-6. The technical efficiency of the farmers is fairly distributed with 30.8 percent having their efficiency within the bracket of 0.81 and 0.90. This gives a mean technical efficiency of 0.80 implying there is room for improvement in technical efficiency by 20 percent with the present technology. The allocative efficiency estimates are ranged between 0.33 and 0.96 with the mean efficiency of 0.76. This implies there is room for improvement by 24 per cent. The economic efficiency estimates of the farmers are ranged between 0.17 and 0.91 with the mean efficiency of 0.61. The implication of this is that the farmers averagely produce output at a minimum cost. In addition, the mean economic efficiency of the farmers shows there is room for improvement by 39 percent.

Table-6. Distribution of production efficiency estimates of food crop farmers.

	Technical efficiency		Allocative efficiency		Economic efficiency	
Class	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
$\leq$ 0.30	0	0	0	0	6	2.5
0.31-0.40	0	0	6	2.5	12	5.0
0.41-0.50	8	3.3	10	4.2	44	18.3
0.51-0.60	16	6.7	28	11.7	44	18.3
0.61-0.70	24	10	30	12.5	70	29.2
0.71-.080	58	24.2	62	25.8	52	21.7
0.81-0.90	74	30.8	72	30	10	4.2
>0.90	60	25	32	13.3	2	0.8
Total	240	100	240	100	240	100
Mean	0.80		0.76		0.61	
Minimum	0.45		0.33		0.17	
Maximum	0.99		0.96		0.91	

Source: Computed from Field Survey Data, 2011.

CONCLUSION AND RECOMMENDATIONS

The findings of the study revealed that majority of the food crop farmers had formal education. The farmers earned more per hectare of farm land as revealed by the result of the budgetary analysis. The stochastic production function revealed that farm output increases with farm size, family labour, hired labour, planting material and fertilizer but decreases with herbicide implying the farmers over-utilized herbicide. The mean technical efficiency of 80 per cent showed that there is potential to increase output by 20 percent with the present technology. The mean allocative efficiency of 76 percent implies there is room for improvement by 24 percent. More so, the mean economic efficiency of 61 percent implies there is room for improvement 39 percent. The determinants of technical efficiency of food crop farmers include age, education, farming experience and extension visit. Policy option requires the food crop farmers to reduce the use of herbicide. Farmers should expand their farm land to ensure efficient utilization of resources. Above all, formal education and adult literacy education should be strengthened among the farmers.

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