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TECHNICAL EFFICIENCY IN PADDY RICE PRODUCTION IN NIGER DELTA REGION OF NIGERIA

Kadiri, F. A.; Eze, C.C; Orebiyi, J. S; Lemchi, J. I;Ohajianya, D. O; Nwaiwu, I. U
Department of Agricultural Economics, Federal University of Technology Owerri.

ABSTRACT: *This study estimated technical efficiency of rice farmers in Niger Delta region of Nigeria. Multistage sampling technique was used to sample 300 rice farmers. A stochastic frontier production function was used to estimate technical efficiency. The study further assessed the factors that affect technical efficiency of the rice farmers. All the coefficients were found to have positively influenced paddy rice productivity. The level of efficiency of rice farmers was found to be 0.63. The study further found that gender and household size were significant determinants of technical efficiency. The study therefore recommended policies that will ensure that costs of productive inputs are affordable to farmers and improving households' income through better prices for their output. Provision of labor saving equipment is also important in reducing inefficiencies in paddy production through reduction in labor cost.*

KEYWORDS: *Rice, Technical Efficiency, Stochastic Frontier Production Function, Niger-Delta, Nigeria.*

INTRODUCTION

Rice is the seed of the monocot plant *Oryza sativa* of the grass family *Gramineae*. (Kuldeep, 2006). Rice cultivation is the principal activity and source of income for millions of households around the globe. Several countries of Asia and Africa are highly dependent on rice as source of foreign exchange earnings and government revenue. (Rice Trade, 2011) Rice is the second largest produced cereal in the world after wheat, it is a crop that cuts across regional, religious, cultural, national and international boundaries with very high demand. Rice production is geographically concentrated in Western and Eastern Asia. Asia is the biggest rice producer, accounting for 90% of the world's production and consumption of rice (Wikipedia, 2011). Today, rice is grown and harvested on every continent except Antarctica (Rice Trade, 2011), where conditions make its growth impossible. Asian farmers (India, China, Indonesia, Vietnam, and Bangladesh) account for 92% of the world's total rice production. More than 661 million tonnes of rice is produced annually around the globe. (United States Development Agency, 2009).

Rice is an increasingly important crop in Nigeria. It is relatively easy to produce and it is grown for sale and for home consumption. In some areas there is a long tradition of rice growing, but for many, it is considered a luxury food for special occasions only. With the increased availability of rice, it has become part of the everyday diet of many people in Nigeria. There are many varieties of rice grown in Nigeria; some of these are traditional varieties while others have been introduced into the country. Rice is grown virtually in all the agro-ecological zones in Nigeria (Akande, 2003). This is because, Nigeria have ideal climatic conditions which is akin to that of South East Asia where the crop is produced for export.

Over the past thirty years, Nigerian government has actively intervened in the rice economy, but policy has not been consistent, including oscillating imports tariffs and import restrictions.

For instance in 1986, the Structural Adjustment Programme (SAP) was introduced and the main policy instrument in this regard was the ban on food importation, especially rice. Nigeria has become a major rice importer in the world market and second only to Indonesia in the last five years of the last decade (2000-2005). From 1999, the value of rice imports rose steadily from US $259 million to US $655 million and US $756 million in 2001, 2002 and 2005, respectively (CBN, 2006). Rice imports have affected the domestic production and marketing of Nigeria's local rice. This is due to the decreased demand for local rice by Nigerians as opposed to the imported ones. Also as a response to the prevailing rice supply deficit situation in Nigeria, successive Nigerian governments intervened in the rice sector through the establishment of parastatals and policies since 1970; all these were aimed at encouraging and boosting local rice production. First, Government established the Federal Rice Research Station (FRRS) at Badeggi in 1970 and the National Cereal Research Institute (NCRI) in 1974 respectively. Also established were the National Seed Service (NSS) in 1975 and Operation Feed the Nation (OFN) in 1976. Other government programmes were the River Basin Development Authority (RBDA) 1977, Agricultural Development Projects (ADP) 1975, the National Grain Production Programmes (NGPP), the Structural Adjustment Programmes (SAP) 1986, and the Presidential Initiative on Increased Rice Production, Processing and Export (PIIRPPE) 2001. The emergence of the VEETEE rice company in 2004 was another way to boost local rice production in Nigeria. The company has the facility for polishing rice, which means high quality of local rice (Bamidele, *et al*., 2010). The most recent programme is National Rice Development Strategy (NRDS) 2009. In spite of these numerous programmes, the existing rice production potential has not yet been realized, as smallholder (small-scale, subsistence and fadama farmers) output is inadequate and paddy rice processing is still substandard.

Considering the rate at which the country's population increases, there is the need to match the population increase with food production; hence increase in rice production is one way of realizing this dream. Rice forms the main meal of majority of the people of Nigeria, both the rich and the poor, hence providing rice at affordable price is an important step towards achieving the food self- sufficiency objective of the Nation.According to Olayide, *et.al*., (1982) agricultural productivity is an index of the ratio of farm output to the value of the total inputs used in producing the output. They also agreed that resource productivity is definable in terms of individual inputs or a combination of them. Thus optimal productivity of resources implies an efficient utilization of resources in production process, while Odii (1998) opined that technical efficiency is a ratio of total output to total input. This implies that productivity and technical efficiency are synonymous.

Technical efficiency is the ability to achieve a higher level of physical output given a small level of production input. Hence the technical efficiency of rice farmers in the study area was needed to be measured to enable us know how efficient rice production is in the region, so that policies and recommendations can be made to improve the production of the crop.The Niger Delta of Nigeria is the 3rd largest wetland in the world. The delta is a vast flood plain built up by the accumulation of sedimentary deposits washed down the Niger and Benue rivers. It is composed of four ecological zones: coastal barrier islands, mangroves, fresh-water swamp forests and lowland rainforests. The region consists of nine (9) states of the Federal Republic of Nigeria which are Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers States, and occupies an area of over 74000 km^2 with a population of over 35 million people (Niger Delta Development Commission, 2010). Niger Delta Region of Nigeria, like all Delta Regions all over the world, is very fertile and suitable for rice cultivation. According to

National Bureau of Statistics (2007), in considering only the Niger Delta States, Ondo state came 1st in areas planted to rice by States, followed by Abia state, Edo and Delta States came 3rd and 4th respectively, Cross River State came 5th, Imo State came 6th, while Akwa-Ibom, Rivers and Bayelsa States came 7th, 8th and 9th respectively.

The objectives of the study include to:

i assess the socio-economic characteristics of rice farmers in the region and
ii measure the technical efficiency of rice farmers in the study area.

The study tested this hypothesis as follows;

Rice farmers in the study area are technically inefficient

MATERIALS AND METHODS

The study was carried out in the Niger Delta Region of Nigeria. The Niger Delta, as defined by the Nigerian Government, covers over 70,000km^2 and makes up 7.5% of Nigeria's land mass (Wikipedia, 2010). Historically and cartographically, it consists of present day Akwa-Ibom, Abia, Bayelsa, Cross-River, Delta, Edo, Imo Ondo and Rivers states. The South-South Niger Delta includes Akwa-Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States; South-East includes Imo and Abia states while Ondo state constitutes the South West Niger Delta State.

A representative sample was selected for the study using a multistage sampling technique. Three states, Abia, Ondo and Imo States were purposively selected because of their relative strengtht in rice production. Two Local Government Areas from each of the state, Abia (Arochukwu and Bende LGAs), Imo (Okigwe and Ihitte-Uboma LGAs), Ondo (Akoko North and Odigbo LGAs) were purposively selected based on their rice production intensity making a total of six Local Government Areas (LGAs). In each LGA selected, lists of rice producing communities were compiled through the assistance of Agricultural Development Programme (ADP) staff. From this list, five communities were selected randomly giving a total of thirty communities. In each of the selected communities ten rice farming households were randomly selected giving a total of fifty (50) farmers per LGA and hence a total of three hundred rice farmers. This technique gave every rice farmer in each community an equal opportunity of being part of the study.

Data for this study were collected from both primary and secondary sources. Primary sources include information that were obtained from oral interview, observations and interview schedule. Two sets of interview schedule were used; the village level and farmer's household level. Structured interview schedule was utilized in gathering primary data.Secondary source of data include information from journals, text books, internet search, websites, published and unpublished materials relevant to the study.Variation in output by different producers, caused by technical inefficiencies could be captured through specification of a production function. Technical efficiencies could be estimated using Stochastic Frontier Approach (SFA) or Data Envelopment Analysis (DEA), which is a non- parametric approach. Data Envelopment Analysis assumes that, there are no random effects in production. The current study therefore employed the Stochastic Production Frontier Approach because most farmers operate under uncertain conditions (Abedullah and Ahmed, 2006). Review of literature showed that Cobb Douglas and Translog production Functions are the widely used forms in agriculture. However, Translog production Function specification suffers from multicollinearity problem as a result of the square and interaction terms of the inputs used (Hussain *et al*., 2012). The current study therefore estimated a Cobb Douglas production function, specified as:

$Yi = f(Xi; \beta) + V_i - U_i$ ____equ 1

Where Yi is output or production (or logarithm of production) of the i-th farm,

Xi is the vector of input quantities used by the ith farm,

β is a vector of unknown parameters to be estimated,

f ( ) represents an appropriate function (e.g Cobb-Douglas, Translog, etc).

The term V_i is a symmetric error, which accounts for random variations in output due to factors beyond the control of the farmer; examples are weather, disease outbreaks and measurement errors. The term Ui is a non- negative random variable representing inefficiency in production relative to the stochastic frontier.

The random error Vi is assumed to be independently, and identically distributed as $N(o, ó_v^2)$ random variables independent of the Ui's which are assumed to be non-negative truncation of the $N(o, ó_u^2)$ distribution (i.e half-normal distribution) or half-exponential distribution.

Technical Efficiency (T.E) model is thus:

$T.E = Yi / Yi^* = f(Xi; \beta) \exp(Vi-Ui)/f(Xi; \beta) \exp(Vi) = \exp(-Ui)$_____________equ 2

This production function is used in the measurement of efficiency in production. The advantages of using this production function are: (1) it introduces a disturbance term representing statistical noise, measurement error and exogenous shocks beyond the control of production units which would other-wise be attributed to technical efficiency. (2) it provides the basis for production structure and the degree of inefficiency.

Technical efficiency (TE) is defined in terms of the observed output relative to production frontier, given the available technology, such that $0 \leq TE \leq 1$.

The production function can be log linearized to be:

$In\ Yi = \beta_0 + \sum_{k=1}^{4} \beta k\ In\ Xki + Vi - Ui$___________________________________equ 3

The production technology of rice farmers in Niger Delta of Nigeria is assumed to be specified by the Translog Frontier Production Function specified as follows:

$Y = f(Xi; \beta) + (Vi-Ui), i = 1, 2, ------ n$____________________________________equ 4

$In\ Y = b_o + b_1 InX_1 + b_2 InX_2 + b_3 InX_3 + b_3 InX_3 + b_4 InX_4 + b_5 InX_5 + b_6 InX_6 + 1/2b_7 (InX_1)^2 + 1/2b_8 (InX_2)^2 + 1/2b_9 (InX_3)^2 + 1/2b_{10} (InX_4)^2 + 1/2b_{11} (InX_5)^2 + 1/2b_{12} (InX_6)^2 + b_{13} InX_1 InX_2 + b_{14} InX_1 InX_3 + b_{15} InX_1 InX_4 + b_{16} InX_1 InX_5 + b_{17} InX_1 InX_6 + b_{18} InX_2 InX_3 + b_{19} InX_2 InX_4 + b_{20} InX_2 InX_5 + b_{21} InX_2 InX_6 + b_{22} InX_3 InX_4 + b_{23} InX_3 InX_5 + b_{24} InX_3 InX_6 + b_{25} InX_4 InX_5 + b_{26} InX_4 InX_6 + b_{27} InX_5 InX_6 + V_i - U_i$__________________________________equ 5

Where: Y = Rice Output (Kg),

X_1 = farm size (hectare)

X_2 = seed input cost (₦)

X_3 = family labor cost (₦)

X_4= hired labor cost (₦)

X_5 = Fertilizer application cost (₦)

X_6= Herbicide application cost (₦)

$b_0, b_1, b_2 ..... b_{27}$ are regression parameters to be estimated while

Vi = symmetric error, which accounts for random variations in output due to factors beyond the control of the farmer, examples are weather, disease outbreaks and measurement errors.

Ui = a non-negative random variable representing the inefficiency in production relative to stochastic frontier.

In addition, Ui is assumed in this study to follow a half normal distribution as is done in most frontier production literature.

In order to determine factors contributing to the observed technical efficiency in rice production, the following model was formulated and estimated jointly with the stochastic frontier model in a single stage maximum likelihood estimation procedure using the computer software Frontier version 4.1 (Coelli, 1996).

$TEi = ao + a_1Z_1 + a_2Z_2 + a_3Z_3 + a_4Z_4 + a_5Z_5 + a_6Z_6 + a_7Z_7 + a_8Z_8 + a_9Z_9$__________equ 6

Where TEi is the technical efficiency of the i^{th} farmer,
Z_1 is farmers' age (years),
Z_2 is sex of farmers (Dummy variable: 1 = male, 0 = female),
Z_3 is marital status, (Dummy variable:single = 1, married = 2, divorced = 3, separated = 4, widowed = 5,),
Z_4 is household size (Number of persons),
$Z_5$is educational level, (years),
Z_6 is farm size (Ha).
While a_0, a_1, a_2 …….. a_6 are regression parameters to be estimated.

Stochastic Frontier Production functional form is used in this study because the coefficients estimated directly represent elasticity of production (Abedullah and Ahmad, 2006). Stochastic Production function is adequate in the representation of the production process since we are only interested in the efficiency measurement, and not production structure (Taylor and Shonkwiler, 1986). Furthermore, Stochastic Frontier Production function has been widely applied in estimating farm efficiencies (Kalirajan and Shand, 1986; Onyenweaku and Ohajianya, 2005; Hussein et al, 2012, Samuel and Kelvin, 2013).

There is evidence that socio economic variables influence producer's efficiency, which will be included in the inefficiency model (Seyoum *et al.*, 1998; and Oladeebo and Fajuyigbe, 2007). The inefficiency effects model is specified as:$\mu = \gamma_0 + \gamma_k \sum_{k=1}^{9} Zki$_____________equ 7

RESULTS AND DISCUSSION

Table 3.1 presents the socio-economic characteristics of the respondents

Characteristics of respondents	Percentage (%)	Mean
Age:		
25 – 35	10.33%	49years
36 – 45	27.67%	
46 – 55	35.00%	
56 – 65	17.33%	
66 – 75	9.69%	
Marital Status:		
Single	9.33%	
Married	70.00%	
Divorced	10.00%	
Separated	1.00%	
Widowed	9.67%	
Gender:		
Male	64.33%	
Female	33.67%	
Participation:		
Part time farming	61.00%	
Full time farming	39.00%	
Educational attainment		

6- 10 years	
Years of experience in rice farming	17 years
Farm size	2.32 (ha)
Farmers household size	6

Source: Field Survey Data, 2012.

Table 3.1 presents the mean of the socio economic characteristics of rice farmers in the study area. The table showed that most of the respondents fell within the age group 36 – 55years which was about 62.66% of the total sample, with a mean of 49years. This implied that rice farming is being practised by middle age farmers.This finding is consistent with the findings of Ibitoye *et. al*., (2012), who found that the mean age of rice farmers in their study area was 45years. This showed that rice farmers belong to the middle age classes, who are physically fit to withstand the stress and risks involved in rice production, and are more mentally alert to embrace new techniques of rice production. Also,rice production in the study area was dominated by male farmers who comprised of 64.33% of sampled farmers.This is in contrast with Ibitoye, *et al.,* (2012) who found out that there were more female rice farmers than males in their study area. The result also showed that 69% of rice farmers were part time farmers and 70.00% were married, this implied that rice farmers were people with high responsibility who needed income from other sources to meet up with their financial obligations. The table also showed that rice farming has been a long time practice amongst the farmers in the study area which on the average was 17 years. The level of education attained which was (6 – 10 years) on the average and the experience attained over the years will assist the farmers to be able to adopt new technologies. Lastly, the result showed that farmers in the study area were small – scale farmers (2.32 hectare) and this small farm size make mechanization difficult thereby limiting output of rice to subsistence level leaving little for commercial. Also, Ibitoye *et. al.,* (2012) confirmed that (53.00%) of rice farmers in Ibaji cultivated between 1-3 hectares.

Table 3.2 Statistics of output and input of paddy rice production in the study area.
Table 3.2 presents the summary of output and input of paddy rice production in the study area

Variable	**Mean**
Paddy rice (Kg/ha)	4713.25
Land size (Hectare)	2.32
Seed input (Kg/ha)	63.45
Family labor (man days/ha)	107.22
Hired labor (man days/ha)	55.12
Fertilizer application (Kg/ha)	48.68
Herbicide application (Kg/ha)	2.42

Source: Field Survey Data, 2012.

Table 3.2 showed the mean values of output and inputs used in rice production in Niger delta region of Nigeria. Rice farmers in Niger Delta Region of Nigeria harvested 4713.25Kg/hectare of paddy rice in 2012 harvesting season. Farmers on the average applied 63.45Kg of seed input on one hectares of land. The average family and hired labor inputs used were 107.22 and 55.12 man days per hectare respectively with 48.68Kg/hec of fertilizer and 2.42Kg per hectare of herbicides whose costs were ₦5,841.60/hec and ₦605.00/hec respectively. The total cost of labor was ₦324,663.00 per hectare.

Table 3.3 Maximum likelihood estimates of the stochastic production function for Paddy Rice production in Niger delta area of Nigeria

Variable	Parameter	Estimate	t ratio
Intercept	b_o	13.9006	7.1307**
Land	b_1	0.3142	3.8647**
Seed Input	b_2	0.5833	4.6851**
Family labor input	b_3	0.2942	2.8481**
Hired labor input	b_4	0.3155	2.7082**
Fertilizer application	b_5	0.4716	3.8094**
Herbicide application	b_6	0.2038	3.8311**
Log likelihood function =		-106.3045	
Sigma (δ^2)		7.5102	3.8889**
Lamda (λ)		6.1047	3.1299**
Gamma (γ)		0.7884	3.0914**

** Significant at 1% level.
Source: Field Survey Data, (2012).

The Maximum Likelihood (ML) estimates of the stochastic frontier production parameters for rice farmers were presented in table three. The coefficients of land (X_1), seed (X_2), family labor (X_3), hired labor (X_4), fertilizer application (X_5), and herbicide application (X_6) have the desired positive signs and are statistically significant at 1% level showing direct relationship with rice output. This is contrast to the findings of Samuel *et. al.*, (2013) who found out that only fertilizer application and labor coefficients were positive and significant while chemical cost coefficient is negative and significant in Technical Efficiency of Rice farmers in Ahero Irrigation scheme, Kenya. The estimated variance ($Ó^2$) is statistically significant at 1% indicating goodness of fit and correctness of the specified distribution assumptions of the composite error term. Besides, the variance of the non-negative farm effects is a small proportion of the total variance of rice output. Gamma (γ), derived as ($\lambda^2/1 + \lambda^2$) is estimated as 0.7884 and it is statistically significant at 1% level indicating that only 79% of the total variation in rice output is due to technical inefficiency. In contrast to this Samuel *et. al.*, (2013) found the gamma estimate of the Ahero Irrigation scheme, Kenya to be 0.999 meaning that 99.9% of the variations in productivities among rice farmers is due to farmers specific inefficiencies. They concluded that, that was particularly for Ahero Irrigation scheme, Kenya because the physical conditions such as weather and soil characteristics were similar. The variance ratio parameter, Lamda (λ) = (λ^2u/λ^2v) is estimated at 6.1047 and it is statistically significant at 1% level, implying that variation in actual rice output from maximum rice output between rice farms mainly arose from differences in farmer practices rather than random variability.

Table 3.4 : Elasticity of Production and Return to Scale
Table 3.4 presents elasticity of production and return to scale of paddy rice production in the study area

Variable	Elasticities
Land	0.3142
Seed Input	0.5833
Family labor (man days)	0.2942
Hired labor (man days)	0.3155
Fertilizer Application	0.4716
Herbicide Application	0.2038
Total	2.1826

Source: Field Survey Data, 2012.

The estimated coefficients of a Cobb Douglas production function can be directly interpreted as elasticities of production. Table four showed an increase return to scale because the total elasticities was 2.1826, meaning that the values of inputs used in the production of rice should be reduced. Seed input had the highest elasticity of production of 0.5833 and herbicide application had the lowest (0.2088). This implied that a ten percent increase in seed input and fertilizer application will lead to 5.8% and 4.7% increase in paddy rice production respectively.

Table 3.5 Distribution of farmers according to level of efficiency
Table 3.5 presents distribution of farmers according to level of efficiency

Efficiency Range	Frequency	Percentage (%)
≤ 0.50	30	10.00
0.51 – 0.60	90	30.00
0.61 – 0.70	115	38.40
0.71 – 0.80	22	7.30
0.81 – 0.90	34	11.30
0.91 – 1.00	9	3.00
Total	**300**	**100**

Mean technical efficiency 0.626
Minimum Technical Efficiency 0.384
Maximum Technical Efficiency 0.941
Source: Field Survey Data, (2012).

Technical efficiency of individual rice farmers was presented in Table 3.5. The content of Table 3.5 showed that the individual technical efficiency indices ranged between 0.384 and 0.941 with a mean of 0.626. The results showed that 90.0% of the rice farmers had technical efficiency index above 0.50. Thus, this result on technical efficiency of rice farmers implies that the rice farmers are technically inefficient in resource utilization since the overall technical efficiency index was less than 1.00 or 100%. Therefore, the hypothesis which states that rice farmers in Niger delta area of Nigeria are technical inefficient in resource use is hereby accepted. The mean technical efficiency of 0.626 obtained in this study implied moderate level of technical efficiency in resource use and is consistent with the low variance of the farm effects in the study area. The mean technical efficiency of 0.626 obtained in this study compares favourably with the the 0.61 obtained for rice in Ebonyi State of Nigeria by Onyenweaku and Ohajianya (2005), but is at variance with the results on technical efficiency of the 0.934 obtained by Onyenweaku and Okoye (2007) for Cocoyam in Anambra State of Nigeria.

Table 3.6 Determinants of Technical Efficiency
Table 3.6 presents the Maximum Likelihood Estimates of Determinants of Technical Efficiency of Paddy Rice farmers in the study area.

Variable	Parameter	Estimate	t-ratio
Intercept	∂_0	16.0943	8.1805**
Age (Z_1)	∂_1	-1.0528	-3.3907**
Sex (Z_2)	∂_2	0.1647	1.3511
Marital Status (Z_3)	∂_3	0.1906	3.1093**
Household size (Z_4)	∂_4	-0.1544	-3.4388**
Educational Level (Z_5)	∂_5	0.3752	3.6569**
Farm size (Z_6)	∂_6	1.0893	4.1688**

** Significant at 1% level
Source: Field Survey Data, (2012).

The estimated determinants of technical efficiency among rice farmers in Niger Delta Region of Nigeria are presented in Table 3. 6, the coefficients of marital status (Z_3), education (Z_5), and farm size (Z_6) were positive and significant at 1% level of probability, indicating a direct relationship with technical efficiency, while the coefficients of age (Z_1) and household size (Z_4) were negative and significant at 1% level of probability, indicating an inverse relationship with technical efficiency. These results imply that these variables are determinants of technical efficiency of rice farmers in Niger Delta Region of Nigeria. The coefficient of age (Z_1) was negative and significant, implying that the older the farmer becomes the less his/her technical efficiency in rice production. The coefficient of marital status (Z_3) was positive and significant, implying that married farmers have higher technical efficiency than their unmarried counterparts. The coefficient of household size (Z_4) was negative and significant, indicating that increase in household size leads to reduction in technical efficiency of rice farmers. The coefficient of education level (Z_5) was positive and significant, implying that higher education leads to improvements in technical efficiency of rice farmers. The coefficient of farm size (Z_6) was positive and significant, indicating that rice farmers that cultivate larger hectares have higher technical efficiency.

CONCLUSION AND POLICY IMPLICATIONS

The study showed that rice farmers in the Niger Delta Region of Nigeria are technically inefficient in using the productive resources. The result of Cobb Douglas production function showed that increase in all the resources will lead to an increase in paddy rice output. Policies should therefore aim at reducing the cost of productive inputs such as fertilizer, herbicides and seed. Also, government should make available direct to rice farmers, appropriate labor-saving technologies such as mechanization and bird scarring mechanism at subsidized rate to reduce labor cost.

Marital status, educational level and farm size were found to be important determinants of technical efficiency. Policies should therefore target improving the educational status of rice farmers and increasing the farm size of rice farmers. Improving farmers' efficiency in rice production therefore has a potential of increasing rice production in the region and in the country as a whole. This in turn will have direct effects of increased local paddy rice output, hence food security, increased income among rice farmers and reduction of supply and demand gap that will reduce rice import bill which is on the high side in the country.

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