STUDY ON ECONOMIC EFFICIENCY IN RICE PRODUCTION OF CUU LONG DELTA

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ABSTRACT

This study was carried out in five provinces of Cuulong delta, the technical, allocative and the economic efficiency of paddy production in 2010-2011 were examined. The data were collected from 200 rice farmers of the command area by the stratified random sampling method and analyzed using cost frontier and the Cobb-Douglas production function. The cost of cultivation of paddy and benefic cost ratio (BC ratio) were different between two seasons. It was by 15,981,790VN dong /ha and 1.06 respectively in the summer-autumn season and in the winter-spring season by 29,449,080VN dong/ha and 1.87 respectively. There was the difference between frontier output and observed output primarily due to factors which are under the control of farming practice; it was 59.83 % in the winter-spring season and 62.84 % in the summer-autumnt season. In the winter-spring season, the average technical, allocative and economic efficiency were 91.7 %, 87.5% and 80.5% and in summer-autumn season, were 84.8%, 92.2% and 73.9% respectively. The results show that the ability of a farmer in Cuulong delta to achieve the best potential output showing by high technical efficiency level in both seasons. However, some of farmers need to reduce the cost of production to obtain the best allocative efficiency.

Keywords*: Cobb-Douglas production function, frontier function analysis, Cuu Long Delta*

INTRODUCTION

Agricultural production plays a important role in uplifting the Vietnam' economy. It depends on most farmers' cultivation practices. However, it is still the existence of farm problems that need to be studied. In which, the effect of rice production is interested in most of the economists. Coelli *et al.,* (2002) studied on economic efficiency that do not tell us what portion of the cost difference is due to inefficient use of the given input bundle (technical inefficiency) and what part is due to the incorrect choice of input ratios or given the input prices faced by the farmer (allocative inefficiency). Pham Le Thong *et al.,* (2011) studied the economic efficiency of Summer-Autumn (SA) and Autumn-Winter (AW) season and revealed that there is no difference between two seasons because of low allocative efficiency of 57% and 58% respectively. Based on that study, if farmers change their technology and make the choice of input price to be optimum, paddy productivity will be improved. According to Vu Hoang Linh (2008), the Mekong Delta has more potential for improving technical efficiency with its scale efficiency of 92.3%, it is highest in eight regions of Vietnam. This study focuses on aspects of economic efficiency which based on stochastic frontier function. Economic efficiency (EE) can be classified in two: technical efficiency (TE) and allocative efficiency (AE). TE measures ability of a farmer to achieve the maximum with given output and obtainable technologies while AE measure a farmer's ability to apply the input in optimal proportion with respective prices (Farrel, 1957). The analysis of economic efficiency will help researchers understand farmer's difficulties in rice production.

METHOD OF DATA COLLECTION AND ANALYSIS

A survey was conducted in 2010-2011 in 5 provinces (An Giang, Kien Giang, Dong Thap, Vinh Long and Hau Giang) where rice production is the main crop and high productivity. From each selected province, 40 smallholder farmers were interviewed randomly, making a total of 200 sample farmers in all. All data related to rice production was interviewed in both seasons, Winter–Spring (WS) and Summer–autumn (SA).

Measurement of technical, allocative and economic efficiency

The measure of economic efficiency can be divided into two components, viz., technical efficiency and price or allocative efficiency. The economic efficiency (EE) is composed of technical efficiency (TE), which is connected to technology, refers to use the minimal possible combination of inputs for producing a certain output (input orientation) or to obtain maximum possible level of output (i.e., frontier output) at the given level of technology (output orientation), and allocative efficiency (AE), which refers to optimal combination of inputs at given input prices (Singh, 2008).

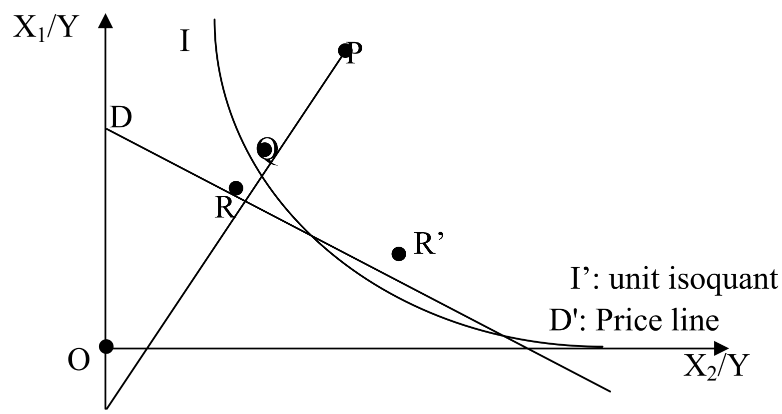

Figure 1. Efficiency in Production

The analysis of efficiency carried out by Farrell (1957) can be explained in terms of Figure 1. The technological set is fully described by the unit isoquant II' that captures the minimum combination of inputs per unit of output needed to produce a unit of output. Geometrically, the technical inefficiency level associated to package P can be expressed by the ratio QP/OP, and therefore; the technical efficiency (TE) of the producer under analysis (1-QP/OP) would be given by the ratio OQ/OP.

If information on market prices is known and a particular behavioral objective such as cost minimization is assumed in such a way that the input price ratio is reflected by the slope of the isocost-line DD'. Therefore, the allocative efficiency (AE) that characterizes the producer at the point P is given by the ratio OR/OQ.

Farm specific economic efficiency is estimated together with the concepts of technical efficiency and allocative efficiency, Farrell (1957) describes a measure of what he termed overall efficiency that renamed economic efficiency (EE) later on. This measure comes from the multiplicative interaction of both technical and allocative components as: EE = TE x AE = OR/OP x OQ/OR = OR/OP

Stochastic frontier function

Stochastic frontier production and cost function

The essential idea behind the stochastic frontier model is that the error term is composed of two parts. One side captures the effects of measurement random error which measures statistical noise and random shocks outside the firm's control. A one side component captures the effects of inefficiency relative to the stochastic frontier. A (linear) stochastic frontier model is specified as:

$Y = f(X_1, X_2,\ldots, X_n) + (v \pm u)$

Where: v is the symmetric error component causing the deterministic kernel of the production frontier $f(X_1, X_2,\ldots, X_n)$ to vary across the firms. Technical or allocative efficiency relative to the stochastic production frontier is captured by the one-sided error component (±u depending on whether specify in a production or cost frontier).

Assuming a half normal distribution for u_i and normal distribution for v_i, the frontier model becomes $Y = f(X_1, X_2,\ldots, X_n) \pm (V_i \pm U_i)$

Where, V_i are random variables which are assumed to be iid $N[0, \sigma_v^2]$

And independent of the $U_i = (U_i\exp(-\eta(t-T)))$, where U_i are non-negative random variables which are assumed to account for technical inefficiency in production and are assumed to be iid as truncation at zero of the $N[\mu, \sigma_u^2]$ distribution;

η is a parameter to be estimated

The components of the disturbance are assumed to be independent and the frontier is assumed to be linear in the above case. (In case of multiplicative models the ± (v - u) component is expressed as exp(u-v)). Now, the firm or observation specific u_i can be estimated as:

$$\hat{u}_i = E(u_i|e_i) = \sigma_v^2.\sigma_u^2\left[\frac{f(.)}{1-F(.)} - \frac{e_i\lambda}{\sigma}\right]$$

Or $E\{u/(u_i + v_i)\} = - \sigma_u\sigma_v/\sigma[f(.)/(1-F(.))-\{(u_i + v_i)/\sigma\}\{r/(1-r)\}^{1/2}]$

Where f(.) and F(.) are standard normal density and distribution functions evaluated at

$\{(u_i + v_i)/\sigma\}\{r/(1-r)\}^{1/2}$ and $r = \sigma_u^2/\sigma^2$ and $\sigma^2 = \sigma_v^2 + \sigma_u^2$

Alternatively,

$E(u|e) = \sigma\lambda/(1 + \lambda^2)[f(E\lambda/\sigma)/F(E\lambda/\sigma – E\lambda/\sigma]$

Where $\lambda = \sigma_u^2/\sigma_v^2$

Model specification

The stochastic frontier function model of Cobb-Douglas functional form is employed to estimate the farm level technical and allocative efficiency in the study.

The Cobb-Douglas stochastic frontier production function is defined by:

$Yi = f(X_i; \beta) \exp(V_i – U_i)$

Where, Y_i represents the production of the i-th farm, which is measured in quantity; X_i represents the quantity of inputs used in the production. The V_is is assumed to be independent and identically distributed random error, having normal $N(0, \sigma_v^2)$ distribution and independent of the U_is. 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 TE of individual farmers is defined in terms of the ratio of the predicted the observed output (Y_i) to the frontier's output (Y_i*) as follows:

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

In specific model,

$\ln Y = \alpha + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + \beta_6\ln X_6 + (V_i – U_i)$

Where, Y: rice production (kg/farm)

α, β_i: parameters to be estimated

X_1: Labour (man-day/ farm)

X_2: Urea fertilizer (kg/farm)

X_3: Phosphorus fertilizer (kg/farm)

X_4: Potassium fertilizer (kg/farm)

X_5: Chemical plant protection (kg/farm)

X_6: Seed (kg/farm)

V_i: random error having zero mean which is associated with random factors

U_i: one-sided inefficiency component

The Cobb-Douglas stochastic frontier cost function in rice production

$C_i = g(Y_i, P_i; \alpha) \exp (V_i + U_i)$

Where, Ci represents the total input cost of the i-th farm; g is a suitable function such as the Cobb-Douglas function; Y_i represents production of the i-th farm; P_i represents input prices employed by the i-th farm and measured in currency; α is the parameter to be estimated. V_is and U_is are random errors assumed to be independent and identically distributed truncations (at zero) of the N (0, σ_v^2) distribution. U_is provides information on the level of allocative efficiency of the i-th farm. The AE of individual farmer is defined in terms of the ratio of the predicted minimum cost (C_i*) to observed cost (C_i) as follows:

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

The Cobb-Douglas stochastic frontier cost function for the rice production is specified by:

$\ln C = \alpha + \beta_1 \ln Y + \beta_2 \ln Px_1 + \beta_3 \ln Px_2 + \beta_4 \ln Px_3 + \beta_5 \ln Px_4 + \beta_6 \ln Px_5 + \beta_7 \ln Px_6 \pm (V_i + U_i)$

Where: C: input cost in VND

α, β_1, β_2, β_3, β_4, β_5, β_6, β_7 are parameters to be estimated

Px_1: average price of labor (1000VND/mandays)

Px_2: average price of urea fertilizer (1000VND/kg)

Px_3: average price of phosphorus fertilizer (1000VND/kg)

Px_4: average price of potassium fertilizer (1000VND/kg)

Px_5: average price of pesticide (1000VND/kg)

Px_6: average price of seed (1000VND/kg)

The farm-specific Economic Efficiency is obtained as the products of TE_i and AE_i.

Given the assumptions of the above stochastic frontier models, the inference about the parameters of the model can be based on the maximum likelihood estimation because of the standard regularity conditions hold. Aigner *et al.*, (1977) suggested that maximum likelihood estimates of the parameters of the model can be obtained in terms of parameterization $\sigma_s^2 = \sigma_v^2 + \sigma_u^2$ and $\lambda = \sqrt{\sigma_u^2/\sigma_v^2}$. Battese (1977) replaced $\gamma = \sigma_u^2/(\sigma_v^2 + \sigma_u^2)$. The parameter γ must lie between 0 and 1. In the case of σ_v^2=0, γ should be equal to 1 and all the differences in error terms of the frontier production functions are the results of management factors under the control of the producer (Battese *et al.*, 1995). When σ_u^2 = 0, γ would be equal to zero, which means all the differences in error terms of the frontier production function are the results of the factors that the producer has no control on them, i.e., random factors. γ close to 1 indicates that the random component of the inefficiency effects makes a significant contribution to the analysis of production system.

The estimates for the parameters of λ, γ and σ are provided through maximum likelihood estimates and are provided by computer packages as LIMDEP.

RESULTS

The input utilized in paddy cultivation in the command area is given in table 1, 2 and 3. Total cost of production in SA season was higher than in WS (15,773,400 and 15,981,790 VND respectively). Cost of fertilizer, pesticide and labor hiring accounted for more than 60% of total cost of production in two seasons, in which 62.72% in WS and 61.35% in SA season. In total cost of rice production**,** input cost for fertilizer was highest followed by pesticide and labor cost. The total cost in cultivation of paddy was more than 15 million VND per hectare in WS and total return of 29 million VND per hectare, given a BC ratio of 1.87. In the SA season, the total cost in cultivation of paddy was little higher than cost of Winter- spring, it was nearly 16 million VND per hectare and total per hectare return of 17 million VND, given a BC ratio of 1.05 because of lower productivity.

Table 1. Costs in rice production per hectare

1,000 VND and %

	Winter-spring		Summer-autumn	
	Mean	**%**	**Mean**	**%**
Cost of land preparation	479.74	3.04	1020.83	6.39
Cost of seed	1022.18	6.48	912.71	5.71
Cost of fertilizer	3889.49	24.66	4298.76	26.90
Cost of herbicide	379.47	2.41	401.20	2.51
Cost of pesticide	2994.43	18.98	2699.32	16.89
Cost of land lending	948.79	6.02	849.49	5.32
Cost of depreciation	124.05	0.79	117.91	0.74
Cost of loans	205.73	1.30	186.35	1.17
Cost of harvesting machine	1301.19	8.25	1023.88	6.41
Cost of irrigation	926.54	5.87	822.63	5.15
Cost of labor	2793.94	17.71	3025.45	18.93
Cost of other	707.85	4.49	623.34	3.90
Total	**15773.40**	**100.00**	**15981.79**	**100.00**

Source: Survey 2010

Some physical inputs for one hectare of rice production are shown in table 2. It includes seed, fertilizer (urea, phosphorus, and potassium), labor and chemical plant protection. In general, inputs used in WS season were lower than in SA season because of the advanced climate. In the contrary, productivity in Winter-spring season was higher than in Summer-autumn season (1.72 times) (table 3).

Table 2. Inputs in rice production

	Items	Unit	WS season	SA season
1	Seed	Kg/ha	186.82	189.46
2	Fertilizer			
3	N	Kg/ha	100.54	104.68
4	P_2O_5	Kg/ha	64.92	75.54
5	K_2O	Kg/ha	41.88	47.78
6	Plant protection chemical	Kg/ha	3.3	3.9
7	Labor	Man-day/ha	71.78	73.75

Source: Survey 2010

Table 3. Return and profit of rice production

Items	Unit	WS season	SA season
Productivity	Kg/ha	7053.98	4682.46
Return (B)	1000đ	29449.08	16889.69
Cost of production (C)	1000đ	15773.40	15981.79
Profit	1000đ	13675.68	997.9
B/C ratio	Times	1.87	1.05

Source: Survey 2010

The maximum likelihood estimates of the Stochastic Frontier Production Function are given in table 4. All independence variables gave the positive coefficient. That means there is a scope for increasing production of rice by increasing the level of these inputs. If farmers are using more inputs, the output will increase. The result of p-value showed that four of coefficient in the WS season (α, β_1, β_2, β_5, β_6) were significant at 10% level and three of them were significant in SA (Labor, chemical plant protection and seed). Hence, based on the result of production function, the number of labor using per ha, amount of seed and chemical plant protection are important determinant of rice production in the study area in both seasons.

Table 4. Maximum likelihood estimates of the stochastic production frontier in Mekong River Delta, Vietnam

Variables	**Winter-spring season**		**Summer-autumn season**	
	Coefficient	**p-value**	**Coefficient**	**p-value**
Constant (α)	6.2573	0.000	4.3004	0.000
Labor (man-days/farm) β_1	0.1131	0.0124	0.1193	0.0473
Urea (kg/farm) β_2	0.1558	0.0437	0.0392	0.5988
Phosphorus fert. (kg/farm) β_3	0.0242	0.771	0.0388	0.6131
Potassium fert. (kg/farm) β_4	0.0362	0.3669	0.0247	0.6938
Chemical Plant protection (kg/farm) β_5	0.084	0.0345	0.1663	0.0001
Seed (kg/farm) β_6	0.5925	0.000	0.6943	0.000
Lambda (λ)	*20.65*		*3.1084*	
Sigma (σ)	*0.5997*		*0.6934*	
Gamma (γ)	*0.5983*		*0.6284*	
Log likelihood	*-25.1017*		*-57.56*	

Source: Survey 2010

The estimated values of σ_v^2 and σ_u^2 indicate that the difference between the observed output and frontier output is not only due to the statistical variability alone, but also due to technical inefficiencies of farms. The estimates of γ indicate the presences as well as the dominance of inefficient effect over random error. The difference between frontier output and observed output is primarily due to factors which are under farm control, i.e. technical inefficiency. This difference in the WS season was lower than SA season, 59.83% and 62.84% respectively (see in table 4). Hence, farmer could change the using of labor, seed, urea and chemical plant protection are important determinant of rice production in the study area to get optimum technical efficiency.

In the table 5, the result of stochastic frontier cost function revealed that all the independent variables conform to a prior, expectation as all the estimated coefficients gave positive coefficients, meaning as these factors increased, total production cost increased ceteris paribus. The result of p - value shows that, in the WS season, four independent variables (α, β_1, β_2, β_5, β_4) were significant at below 10% level. In the SA season, production, price of labor, phosphorus, pesticide and seed were significant at 10% level. That means the change in the price of labor, urea, seed and chemical plant protection can determine the cost of rice production in the study area in both seasons.

Table 5. Maximum likelihood estimates of the stochastic frontier cost function in Winter-spring and Summer-autumn season, Mekong River Delta, Vietnam

Variables	WS season		SA season	
	Coefficient	**p-value**	**Coefficient**	**p-value**
Constant (α)	8.2985	0.000	9.1498	0.000
Production (kg/farm) β_1	0.1087	0.000	0.4378	0.000
Price of labor (1000VND/man-days) β_2	0.2318	0.002	0.1469	0.0454
Price of urea (1000 VND/kg) β_3	0.0588	0.811	0.3169	0.5929
Price of phosphorus (1000 VND/kg) β_4	0.4215	0.0821	0.1469	0.0363
Price of potassium (1000 VND/kg) β_5	0.5681	0.0207	0.1081	0.7923
Price of pesticide (1000 VND/kg) β_6	0.1823	0.6921	0.7543	0.0515
Price of seed (1000 VND/kg) β_7	0.0899	0.1455	0.1125	0.0799
Lambda (λ)	*2.9118*		*0.7255*	
Sigma (σ)	*0.7217*		*0.5128*	
Gamma (γ)	*0.6455*		*0.1784*	
Log likelihood	*-57.712*		*-57.055*	

Source: Survey 2010

The values of σ_v^2 and σ_u^2 from Stochastic Frontier Cost Function indicate that there was the presence and dominance of allocative inefficiencies in rice production in the study site. The estimate of γ indicates that more than 64.55% of the difference between observed cost and frontier cost is due to allocative inefficiencies in WS season and 17.84% in SA (see in table 5).

Table 6. Decile ranges of frequency distribution of technical, allocative and economic efficiency in WS season

Levels	Technical efficiency		Allocative efficiency		Economic efficiency	
	No. HH	**%**	**No. HH**	**%**	**No. HH**	**%**
0.6-0.7	0	0.00	0	0.00	17	8.5
0.7-0.8	0	0.00	27	13.5	73	36.5
0.8-0.9	67	33.5	95	47.5	85	42.5
0.9-1.0	133	66.5	78	39.0	25	12.5
Average	**0.917**		**0.875**		**0.805**	
Min	**0.801**		**0.729**		**0.63**	
Max	**1.000**		**0.95**		**0.95**	
Media	**0.92**		**0.878**		**0.805**	

Source: Survey 2010

The distribution of frequency of technical, allocative and economic efficiency in table 6 clearly show that the highest technical efficiency was 0.9 -1.0 in range, represented by 66.5% of the sample farmers in WS season. The narrow variation in TE estimates is an indication that most of the farmers are still using their resources efficiently in the production process. However, there still exists opportunities for improving on their current level of TE (nearly 9 %). In the case of AE, it ranged from 0.80-0.90 and represented by 47.50% of sample farmers. No farmer obtained TE level under 80% and AE level below 70%. The average TE level was 0.917 indicates that the farmers produced 91.7% of the potential output level. The mean allocative efficiency level was 0.875 indicates that these farmers could reduce costs by 12.5%, by taking notice of relative input prices when selecting input quantities. In general, with advantages of climate condition, natural resource (water, soil…), rice farmer can obtain high efficiency in WS. However, to get higher EE, farmers should pay more concentrate on AE than TE (0.917 and 0.875 respectively). There are some of farms need to be improved technology (using urea, labor and chemical plant protection) or checking relative input prices when selecting input quantities (price of potassium, phosphorus and labor) to obtain the best technical and allocative efficiency.

Table 7. Deciles range of frequency distribution of technical, allocative and economic efficiency in SA season

Levels	Technical efficiency		Allocative efficiency		Economic efficiency	
	No. HH	%	No. HH	%	No. HH	%
<0.5	0	0.00	0	0.00	2	1.00
0.5-0.6	2	1.00	0	0.00	9	4.50
0.6-0.7	13	6.50	0	0.00	50	25.00
0.7-0.8	43	21.50	33	16.50	83	41.50
0.8-0.9	80	40.00	85	42.50	50	25.00
0.9-1.0	62	31.00	82	41.00	6	3.00
Average	**0.848**		**0.922**		**0.739**	
Min	**0.581**		**0.709**		**0.444**	
Max	**1.000**		**0.95**		**0.95**	
Media	**0.848**		**0.872**		**0.732**	

Source: Survey 2010

In the SA season, the average of TE and EE level were lower than in WS season. However, the AE level was higher than in WS season. The distribution of frequency of deciles ranged in table 7 indicated that the highest number of farmers obtained TE between 0.80-0.90 (represented by 40%). The variation in TE estimated to be wide and it indicates that many farmers have been still using their resources inefficiently in the production process. In average, there was 15.2% gap in technical skills which could be improved by training to get highest the level of TE. In this season, farmers must face to the disadvantages of climate, low productivity, and high rate of diseases. Therefore the combined input of production based on the price was better than WS season. That explains why the AE in SA season is higher than one in WS season. No farms obtained AE level below 70 %. The average of TE level was 0.848 with 82 farms fully efficient. This TE level of this season suggests that farmers have been producing at 84.8% of the potential output level. The mean allocative efficiency level was 0.922 indicates that these farmers could reduce costs by nearly 8%. In this season, farmers need to change some inputs (using seed, labor and chemical plant protection) to get optimum TE. To obtain the best AE, famers need to examine the relative price of seed, pesticide, phosphorus and labor. The AE constitutes more important effect than TE in EE, 0.922 and 0.848 respectively.

CONCLUSION

This present study focuses on the economic efficiency in rice production in the Cuulong river delta. The analyzed data by using production and cost frontier functions show that the difference between frontier output and observed output is primarily due to factors which are under farm control i.e. technical inefficiency and the estimate of γ indicates that the difference between observed cost and frontier cost is due to allocative inefficiencies. Using labor, fertilizer and chemical plant protection are the important variables in rice production. The technical efficiency, allocative efficiency and economic efficiency of rice production in Mekong River Delta are consistent with the current production situation and are different between seasons. Another finding stems from the results is that overall economic efficiency of rice farms can be improved substantially and that technical efficiency constitutes a more serious problem than allocative efficiency in the Winter-spring season. Besides, the allocative efficiency constitutes has high rate than technical efficiency in the Summer- autumn season. Farmers cultivating rice in this region should pay attention in the technology in the Winter- spring season and the relative price of input in the Summer- autumn season to achieve the best in technical efficiency and allocative efficiency.

REFERENCES

Aigner, D.J., Lovell, C.A.K. and Schmidt, P. 1977. Formulation and Estimation of Stochastic Frontier Production Function Models. *Journal of Econometric.* **6** (1): 21-37

Battese, G.E. and Coelli, T.J. 1995. A Model of Technical Inefficiency Effects in a Stochastic Frontier Production for Panel Data. *Empirical Economics.* **20**: 325-345

Coelli, T., Rahman, S. and Thirtle C. 2002. Technical, Allocative, Cost and Sale Efficiencies in Banladesh Rice Cultivation: A Non-Parametric Approach. *Journal of Agricultural Economics.* **53** (3): 607-626

Farrell, M.J. 1957. The Measurement of Productive Efficiency. *Journal of the Royal statistical Society.* series A (120): 253-281.

Ling, V.H. 2008. Essays on the Economics of Food Production and Consumption in Vietnam, PhD thesis *Unpublished,* University of Minnesota, USA

Palanisami, K., Paramasivam, P. and Ranganathan, C.R. 2002. Agricultural Production Economics, Analytical Methods and Applications. *Associated Publishing Company,* New Delhi.

Thong, P.L., Xuan, H.T.D and Duyen, T.T.T. 2011. Economic Efficiency in Rice Production Cuulong Delta, Vietnam. *Cantho University Journal of Science.* **18** (a): 174-178.

NGHIÊN CỨU HIỆU QUẢ KINH TẾ TRONG SẢN XUẤT LÚA Ở ĐỒNG BẰNG SÔNG CỬU LONG

Nghiên cứu được thực hiện tại 5 tỉnh vùng Đồng bằng sông Cửu Long, tính toán hiệu quả kỹ thuật, hiệu quả phân phối cũng như hiệu quả kinh tế trong sản xuất lúa thời gian 2010-2011. Hai trăm hộ nông dân được phỏng vấn các chi phí trong sản xuất lúa bằng phương pháp lấy mẫu ngẫu nhiên. Hàm sản xuất, chi phí giới hạn biên Cobb-Douglas được sử dụng để phân tích. Chi phí trong sản xuất lúa và hệ số doanh thu, chi phí tại vùng khảo sát có sự khác nhau ở hai vụ sản xuất chính, doanh thu của vụ Hè Thu là 15.981.790 đồng/ha, hệ số doanh thu, chi phí là 1,06, trong khi đó doanh thu của vụ Đông Xuân cao hơn là 29.449.080 đồng/ha và hệ số doanh thu, chi phí là 1,87. Trong vùng nghiên cứu, có sự khác nhau giữa sản lượng tiềm năng và sản lượng thực tế bởi vì những yếu tố trong tầm kiểm soát của nông dân, vụ Đông Xuân là 59,83% và vụ Hè Thu là 62,84%. Hiệu quả kỹ thuật, phân phối và kinh tế là khác nhau ở hai vụ, vụ Đông Xuân là 91,7%, 87,5% và 80,5%, trong khi đó vụ Hè Thu là 84,8%, 92,2% và 73,9%. Nông dân trồng lúa ở Đồng bằng sông Cửu Long có trình độ kĩ thuật để đạt được sản lượng tiềm năng. Tuy nhiên có một số nông dân cần phải giảm chi phí sản xuất bằng việc lựa chọn đầu vào hợp lý hơn để đạt được hiệu quả phân phối tốt nhất.

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