Allocative Efficiency Among Maize Farmers In Imo State, Nigeria

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Abstract: The study analyzed allocative efficiency among maize farmers in Imo State, Nigeria. It specifically sought to analyze the farmers' socioeconomic characteristics, estimate their price efficiency and its determinants. A multistage random sample of 120 maize farmers were used and interviewed with structured and validated questionnaire. Data were analyzed using descriptive statistics such as mean, frequency distribution and percentages. Stochastic translog cost and production frontier were used to estimate allocative efficiency and its determinants. Results showed that most of the farmers are active small holders and literate with many years of farming experience. Maize production was female dominated while household size was large. Maize farmers in Imo State are not operating at full price efficiency level, and this was influenced by age, farmsize, education, farming experience, extension contact, credit access, co-operative membership, household size and gender. The average maize farmer in Imo State would require a cost savings of 36.8% to attain the status of most price efficient farmer. More opportunities exist for improvement of allocative efficiency by the maize farmers.
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1. Introduction

Maize (Zea Mays) is a crop popularly grown in many parts of the world. It is a staple food crop found in the diets of many households in Nigeria. Its vegetative part is used in making silage for ruminants and the maize crop residue is also a useful source of feed for cattle during the dry season. Maize is a good source of energy in poultry feed, and its bye-product is added to pig ration to boost the energy level. It supplies raw materials for beverage, soap and pharmaceutical industries (Fadiji et al, 2005). The numerous use of the products of maize makes it's demand more elastic than other cereals as decrease in price of a unit measure of maize will result to a more than proportionate increase in its demand. Maize is cultivated largely in Nigeria by farmers on subsistence and commercial levels taking about 1.8 million hectares of land, which yields an estimate of 1.5 metric tones (FAO, 2004). The annual growth rate in area of cultivation to maize between 1995 and improvement in the economic efficiency of farming operations. Economic efficiency consists of two components; (i) technical efficiency; which reflects the ability of a farm to obtain maximum output from a given set of inputs and available technology; and (ii) allocative efficiency, which reflects the ability of a farm to use the inputs in optimal proportion, given their respective prices (Coelli,1995; Ohajianya 2005, 2000 was 3.5% and the annual grain production was 5.3% (IITA, 2003). In recent times there has been a continuous decline in output of maize in most states of Nigeria of which Imo State is one (Agbola et al, 2004). The Government of Imo State and other donor agencies have formulated and implemented some policies and programmes aimed at increasing maize output. Such policies and programmes include; fertilizer distribution through farmers' associations, improved maize seeds distribution to farmers, tractor hire services at reduced costs, Agricultural advisory services, formation of co-operative societies, microfinance programmes, and women in Agriculture. Despite these maize output increasing programes the output of maize is still low (Anyanwu et al, 2005). This decline in maize output is attributed to productive inefficient farm inputs combination among the farmers (Ukeje 2000, Falusi 1999). Increases in output can result from the development and adoption of new technologies and Onyenweaku and Okoye, 2007; Wadud and White 2000). Effort designed to improve, efficiency as a means of increasing agricultural output are more cost-effective than introducing new technology if farmers are not making efficient use of existing technology (Rahman, 2002). If farmers are efficient, the increases in productivity would require new inputs and technology to shift the production frontier upwards (Ali and Byerlee, 1991) Ike and Inoni, 2004). There have been many studies to determine the relative efficiency of farmers in recent years (Onyenweaku and Ohajianya, 2007, Ohajianya and Onyenweaku 2002, Ike and Inoni 2004, Rahman 2002, Wadud and White 2000, Izonvelekas 2001), the only few that analyzed allocative efficiency were not on maize. This study aims at identifying the farmers socioeconomic characteristics, estimate their allocative efficiency and its determinants using the stochastic frontier approach. The socioeconomic characteristics of the farmers were identified because such variables may have a direct influence on efficiency.

2. Analytical Framework

Following Aigner et al (1977) and Battlesse and Corra (1977), the frontier production function was estimated in an effort to bridge the gap between theory and empirical work. The stochastic frontier production function can be generally stated as follows:

$$Yi = f(Xi, \beta) \exp(Vi - Ui), \quad i = 1,2,\ldots n \ldots\ldots (1)$$

Where Yi is the production of the ith farm, xi is a vector input used by the ith farm, B is a vector of unknown parameters, Vi is a random variable which is assumed to be $N(O, \sigma^2 v)$ and independent of the Ui which are non-negative random variables assumed to account for efficiency in production. Allocative or price efficiency traditionally rests on an index of marginal product of opportunity costs. If among all inputs, the ratios of marginal products to opportunity costs are equal to one, a farm is price efficient. This efficiency measure has to do with the extent to which farmers make efficient decision by using inputs, up to the level at which their marginal contribution to production value is equal to the factor. If a farm is allocatively inefficient, it operates off its least cost path (Ajani and Olayemi, 2001). The price or allocative efficiency can be derived from the stochastic frontier cost, function and thus defined by;

$$C = f(Wi, Yy, \alpha) \exp \varepsilon i, \ i = 1, 2, ..n.\ldots (2)$$

where

C = Minimum cost associated with maize production

W = Vector of input prices

Y = Maize output

α = Vector of parameters

εi = Composite error term

Applying Lema Sheppard, we obtain

$$\frac{\partial C}{\partial Pi} = Xi(W, Y, \alpha)\ldots.. (3)$$

Substituting a farm's input prices and quantity of output in equation (3) yields the economically efficient input vector Xi. With observed levels of outputs given, the corresponding technically and economically efficient costs of production will be equal to XiiP and Xie respectively while actual operating input combination of the farm is XiP. The three cost measures can then be used to compute the technical efficiency (TE) and economic efficiency (EE) indices as follows:

$$TE = (XiiP)/(XiP)\ldots\ldots (4)$$

$$EE = (Xie\,P)/(XiP)\ldots.. (5)$$

The combinations of equations (4) and (5) are employed to obtain the allocative efficiency (AE) index which is consistent with Farrell (1957).

$$AE = EE/TE = (XieP)/(XiP)\ldots.. (6)$$

Price or allocative efficiency value ranges from 0 to 1

3. Materials and Methods

The study was conducted in Imo State. It lies between latitude 5^o 10' and 6^o 35' North of the equator and longitude 6^o 35' and 7^o 31' East of the Greenwish Meridian. It is therefore in the tropical rainforest zone. Imo State is composed of three agricultural zones namely; Owerri, Okigwe and Orlu and it is subdivided into 27 Local Government Areas (LGAs). The study employed multistage random sampling technique where 40 maize farmers were selected from each of the three agricultural zones of the state. in the first stage, two LGAs were purposively chosen from each of the zones viz, Ahiazu Mbaise and Ikeduru (Owerri Zone), Obowo and Isiala Mbano (Okigwe Zone) and Ohaji/Egbema and Orsu (Orlu Zone). In the second stage two communities were randomly selected from each LGA making a total of 12 communities. The lists of communities were collected from the office of the community Development Officer in each selected LGA. The last stage was the random selection of 10 maize farmers from each of the 12 communities, giving a sample size of 120 formers. The sampling frame for the selection of respondents was compiled with the assistance of resident extension agents, officials of maize farmers associations and community leaders. Data were collected using structured and validated questionnaire. Data were collected on the socioeconomic characteristics of the farmers and their production activities in terms of inputs, output and their prices for the year 2006.

3.1 Model specification

Technical Efficiency: This was measured using stochastic translog production frontier function for maize production. The functional form is specified as follows;

$$\text{Ln } Yi = b_o + b_1 LnX_1 + b_2 LnX_2 + b_3 LnX_3 + b_4 LnX_4 + b_5 LnX_5 + \tfrac{1}{2} b_6 Ln(X_1)^2 + \tfrac{1}{2} b_7 Ln(X_2)^2 + \tfrac{1}{2} b_8 Ln(X_3)^2 + \tfrac{1}{2} b_9 Ln(X_4)^2 + \tfrac{1}{2} b_{10} Ln(X_5)^2 + b_{11} LnX_1 LnX_2 + b_{12} LnX_1 LnX_3 + b_{13} LnX_1 LnX_4 + b_{14} LnX_1 LnX_5 + b_{15} LnX_2 LnX_3 + b_{16} LnX_2 LnX_4 + b_{17} LnX_2 LnX_5 + b_{18} LnX_3 LnX_4 + b_{19} LnX_3 LnX_5 + b_{20} LnX_4 LnX5 + Vi - Ui \ldots\ldots\ldots\ldots (7)$$

where Yi is maize output in kg, X_1 is farm size in hectares, X_2 is quantity of seeds in kg, X_3 is labour input in mandays, X_4 is fertilizer input in kg, X_5 is capital (depreciation on implements) in Naira, b_1 – b_{20} are parameters to be estimated, b_o is intercept, Vi is error term not under the control of farmers while Ui is error term under the control of farmers.

3.2 Economic Efficiency:

Economic efficiency was measured using a stochastic cost frontier function specified as;

$$\text{Ln } C = a_o + a_1 Lnq_1 + a_2 Lnq_2 + a_3 Lnq_3 + a_4 Lnq_4 + a_5 Lnq_5 + \tfrac{1}{2} a_6 Ln(q_1)^2 + \tfrac{1}{2} q_7 Ln(q_2)^2 + \tfrac{1}{2} a_8 Ln(q_3)^2 + \tfrac{1}{2} a_9 Ln(q_4)^2 + \tfrac{1}{2} a_{10} Ln(q_5)^2 + a_{11} Lnq_1 Lnq_2 + a_{12} Lnq_1 Lnq_3 + a_{13} Lnq_1 Lnq_4 + a_{14} Lnq_1 Lnq_5 + a_{15} Lnq_2 Lnq_3 + a_{16} Lnq_2 Lnq_4 + a_{17} Lnq_2 Lnq_5 + a_{18} Lnq_3 Lnq_4 + a_{19} Lnq_3 Lnq_5 + a_{20} Lnq_4 Lnq_5 + Vi - Ui \ldots\ldots\ldots\ldots (8)$$

where C is total input cost of the ith farm, q_1 is land rent in naira per hectare, q_2 is price of seeds in naira per kg, q_3 is average wage rate in naira per manday, q_4 Is price of fertilizer in naira per kg, q_5 is depreciation on implements in naira, a_o is intercept, a_1 – a_{20} are parameters to be estimated, while Vi and Ui are as defined for equation (7).

3.3 Estimation of Allocative Efficiency and its Determinants

Allocative Efficiency (AE) for each farmer was calculated as the ratio of estimated Economic Efficiency (EE) to estimated Technical Efficiency (TE) since from equation 6,

$$EE = AE + TE \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Therefore, $AE = EE/TE \ldots\ldots\ldots\ldots\ldots (10)$

The allocative efficiency scores from equation (10) were regressed against the farm specific factors to obtain the determinants for allocative efficiency following Kalirajan (1991);

$$Exp(-Ui) = K_o + K_1 Z_1 + K_2 Z_2 + K_3 Z_3 + K_4 Z_4 + K_5 Z_5 + K_6 Z_6 + K_7 Z_7 + K_8 Z_8 + K_9 Z_9 + Ei \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

where, Exp (-Ui) is the allocative efficiency of the farmer, Z_1 is the age (years), Z_2 is farm size (hectares), Z_3 is level of education (No. of years spent in school), Z_4 is farming experience (years), Z_5 is extension contact (No. of visits), Z_6 is credit access (dummy, 1 if the farmer has access to credit, zero if otherwise), Z_n is co-operative society membership (dummy, 1 if the farmer belongs to a co-operation society or farmers' association, zero if otherwise), Z_8 is household size (No. of persons), Z_9 is gender (dummy, 1 for male, zero for female), Ei is error term, K_o is intercept while K_o - K_9 are regression parameters to be estimated. The a priori expectation is that K_2, K_3, K_4, K_5, K_6, K_7, K_9 be positive, while K_1, K_8 and K_0 be negative.

The estimate was by the method of maximum likelihood using the computer program, frontier 4.1 (Coelli, 1994).

4. Results and Discussion

4.1 Socioeconomic characteristics.

The distributions of farmers according to age, farm size, level of education, farming experience, extension contact, household size and gender were shown in: Table 1. The mean age of the farmers was about 41 years,

Table 1. Distributions of socioeconomic characteristics of maize farmers in Imo State

Socioeconomic characteristics	frequency	Relative frequency
Age (years)		
29 – 34	18	15.0
35 – 40	33	27.5
41 – 45	43	35.8
46 – 51	19	15.8
52 and above	7	5.9
Total	120	100
Mean	41.3 years	

Level of Education (years)				
O (No. formal education)	6		5.0	
1 – 6		38		31.7
7 – 12		51		42.5
13 – 18	23		19.1	
19 and above		2		1.7
Total		120		100
Mean		8.4 years		
Farm size (ha)				
0.1 – 0.5	31		25.8	
0.6 – 1.0	63		52.5	
1.1 – 1.5	18		15.0	
1.6 and above		8		6.7
Total		120		100
Mean		0.8ha		
Farming experience (years)				
1 – 5		15		12.5
6 – 10		49		40.8
11 – 15	25		20.8	
16 – 20	22		18.4	
21 and above		9		7.5
Total		120		100
Mean		11.2 years		
Extension contact (No. of visits)				
1 – 2		73		60.8
3 – 4		28		23.3
5 – 6		17		14.2
7 and above		2		1.7
Total		120		100
Mean		2.6 visits		
Household size (No. of persons)				
1 – 5		24		20.0
6 – 10		41		34.2
11 – 15	38		31.7	
16 and above		17		14.1
Total		120		100
Mean		10 persons		
Gender				
Male		39		32.5
Female		81		67.5
Total		120		100

Source: Field survey data, 2006.

35.8% of them fell within the age group of 41-45 years which implies that they are still very active for farm work. Apart from increase in labour supply, respondents within the productive age bracket are likely to adopt innovation more than the aged farmers (Onyenweaku and Okoye, 2007). The mean level of education was found to be 8.4 years, 42.5% of the farmers spent 7-12 years in school which implies that most of the farmers obtained secondary education. The level of education attained by a farmer not only increases his farm productivity but also enhances his ability to understand and evaluate new production technologies (Obasi, 1991, Nwachukwu 2006; Attavar, 2000).

About 53% of the farmers had farm sizes of 0.6 – 1.0 hectares, with a mean farm size of 0.8 ha.

This result implies that majority of the maize farmers in Imo State are small scale farmers, and this could be because of the limited availability of farm land due to land fragmentation (Mbanasor and Obioha, 2003). About 41% of the farmers acquired farming experience of 6 – 10 years, with a mean farming experience of 11.2 years, implying that the maize farmers in Imo State acquired reasonable farming experience allocation. The mean extension contact was found to be 2.6 visits, and majority (60.8%) of the farmers had only 1-2 visits per annum which is low for the desired extension attention to the farmers. Farmers adopt more innovations and manage farm resources better with increase in extension visits. The result on household size showed that majority (34.2%) of the farmers have household sizes of 6-10 persons with a mean household size of 10 persons which implies that most of the households would save labour costs by employing household labour. The result on gender shows that 67.5% were females while 32.5% were males, which implies that females cultivate maize more than their male counterparts.

4.2 Estimation of cost and production functions

The maximum likelihood estimates of the cost frontier for maize production in Imo State shows that the variance ratio (Y = 0.973) and total variance (σ^2) are statistically significant at 1% level (Table 2). Total variance estimates goodness of fit and the correctness of the specified distributional assumption of the composite error term. The variance error of 0.973 implies that 97.3% of disturbance in the system is due to inefficiency, one-sided

Table 2. Parameter estimates for the stochastice Translog Cost function.

Production factor	Parameter	coefficient	t-ratio
Constant term	a_o	-13.903	-8.117
Lnq_1	a_1	1.314	4.512**
Lnq_2	a_2	3.119	3.106**
Lnq_3	a_3	4.206	2.814**
Lnq_4	a_4	2.017	3.017**
Lnq_5	a_5	0.209	1.603
½ Lnq_1^2	a_6	-0.493	-2.421*
½ Lnq_2^2	a_7	-0.216	-3.803**
½ Lnq_3^2	a_8	-0.338	-4.921**
½ Lnq_4^2	a_9	-0.104	-3.114**
½ Lnq_5^2	a_{10}	-0.115	-2.608**
Lnq_1Lnq_2	a_{11}	-1.317	-3.157**
Lnq_1Lnq_3	a_{12}	-0.804	-2.065*
Lnq_1Lnq_4	a_{13}	0.313	2.524*
Lnq_1Lnq_5	a_{14}	0.609	3.033**
Lnq_2Lnq_3	a_{15}	0.421	5.902**
Lnq_2Lnq_4	a_{16}	0.079	4.817**
Lnq_2Lnq_5	a_{17}	0.065	3.449**
Lnq_3Lnq_4	a_{18}	-1.559	-1.207
Lnq_3Lnq_5	a_{19}	-0.204	-1.491
Lnq_4Lnq_5	a_{20}	-0.138	-1.822
Diagnostic statistics			
Log-likelihood functions		76.108	
Total Variance (σ^2)		1.553	9.204**
Variance Ratio (Y)		0.973	15.138**
LR Test		81.119	

Source: Computed from frontier 4.1 MLE/Survey, data, 2006.
**, * are significant levels at 1% and 5% respectively

error and therefore 2.7% is due to stochastic disturbance with two-sided error, supported by a high t – value (Flemming et al, 2004).

Since total cost (the dependent variable) is in natural logarithm and has been normalized, the first order coefficients are interpretable as cost elasticities evaluated at the sample median. All the first order exogenous variables have the expected signs. Price of seeds, wage rate and price of fertilizer are significant at 1% with elasticities of 3.119, 4.206 and 2.017 respectively. This shows that the farmers operate in stage one of the classical production function and thus increased procurement of maize seeds, labour demand and fertilizer should be encouraged since the factors are under utilized. Land rent is highly significant at 0.01 level and has a coefficient of 1.314, which implies that a 1.0% increase in the factor will increase total cost by 1.314 percent. The second order terms which show possible non-linear changes of the effects over time revealed that all the coefficients of the square term (own interactions) are statistically significance at different levels of significance. The cross interactions also maintained strong statistical significance, except for q_3 q_4, q_3 q_5 and q_4 q_5 variables that were not. The own second derivatives establish direct relationship with total cost, while the cross second derivatives show indirect relationships with total cost. With respect to the stochastic translog frontier production results, (Table 3) all the first order coefficients are significant while majority of the second order coefficients are not significant. The coefficient of seed is positive and significant at 1% level of probability, implying that increased quantity of seeds would lead to increase in technical efficiency. Fertilizer and labour inputs have negative coefficient (-4.306 and – 3.107 respectively) and are highly significant at 1% level. This implies that a 1.0% increase in fertilizer and labour input would lead to decrease in technical efficiency to the tune of 4.31% and 3.11% respectively. The diagnostic statistics have coefficients that are all statistically significant at 1% level of probability. The coefficient of total variance (σ^2) is 0.473 while the variance ratio is O. O.638, which is the ratio of the variance of farm specific technical efficiency to the total variance. This would mean that 63.8% of the variation in Maize output among the farmers is due to the disparities in technical efficiency.

Table 3. Maximum Likelihood Estimates of the Stochastic Translog Production Function

Production Factor	Parameter	Coefficient	t – ratio
Constant term	b_o	21.607	17.552
LnX_1	b_1	2.019	2.093*
LnX_2	b_2	1.442	4.907**
LnX_3	b_3	-3.107	-2.113*
LnX_4	b_4	-4.306	-3.817**
LnX_5	b_5	0.903	2.335*
½ LnX_1^2	b_6	-0.395	-1.201*
½ LnX_2^2	b_7	-0.183	-1.334
½ LnX_3^2	b_8	-2.197	-3.045**
½ LnX_4^2	b_9	-0.821	-2.379*
½ LnX_5^2	b_{10}	0.152	1.041
LnX_1LnX_2	b_{11}	0.309	0.709
LnX_1LnX_3	b_{12}	-0.411	-2.556*
LnX_1LnX_4	b_{13}	-0.505	-1.422
LnX_1LnX_5	b_{14}	0.413	0.837
LnX_2LnX_3	b_{15}	-0.603	-1.366
LnX_2LnX_4	b_{16}	-0.709	-0.714
LnX_2LnX_5	b_{17}	0.612	0.921
LnX_3LnX_4	b_{18}	-0.304	-2.609**
LnX_3LnX_5	b_{19}	-0.606	-4.403**
LnX_4LnX_5	b_{20}	0.708	3.364
Diagnostic statistics			
Log-likelihood function –		-116.031	
Total variance (σ2)		0.473	3.802**
Variance Ratio (Y)		0.638	4.117**
LR Test		47.119	

Source: Computed from frontier 4.1 MLE/Survey data 2006.
*, ** indicate statistical significant at 5% and 1% levels respectively.

4.3 Estimates of Allocative Efficiency

The result of the frequency distribution of allocative efficiency estimates in Table 4 shows that the estimates ranged from 0.30 to 0.95. The distribution seemed to be skewed toward the frontier. The minimum allocative efficiency was 0.30, which indicated high level inefficiency in resource allocation, while the maximum allocative efficiency score was 0.95, implying that the most efficient farmer operated almost on the frontier. Even the mean of 0.65, about 39.6% of the farmers are frontier farmers since their efficiency scores are above the mean; the average farmer needs a cost savings of 36.8% (i.e, 1 – 0.65/0.95) 100 to attain the status of the most allocatively efficient farmer.

Table 4: Distribution of allocative efficiency for maize farmers

Allocative Efficiency Range	Frequency	Percentage
0.30 – 0.40	4	3.3
0.41 – 0.51	6	5.0
0.52 – 0.62	39	32.5
0.63 – 0.73	47	39.2
0.74 – 0.84	21	17.5
0.85 – 0.95	3	2.5
Total	120	100
Maximum Allocative Efficiency	0.95	
Minimum Allocative Efficiency	0.30	
Mean Allocative Efficiency	0.65	

Source: Computed from field survey data, 2006.

4.4 Sources of Allocative Efficiency

All the efficiency factors are statistically significant at 0.01 level except, for coefficients for farming experience, credit access and gender that are significant at the 0.05 level (Table 5).

Table 5. Sources of Allocateive Efficiency in Maize Production

Variable	**Parameter**	**Coefficient**	**t- ratio**
Intercept	k_o	21.667	14.309**
Age	k_1	1.063	3.117**
Farm size	K_2	- 0.372	- 2.408**
Education level	k_3	2.108	3.103**
Farming experience	k_4	0.921	2.514*
Extension contact	k_5	- 0.058	-3.112**
Credit Access	k_6	- 0.022	-2.522 *
Co-operative Membership	k_7	0.017	2.206*
Household size	k_8	-0.703	-3.492**
Gender	k_9	0.046	2.381*

** and * are significant levels at 1% and 5% respectively.
Source: computed from frontier 4.1 MLE/ survey data, 2006.

The coefficient for age is positive implying that as a farmer gets older his level of allocative efficiency increases due to increase in wealth of experience. Farm size had a negative coefficient which implies that smaller farm sizes lead to decrease in level of allocative efficiency. Education level had a positive coefficient, implying that more educated farmers allocated their resources better than their less educated counter parts.

Farming experience had a positive coefficient, implying that farmers that acquired more experience had increases in their allocative efficiency level. These findings are similar with those of Wadud (2000), Nwachukwu (2006) and Ike and Inoni (2004). Extension contact had a negative coefficient, implying that decreases in extension visits lead to reduction in allocative efficiency level. Credit access had a negative coefficient, suggesting that farmers that had poor access to credit have lower levels of allocative efficiency. Co-operative membership had a positive coefficient, implying that farmers hat belong to co-operative societies / farmers association have higher levels of allocative efficiency. These results conform to those of Ajammy and Olayemi 2001 and Fleming et al (2004). The coefficient for household size is negative, indicating that larger household sizes reduce the allocative efficiency level of farmers. This is because the bid to provide numerous household needs engenders reduction in the magnitude of resources allocated to farming activities. The coefficient for gender is positive, implying that male farmers had higher levels of allocative efficiency than their female counter parts. These findings agree with those of Onyenweaku and Okoye (2007) and Tzouvelekas et al (2001).

5. Conclusion

The study analyzed allocative efficiency among maize farmers in Imo State, Nigeria, using the stochastic translog cost and production frontier approach. The findings of the study showed that maize farmers in Imo State are not operating at full allocative efficiency level, but opportunities exist for improvement of allocative efficiency by the maize farmers. Small farm holdings, poor extension contact, credit inaccessibility and larger household sizes lead to misallocation of the resources employed by maize farmers. Therefore, there is need for households to embrace family planning and reduce their household sizes. Credit should be extended to maize farmers to enable them purchase farm inputs, increase farm holding and hire labour. Extension attention to the maize farmers should be intensified so as to extend improved practices and technical advise to the farmers.

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References

[1] Ali, M. and D. Byerlee. Economic Efficiency of Small Farmers in a Changing World. A survey of recent evidence. Journal of International Development, 1991; (3): 1 27.
[2] F.A.O. Food and Agricultural Organization Production Year Book, Rome, Italy. . 2004
[3] IITA Sustainable Food Production in Nigeria. Annual Report Review. IITA Ibadan. 2003.
[4] Agbola, P. O; A. E. Ikpi and P. M. Komawa ,Factors influencing food insecurity among rural farming households in Africa. Results of Analysis from Nigeria. (2004).
[5] Anyanwu, J. C. A. Oyfus, H. Onikhenan and F.A Diamond. The Structure of Nigerian Economy. Yavance Educational Publishers Ltd. Onitsha, Nigeria. 2005.
[6] Ukeje, E. U. Productivity in Agricultural Sector in Nigeria. Cited in Central Bank of Nigeria Annual Report. 2000.
[7] Coelli, T. J. A Guide to Frontier 4.1: A Computer Programme for Stochastic Frontier Production and Cost Function Estimation. Department of Economics, University of New England, Armidale, Australia.1994 Measurement of Technical Efficiency". Pakistan Journal of Applied Economics, 1991; (2): 167 – 180.
[8] Ohajianya D. O. Profit efficiency among cocoyam producers in Imo State. "Stochastic translog Profit Frontier Approach" Proceedings of the 39th Conference of the Agricultural society of Nigeria, Benin. . 2005; 332 – 335.
[9] Wadud, A and B. A. White Farm House Hold Efficiency in Bangladesh: A comparison of Stochastic Frontier and DEA Methods. Applied Economics. 2000; 32: 1665 – 1673.
[10] Rahman, S. Profit Efficiency among Bangladesh Rice Farmers. Discussion Paper Series 0203, School of Economics studies, The University of Manchester, UK. 2002.
[11] Onyenweaku, C. E. and B. C. Okoye Technical Efficiency of Small Holder

Cocoyam Farmers in Anambra State, Nigeria. A Translog Stochastic Frontier Production Function Approach. International Journal of Agriculture and Rural Development, 2007. vol. 9, pp. 1-6

[12] Ike, P. C. and O. E. Inoni Determinants of European Agriculture. 2004;. 7 (2) : 337-342.

[13] Tzouvelekas, V; pantzios, C. J. and C. Yotopoulos Technical Efficiency of Alternative Farming Systems: The case of Greek Organic and Conventional Olive- Growing Farms. Food policy 2001; 26 – 549 – 569

[14] Aigner, D. J; Lovelt C. A. K. and P. Schmidt Formulation and Estimation of Stochastic Frontier Production Function Models. Journal of Economics, 1977; 6:21 -37

[15] Battese, G.R. and G.S Corra. Estimation of a Production Frontier Model with application to the Pastoral Zone of Eastern Australia. Australian Journal of Agricultural Economics. 1977;. 21(3): 169 – 179.

[16] Ajani, O. I. Y. and J. K Olayemi, Relative Efficiency of Food Crop Farmers in Oyo North Area of Oyo State. A Profit Function analysis. Paper Presented at the Annual Conference of the Nigerian Association of Agricultural Economics held at Nsukka, 11 – 13th June. 2001

[17] Kalirajan K. P. and Flinn, J. C. "The

Yam Production and Economic Efficiency Among Small Holder Farmers in South Eastern Nigeria. Journal of Central

[18] Nwachukwu, I. N. Efficiency of Vegetable Production in Imo State. The case of Fadama Telfairia Occidentadis. M.Sc Thesis, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umualike, Abia State, Nigeria. 2006.

[19] Attavar, M. Tool for Productivity Gain. The Ilindu Survey of Indian Agriculture. 2000.

[20] Obasi, P. C. Resource use Efficiency in Food Crop Production. A case of Owerri Agricultural zone of Imo State. M.Sc Thesis, University of Ibadan, Nigeria. 1991.

[21] Coelli, T. J. Recent Development in Frontier Modeling and Efficiency Measurement. Australian Journal of Agricultural Economics, 1995; 39:215 – 245.

[22] Fleming, E.P; Fleming, P; Rogers H; Griffiten, G. and D. Johnston Animal Efficiency in an Intensive Beef Production. Genetic Breeding Unit, University of New England, Armidale, NSW, Australia. 2004.

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