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Economic Efficiency of Small Scale Food Crop Production in Nigeria: A Stochastic Frontier Approach

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ABSTRACT This paper examines the overall efficiency of small holder croppers in Nigeria with a view to examine the productive efficiency of in food crop production in the country. Data were collected from 200 farmers' selected using multi-stage sampling technique and analysed using descriptive statistics, stochastic frontier production and cost function models. The return to scale (RTS) for the production function revealed that the farmers operated in the irrational zone (stage I) of the production surface having RTS of 1.113. The mean technical, allocative and economic efficiency of 0.733, 0.872 and 0.684 respectively were obtained from the data analysis, indicating that the sample farmers were relatively very efficient in allocating their limited resources with AE appears to be more significant than TE as a source of gains in EE. The result of the analysis indicate that presence of technical inefficiency and allocative inefficiency had effects in the food crop production as depicted by the significant estimated gamma coefficient of each model, the generalized likelihood ratio test and the predicted technical and allocative efficiencies within the farmers.

INTRODUCTION

Agriculture belongs to the real sector of Nigerian economy. It is characterized by: a multitude of small scale farmers scattered over wide expanse of land area, with small holding ranging from 0.05 to 3.0 hectares per farm land, rudimentary farm systems, low capitalization and low yield per hectare. The roles of agriculture remain significant in the Nigerian economy despite the strategic importance of the oil sector. Agriculture provides primary means of employment for Nigerians and accounts for more than one-third of total Gross Domestic Product (GDP) and labour force (FAO, 2003; World Bank, 2003). The agricultural share of the GDP stood at about 90% before independence in 1960, about 56% between 1960—1969 and more than 40% since 1986 (CBN, 2003).

The decline in the contribution of agriculture to the country's GDP overtime is due to the slower growth of the sector relative to other sectors of the economy and most especially commercial exploration of petroleum (CBN, 1997).

The national strategic importance of food is evident in its consideration as a key variable in matter relating to national security and in planning against disaster and other emergencies. However, a major indicator of depressed performance of the Nigeria agricultural sector is the food crisis experienced in the country in the past years. Nigeria as a country endowed with a large expanse of land with tremendous potential resources and favourable climate for producing food and other raw materials for export and domestic industries has not been self-sufficient in food production (Spore, 1993)

The rate of growth of Nigeria food production has been very low; food production grows at the rate of 2.5% per annum in recent years while food demand has been growing at the rate of more than 3.5% per annum due to high rate of population growth of 2.83% (FOS, 1996). The apparent disparity between the rate of food production and demand for food in Nigeria has led to: (i) a food demand supply gap thus leading to a widening gap between domestic food supply and the total food requirement;(ii) an increased food importation and (iii) high rates of increase in food prices due to a growing food supply deficit despite food importation (FMAWRRD, 1988).

In reaction to the worrisome performance of the agricultural sector, the federal government had made various attempts, albeit with limited successes at various programmes at reforming the sector to its enviable position in the Nigerian economy. Some of these programmes include: National Accelerated Food Production Projects (NAFPP) 1980; River Basin Development Authority (1970); Operation Feed the Nation (1976); Green Revolution (1980); Directorate of Food and Rural Infrastructure (DFRRI) 1986;

Agricultural Development Project (ADP) (1972) and National Directorate of Employment (NDE 1986).Hence, government efforts over the year have not yielded sufficient desired result as the country still witnessed increasing high cost of food, generally high cost of living and perpetual poverty (Dittoh, 1994).

The food problem has been heightened by the relatively low level of productivity of resources used by the farmers in the country (Ojo, 2004).And to examine the productivity of the resource use of the food crop farmers in the country, this paper is therefore designed to estimate current level of technical, allocative and economic efficiencies as well as farmer's demographic factors as they influence the level of efficiency of the farmers. In this fashion we go beyond much of published literature on efficiency because most researches in this area of productivity analysis as they affect Nigerian agricultural sector are focused exclusively on the measurement of technical efficiency (Ojo, 2004, Ajibefun et al., 2002). The remainder of this paper is divided into four sections. Section 2 specifies theoretical framework for the analytical model. Section 3, describes research methodology. Empirical results are discussed in section 4. In section 5, conclusion and policy implications from the result are drawn.

THEORETICAL FRAMEWORK

Stochastic Frontier Production and cost Functions: The stochastic frontier modelling is becoming increasingly popular because of its flexibility and ability to closely marry economic concepts with modelling reality.And, based on this, the model is employed in this paper to provide the basis for measuring farm-level technical and allocative efficiencies which are the basis of estimating the economic efficiencies of small scale food crop production in the study areas.

The modelling, 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. According to Farrell, technical efficiency (TE) is associated with the ability of a firm to produce on the isoquant frontier while allocative efficiency (AE) refers to the ability of a firm to produce at a given level of output using the cost-minimising input ratios .Thus defining economic efficiency (EE) as the capacity of a firm to produce a predetermined quantity output at a minimum cost for a given level of technology (Bravo et al., 1997).

However, over the years, Farrell's methodology had been applied widely, while undergoing many refinement and improvements. And of such improvement is the development of stochastic frontier model which enables one to, measure firm level technical and economic efficiency using maximum likelihood estimate (a corrected form of ordinary least square –COLS).Aigner *et al.* (1977) and Meeusen and Van den Broeck (1977) were first to proposed 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. In Meeusen and Van den Broeck (1977) application, the technique was applied to the analysis of ten French manufacturing industries. And more recently, empirical analyses have been reported by Battese et al. (1993), Ajibefun and Abudulkadri (1999) and Ojo (2004).The model used in this paper 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 inefficiencies effects and simultaneously estimate all the parameters involved in the production and cost function models.

Model Specification: The stochastic frontier production function model of Cobb-Douglas functional form is employed to estimate the firm – level technical and allocative efficiencies of the farmers in the study areas. The Cobb-Douglas Functional form was used because: the functional form has been widely used in farm efficiency for the developing and developed countries, the functional form meets the requirement of being self-dual, allowing an examination of economic efficiency and lastly Kopp and Smith(1980) suggested that functional form has a limited effects on empirical efficiency measurement.

The Cobb-Douglas production functional form which specifies the production technology of the farmers is expressed as follows:

$$Y_i = f\ (Xi;\ \beta)\ \exp\ V_i - U_i \quad \ldots\ 1$$

Where Y_i represents the value of output, which is measured in naira (₦); X_1 represents the quantity of input used in the production. The V_is are assumed to be independent and identically distributed random errors, having normal $N(0,\sigma_v^2)$ distribution and independent of the U_is. The U_is are technical inefficiency effects, which are assumed to be non-negative truncation of the half-normal distribution $N(\mu,\sigma_u^2)$

The technical efficiency of individual farmers is defined in terms of the ratio of observed output to the corresponding frontiers output, conditional on the level of input used by the farmers. Hence the technical efficiency of the farmer is expressed as

$TE_i = Y_i / Y_i^* = f(Xi; \beta) \exp(V_i - U_i) / f(X_i; \beta) \exp V_i = \exp(-U_i)$ 2

Where: Y_i is the observed output and Y_i^* is the frontiers output. The TE ranges between 0 and 1 that is 0 d" TEd" 1.

The corresponding cost frontier of Cobb-Douglas functional form which is the basis of estimating the allocative efficiencies of the farmers is specified as follows:

$C_i = g(P_i; \alpha) \exp(V_i + U_i); = 1, 2\ldots n$ 3

Where C_i represents the total input cost of the i-th farms; g is a suitable function such as the Cobb-Douglas function; P_i represents input prices employed by the i-th farm in food crop production and measured in naira; α is the parameter to be estimated, V_is and U_is are random errors and assumed to be independent and identically distributed truncations (at zero) of the $N(\mu,\sigma^2)$ distribution. U_i provides information on the level of allocative efficiency of the i-th farm. The allocative efficiency of individual farmers is defined in terms of the ratio of the predicted minimum cost (C_i^*) to observed cost (C_i).That is:

$AE_i = C_i^*/C_i = \exp(U_i)$ 4

Hence, allocative efficiency ranges between zero and one.

RESEARCH METHODOLOGY

The study area: This study was based on farm level data on food crop farmers in Ondo state, Nigeria. Ondo State lies in the western part of Nigeria. Climatically, the state falls within the rainforest belt of the country with vast agricultural potential. The rainfall decreases in amount from the costal to interland.The state enjoys luxuriant vegetation with rain forest found in the south while the northern fringe is mostly sub-savannah forest. The majority of the farmers in the state are small scale farmers with an average farm size of about one hectare .Part time farming in which farm households are involved in non-farm job is common in the state. Farming practices in the study area involve the use of hand tools and other simple implements. The prominent food crops grown in this area include; Yams, Cassava, Maize, Pepper while Sweet potato, Rice, Plantain, Beans and Cocoyam are grown in some localities in commercial quantities. And for this study the field survey covers some commonly grown crops because mixed farming is a common feature in the study area. The crops are: Maize, Yam, Cassava and Cocoyam.

The Data: The data mainly from primary sources were collected from 200 food crop farmers selected from four local government areas (Akure South, Akure North, Idanre and Owo (LGAs) using multistage sampling techniques. The four LGAS were purposively selected because of the prevalence of the selected crops in these areas. The second stage involved a simple random selection of 50 farmers from each of the four local government areas, thus making 200 respondents. Data were collected with the use of a structured questionnaire to collect information on the input-output data of the farmers for both the production and cost function analyses. The output data include the total value of the commonly grown food crop obtained by adding cash receipt from selling farm products plus those consumed in the household while the input data include: land area under cultivation (ha), family and hired labour in man-days, quantity of fertilizer (kg), Cost of planting materials, and cost of simple farm tools such as cutlass; hoe and other simple farm implement. And for the cost function analysis; the output data include the total cost of production while the input data include; cost of labour, cost of fertilizer used; cost of planting materials, other operating expenses (cost of transportation and herbicides) and cost of simple farm tools such as cutlass; hoe and other simple farm implement. Data were also collected on the socio-economic variables, such as age, farming experience, educational level and credit availability (dummied as 1 for access to credit and 0 otherwise).

Method of Data Analysis: Descriptive statistics (mean and standard deviation) and stochastic frontier production and cost functions were used to analyse the socio-economic characteristics, technical and allocative efficiency respectively of the farmers. While the farmer's economic efficiencies were estimated as the product of TE and AE.

The production technology of the farmers was assumed to be specified by the Cobb-Douglas frontier production function which is defined by:

$$InY_i = In\beta_i + \beta_1 InX_{1i} + \beta_2 InX_{2i} + \beta_3 InX_{3i} + \beta_4 InX_{4i} + \beta_5 InX_{5i} + V_i - U_i \quad \ldots 5$$

Where Y = Total value of farm output measured in naira, X_1 = Farm size (ha), X_2 = Labour, X_3 = Quantity of fertilizer (kg), X_5 = Cost of planting materials, X_5 = Cost of farm tools.

The Cobb-Douglas cost frontier function for the food crop farmers was specified and defined as follows:

$$In\ C = \alpha_0 + \alpha_1 InP_1 + \alpha_2 InP_2 + \alpha_3 InP_3 + \alpha_4 InP_4 + \alpha_5 InP_5 + V_i + U_i \quad \ldots 6$$

Where C = total cost of production of i-th farm in naira (₦); P_1 = cost of labour (₦);

P_2=cost of fertilizer (₦); P_3=cost of planting materials (₦); P_4=Other Operating expenses (cost of transport and chemicals) (₦); P_5= cost of implements use in naira (₦);

The technical and allocative inefficiency effects μ_i is defined by:

$$\mu_i = \delta_0 + \delta_1 Z_1 i + \delta_2 Z_{2i} + \delta_3 Z_{3i} + \delta_4 Z_{4i} \quad \ldots 7$$

Where: Z_1, Z_2, Z_3 and Z_4 respectively educational level, farming experiencei,age of farmers, and credit availability (dummied as 1 for access to credit and 0 otherwise).These are included in the model to indicate their possible influence on the technical efficiencies of the farmers. The β's, σ's are scalar parameters to be estimated

The variances of the random errors, σ_v^2 and that of the technical and allocative inefficiency effects σ_u^2 and overall variance of the model σ^2 are related thus: $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and the ratio $\gamma = \sigma_u^2/\sigma^2$, measures the total variation of output from the frontier which can be attributed to technical or allocative inefficiency (Battese and Corra, 1977).The estimates for all the parameters of the stochastic frontier production function and the inefficiency model are simultaneously obtained using the program *FRONTIER version 4.1c* (Coelli, 1996).

Log likelihood ratio test: For this study, two different models were estimated. Model1 is the traditional response function in which the inefficiency effects are not present. It is a special case of the stochastic frontier production function model in which the total variation of output from the frontier output due to technical inefficiency is zero, that is, $\gamma = 0$. Model 2 is the general model where there is no restriction and thus $\gamma \neq 0$. The two models were compared for the presence of technical inefficiency effects using the generalized likelihood ratio test which is defined by the test statistic, chi-square (χ^2).

$$\gamma^2 = -2\{In\ [L\ (H_0) - L\ (H_a)]\} \quad \ldots 8$$

Where, χ^2 has a mixed chi-square distribution with the degree of freedom equal to the number of parameters excluded in the unrestricted model. H_0 is the null hypothesis that $\gamma = 0$. It is given as the value of the likelihood function for the frontier model and H_a is the alternative hypothesis that $\gamma \neq 0$ for the general frontier model.

RESULTS AND DISCUSSION

Summary Statistics: The summary statistics of variables for the production and cost frontier estimation is presented in Table 1. The table revealed that the average total farm value of all food crop produced (obtained by adding cash receipt from selling farm products to those consumed) is ₦ 83,432.90 with a standard deviation of ₦ 65,453.62. The large variability by the standard deviation implies that the farmers operated at different levels of farm sizes which tend to affect their output levels.

The mean farm size was 0.75ha with a standard deviation of 0.60ha.The variability in farm size measured by the standard deviation is due to changes in hectarage of matured food crops under the production season. The mean total family and hired labour used was 182.42 with a standard deviation of 155.88.This is an indication that food crop production is a labour intensive exercise considering the large variability recorded. The average quantity of fertilizer used was 54.97kg with a standard deviation of 44.03kg

Table 1: Summary statistics of variables of stochastic frontier production and cost variables

Variables	*Mean*	*Std. Dev.*
Total value crops produced	83,432.90	65,453.62
Farm size	0.752	0.601
Labour	183.42	155.88
Quantity of fertilizer	54.97	44.03
Cost of planting materials	4,460.04	2,457.10
Cost of fertilizer	2,420.17	2,225.85
Cost of labour	36,481.72	24,598.78
Other operating expenses	4,505.17	2,814.77
Cost of farm tools	1,905.37	1,204.87
Total cost of production	48,712.95	43,358.81
Age of the farmers (years)	58.5	23.12
Farming experiences (years)	22.65	9.62
Educational level	11.52	10.18

indicating a large variability in the fertilizer usage among the farmers.

The mean total cost of production is ₦ 48,712.95 with a standard deviation of ₦ 43,358.81. The large variability by the standard deviation implies that the farmers operated at different levels of farm sizes which tend to affect their level of cost. The average cost of labour was ₦ 36,481.72 with a standard deviation of ₦ 24,598.78.The large variability and large mean of average cost of labour incurred by the farmers is a reflection of the fact that most of the farm operations were done manually which are labour intensive and costly.

The cost analysis showed that cost of labour accounts for 74.89% of total cost, cost of planting materials accounts for 9.17%, cost of fertilizer accounts for 4.96%, cost of agrochemicals accounts for 3.55% while cost of transportation accounts for 3.52%.

The average age of the farmers was 58.5years with a standard deviation of 23.12years. This shows that the farmer were a relatively old. The average farming experience was 22.65 years with a standard deviation of 9.62years. This implies that the farming experience varied significantly among the farmers. The average years of schooling was 11.52years with standard deviation of 10.18 years showing that most of the farmers were educated. The result of credit availability shows that 80% of the respondents have access to informal source of credit.

Productivity Analysis: The maximum likelihood estimates of the stochastic frontier production function for food crop farmers in the study area are presented in Table 2. The estimated coefficients of all the parameters of production function are positive meaning that total farm value increases by the value each of coefficient as the quantity of each variable increase by unity. The following variables: cost of planting materials, farm size, labour and costs of farm tools were significant at 5% level. The estimated elasticities of the explanatory variables of the general model show that all the variables have positive decreasing function to the factors indicating that the variables allocation was in stage II of production surface (the stage of efficient factor usage). The returns to scale (RTS) in Table 3 was 1.113 indicating an increasing returns to scale and that food crop production was in stage I of the production surface. This shows that efforts should be made to expand the present scope of production to actualise the potential in it, that is, more of the variables input could be employed to achieve more output.

The estimates of the parameters of stochastic frontier cost model of food crop farmers in the sample area were presented in Table 4. The estimated coefficients of the parameters of cost function were positive .This implies that the variables (cost of labour ,cost of fertilizer, cost of planting materials, other operating expenses and cost of farm tools) used in regression analysis have direct relationship with total cost of production used as output. In other words, cost of food crop production increases by the value of each coefficient as the quantity of each variable is increased by one. All the cost variables were significant to the total cost of production. The significance is confirmed by the t-ratio test at 5% level of significance.

Table 2: Maximum likelihood estimates of the stochastic frontier production function

Variables	*Para-meters*	*Model 1*	*Model 2*
General model:			
Constant	β_0	7.405	7.234*
		(11.149)	(14.832
Farm size	β_1	0.296	0.332*
		(3.836)	(5.875)
labour	β_2	0.386	0.225*
		(3.86)	(2.729)
Quantity of fertilizer	β_3	1.985	0.098
		(1.449)	(1.083)
Cost of planting materials	β_4	0.323	0.335*
		(-2.155)	(7.556)
Cost of farm tools	β_5	8.687	0.123*
		(1.79)	(3.034)
Inefficiency Model:			
Constant	δ_0	0	-6.077*
			(-2.401)
Educational level	δ_1	0	-0.374*
			(-2.016)
Farming experience	δ_2	0	0.186*
			(2.631)
Age of the farmer	δ_3	0	5.050*
			(2.142)
Credit Availability	δ_5	0	-0.366*
			(-2.695)
Variance:			
Sigma square	σ^2	0.452	2.094*
			(3.432)
Gamma	γ	0	0.955*
	llf		(63.301)
Log likelihood function		-14.704	11.049

Figures in parentheses are t-ratio
* Estimate is significant at 5% level

Table 3: Elasticity of production and return to scale

Variable	*Elasticity*
Farm size	0.332
Labour	0.225
Quantity of Fertilizer	0.098
Cost of planting materials	0.335
Cost of Implements	0.123
RTS	1.113

Hypothesis Testing of Presence of Inefficiency: The study revealed that there was presence of technical and allocative inefficiency effects in food crop production as confirmed by the test of hypothesis for the presence of inefficiency effects using the generalized likelihood ratio test. The chi-square computed for the presence of technical inefficiency effect is 51.51 while the critical value of the chi-square at 5% level of significance with 6 degree of freedom χ^2 (5%, 6) was 12.60 while the computed chi-square for the presence of allocative inefficiency is 73.07 while the critical value of the chi-square at 5% level of significance with 6 degree of freedom χ^2 (5%, 6) was 12.60. The null hypothesis of no technical and allocative inefficiency effects in the course of the farmers production $\gamma = 0$, was strongly rejected. Thus model I for both production and cost function was not an adequate representation of the data, hence model 2 was preferred model for further economic analysis. The estimated gamma parameter (γ) of model 2 for production function was 0.955, indicating that about 96% of the variation in the output of food crop among the farmers was due to differences in their technical efficiencies while the estimated gamma parameter (γ) of model 2 for the cost function was 0.731 indicating that about 73% of the variation in the total cost of production among the farmers was due to the presence of allocative inefficiency.

Table 4: Maximum likelihood estimates of the stochastic frontier cost function

Variables	*Parameters*	*Model 1*	*Model 2*
General model:			
Constant	β_0	1.92 (7.726)	1.974* (7.658)
Cost of labour	β_1	0.203 (7.509)	0.204* (7.012)
cost of fertilizer	β_2	0.024 (4.445)	0.024* (4.521)
Cost of planting materials	β_3	0.261 (11.365)	0.250* (10.137)
Other operating expenses	β_4	0.285 (10.777)	0.295* (11.27)
Cost of farm tools/ implements	β_5	0.139 (4.496	0.135* (4.21)
Inefficiency Model:			
Constant	δ_0	0	-0.073 (-0.476)
Years of schooling	δ_1	0	-0.011* (-2.569)
Farming experience	δ_2	0	-0.004 (-1.373)
Age of the farmer	δ_3	0	0.003 (1.265)
Credit Availability	δ_5	0	-0.259* (-3.148)
Variance:		0.271	0.2536
Sigma square	σ^2		(9.827)
		0	0.731
Gamma	γ		(4.204)
Log likelihood function	llf	-19.845	16.692

Efficiency Estimation :The decile range of

Table 5: Deciles range of frequency distribution of technical, allocative and economic efficiency of the farmers

Efficiency level	*Technical efficiency*		*Allocative efficiency*		*Economic efficiency*	
	Frequency	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*
0.10-0.19	2	1	-	-	-	-
0.20-0.29	3	1.5	-	-	-	-
0.30-0.39	1	0.5	-	-	-	-
0.40-0.49	2	1	-	-	-	-
0.50-0.59	5	2.5	2	1	15	7.5
0.60-0.69	10	5	2	1	15	7.5
0.70-0.79	68	34	26	13	67	33.5
0.80-0.89	106	53	103	51.5	86	43
0.90-0.99	3	1.5	67	33.5	19	9.5
Total	200	100	200	100	200	100
Minimum (%)	11.01		57.2		56.48	
Maximum (%)	96.3		97.1		92.87	
Mean (%)	78.2		87.7		68.38	
Std.Dev. (%)	13.11		8.265		13.17	

frequency distribution of technical, allocative and economic efficiency (Table 5) shows that the predicted farm specific technical, allocative and economic efficiencies range between 11.01% - 96.30% with a mean of 78.20%, 57.20% -97.10 with a mean of 87.70% and 56.48% - 92.87% with a mean of 68.38% respectively. This implies capacity of farmers to produce a predetermined quantity of output at a minimum cost is relatively low with TE contributing less to EE in the study area.

The analysis of the inefficiency model (Table 2 and Table 4) shows that the signs and significance of the estimated coefficients in the inefficiency model have important implications on the TE and AE of the farmers respectively.

Table 2 shows that the coefficients of age of farmers and farming experience were positive, indicating that these factors led to increase in technical inefficiency of farmers in the study area while coefficients of educational level and credit availability were negative , meaning that these factors increases T.E of food crop farmers in the study area. This is in conformity with the work of (Abdulai and Huffman, 1988), on their work on rice farmers in Ghana, the estimated coefficient of credit availability in profit inefficiency model was negative which means that their profit inefficiency decreased with increase in credit availability. Table 4 shows that the coefficient of age of the farmers was positive meaning that increase in the age of the farmers increases allocative inefficiency of farmers in the study area while the coefficients of educational level ,farming experience and credit availability were negative, indicating that these factors led to decrease in allocative inefficiency of the farmers.

CONCLUSION AND RECOMMENDATIONS

The study revealed that food crop farmers are yet to achieve their best. This had been confirmed by the presence of both technical and allocative inefficiency effects in their operations. Also, it is evident from this study that economic efficiency (EE) of the farmers could be improved substantially and that technical inefficiency constitutes a more serious problem than allocative inefficiency judged by the average technical and allocative efficiency recorded in the area. The study further shows that AE appears to be more significant than TE as source of gain in EE meaning that allocative inefficiency is not a serious problem to the food crops farmers. That is, the food crop farmers are capable of producing a give level of output at a minimum cost input ratio. The result however pointed to the importance of examining not only TE, but also AE and EE when measuring productive efficiency with the aim of examine critically the role higher efficiency level can have on output in agriculture. Hence, research efforts directed towards the generation of new technology should not be neglected because a productivity gain stemming from technological innovation remains critical importance. The results of this study have further shown that the farmers were small scale and resource-poor, but they are fairly efficient in the use of their resources and any expansion in the use of any resources would bring more than proportionate increase in their output, given the increase returns – to – scale value obtained for the study.

The fact that rising age would lead to a decline in the efficiency means, government policy should focus on ways to attract and encourage young people who are agile and aggressive in farming business. This group of people would be able to put in a lot of efforts at raising the current level of efficiency, given a conducive policy environment. Also, the food crops farmers should be given assistance in form of loan in order to be able to cope with increasing cost of inputs. Government should therefore show more seriousness in the implementation of agricultural credit schemes because farmers in the village could still not have access to agricultural development banks and other related agencies that are located only in the state capital

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