Omonrice 17: 174-178 (2010)

ECONOMIC ANALYSIS ON PRODUCTION OF HIGH QUALITY RICE IN CUULONG DELTA, VIETNAM

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ABSTRACT

Rice is the principal food for about half of the world's population. Rice consumption increased with increase in the population. Demand for rice in the future was predicted that rice consumption worldwide would be 482 million tones in 2010. Rice is considered as the most important crop in Vietnam where about 70 per cent of workers and contributes 67 per cent of household income. In the recent past, Vietnam's rice quality has also considerably improved by investment to research. HQR was affected to changes area, yield, and production. The growth rate of area under HQR was 2.28 per cent, growth rate of yield was 1.72% and the growth rate in production was as high as 4.03 per cent annual for the study period 1995-2008. Yield and production are increasing in Cuulong Delta. The contribution of technology effect to total change in per hectare output was observed to be 14.12 per cent. The high yield of rice in Cuulong Delta which was creates by HQR varieties. This is a reasons necessitate to concentrate on research and create HQR varieties.

Key words: decomposition model, rice, technology efficiency.

INTRODUCTION

Rice is the principal food for about half of the world's population. Rice consumption increased with increase in the population. Demand for rice in the future was predicted that rice consumption worldwide would be 482 million tones in 2010. Rice is considered as the most important crop in Vietnam. Rice production also absorbs the greatest percentage of the labour force in rural areas, where about 70 per cent of workers in the Vietnamese economy live, and contributes 67 per cent of household income (World Bank 1996). Since 1989, Vietnam has become the world's second largest rice exporter. Rice production reached 32.9 millions tones a year for the period 2000–2002 with annual exports touching 3.5 million tones. Actually, rice production in Vietnam obtained 38.9 million ton in 2009. Vietnam supplied rice to more than 120 countries. Vietnam has got a lot of high quality rice (HQR) which could be called aromatic rice variety such as Tam Thom, Du Thom, Nang Huong, Nang thom Cho Dao. Area under HQR is increasing in Cuulong Delta. The HQR always command high price in the market and the domestic consumers prefer to use HQR. Thus, the farmers who cultivate HQR make huge profit compared with those cultivating normal rice.

RESEARCH DESIGN AND METHODOLOGY

1 Data

Area, yield and production of rice and high quality rice from 1995 to 2008 in Cuulong Delta, Vietnam were collected. From 13 provinces in the Cuulong Delta, four provinces (AnGiang, BenTre, CanTho, TienGiang) were selected, making the total sample of 200 farmers for the study. Further, while interviewing the rice growers information pertaining to the names and addresses of the agencies to which they sold, quantity sold, price received and other details, were collected.

2 Growth rates in Area, Yield and Production

The growth in production (area, yield and production) for Normal Rice and High Quality Rice of Vietnam was analyzed by employing an exponential model of the form $\mathbf{Y_t = ab^t}$. **Where**: Y_t = Dependent variable for which growth rate is to be estimated (area, yield, production), a = Intercept, b = Regression coefficient, t = Time variable. The linearly transformed estimating form of the above equation is:

$$\mathbf{Ln\ Y = ln\ a + t\ ln\ b}$$

Then, an estimate of the average annual percentage rate of growth of the production for the t- year's period is computed from the regression coefficient. The growth rate is given by the formula:

Growth rate (G) = [anti ln (ln b) – 1] x 100

3 Cobb-Douglas production function

Production function is obviously the convenient economic frame work for testing the equality of parameters governing the input–output relationships and for decomposing the total change in output. The important forms of production functions used in a study of this nature are Cobb-Douglass. Production function in Cobb- Douglass form is specified as: $\mathbf{Y = A\, S^a F^b P^c I^d L^e K^f e^u}$

Where

Y: Physical output of rice yield measured in ton per ha,
A: Constant term, a scale parameter,
S: Value of seedlings in 000'vnd per hectare,
F: Value of chemical fertilizers in 000'vnd per hectare,
P: Value of plant protection chemicals measured in 000'vnd per hectare,
I: Irrigation cost measured in 000' vnd per hectare,
L: Value of labour input (human labour) measured in 000'vnd per hectare,
K: Capital for others cost measured in 000' vnd per hectare,
e: Random disturbance term independently distributed with zero mean and finite variance.

Output decomposition model for HQR and NR: Taking the difference:

$\text{Log } [Y_1/Y_2] = \log [A_1/A_2] + [(a_1 - a_2) \log S_2 + (b_1 - b_2) \log F_2 + (c_1 - c_2) \log P_2 + (d_1 - d_2) \log I_2 + (e_1 - e_2) \log L_2 + (f_1 - f_2) \log K_2] + [a_1 \log (S_1/S_2) + b_1 \log (F_1/F_2) + c_1 \log (P_1/P_2) + d_1 \log (I_1/I_2) + e_1 \log (L_1/L_2) + f_1 \log (K_1/K_2)] + [U_1+U_2]$

Where:

Log $[Y_1/Y_2]$… is the percentage change in output due to new technology.

{log $[A_1/A_2]$)}…… is the measure of percentage change in output due to shift in scale parameter of the production function.

$[(a_1 - a_2) \log S_2 + (b_1 - b_2) \log F_2 + (c_1 - c_2) \log P_2 + (d_1 - d_2) \log I_2 + (e_1 - e_2) \log L_2 + (f_1 - f_2) \log K_2]$ …… is a measure of change in output due to shift in slope parameters, *i.e*; output elasticities of production function. $[a_1 \log (S_1/S_2) + b_1 \log (F_1/F_2) + c_1 \log (P_1/P_2) + d_1 \log (I_1/I_2) + e_1 \log (L_1/L_2) + f_1 \log (K_1/K_2)] + [U_1+U_2]$… is the measure of change in output due to changes in input use per hectare under new production technology.

RESULTS AND DISCUSSION

1 Growth rates in Area, Yield and Production

The compound growth rates of area, yield and production of normal rice and HQR in Cuulong Delta for the total period 1995 to 2008 was worked out based on exponential growth function and the results are presented in Table 1. The table reveals that in period area under rice cultivation and HQR were showing positive growth rates. All the growth rates of rice cultivation and HQR (area, yield and production) were found to be statistically significant. The growth rate of area under normal rice cultivation was 0.82 per cent lower than the growth rate of area under HQR (2.28 %). The yield of normal rice cultivation has shown an annual compound growth rate 2.40 per cent for the period 1995-2008. The growth rate in production was as high as 3.24 per cent for the study period. The estimates are statistically significantly at one per cent. Compound annual growth rates for area, yield, and production of HQR were also computed by estimating the exponential growth model. It could be noticed in Cuulong Delta that area under HQR were increasing over the years 2.28 per cent. The yield of HQR was increasing over the years as the growth rates 1.72 per cent. Normal Rice cultivation and HQR were registered positive production growth rates in period 1995 to 2008, HQR registered higher positive production growth.

2 Technical efficiency

The results of the production function analysis and decomposition analysis of output differentials across of rice in different seasons are presented. Before partitioning the output into different components, the structural break in the estimated production functions was tested using analysis of variance (Table 2). The analysis clearly indicated that the estimated production function parameters were significantly different from each other. This strongly supports the analysis of output differentials into different components across production rice. A log linear regression (Cobb–Douglas type) was estimated by the method of ordinary least square (OLS) method.

In the case of HQR, the calculated F value was 17.50 and R^2 at 0.53 for the WS season. The regression coefficients for seed, plant protection chemicals and labour were significant at one per cent level and the coefficient for irrigation was significant at the five per cent level. The case of HQR in the SS, the calculated F value was 21.24 and R^2 at 0.58. The regression coefficients for seed, fertilizers, plant protection chemicals, irrigation were significant at the one per cent level. The case of HQR in the SA, the calculated F value was 19.07 and R^2 at 0.55. The regressions coefficients for all of constraint variables were significant at the one per cent level.

Table 1: Growth rates of area, yield and production for Cuulong Delta of Vietnam (1995-2008)

(In Per cent)

SL.No.	Particulars	Area	Yield	Production
I.	**Normal Rice**			
a.	R square	0.53	0.92	0.91
b.	t - Stat	2.41	12.15	11.05
c.	Growth rate	0.82**	2.40*	3.24*
II.	**HQR**			
a.	R square	0.60	0.77	0.89
b.	t - Stat	4.24	6.36	10.11
c.	Growth rate	2.28*	1.72*	4.03*

Note: HQR: High Quality Rice, Significant at one per cent, ** Significant at five per cent, *** Significant at ten per cent.*

Table 2: Production function estimates (Per hectare)

Slope coefficients	Season crops					
	Winter-Spring		Spring-Summer		Summer-Autumn	
	HQR	NR	HQR	NR	HQR	NR
Intercepts	2997.30* (627.59)	4133.50* (631.01)	4807.51* (380.67)	3002.41* (379.38)	1336.58* (458.98)	2203.97* (249.89)
Seed	2.50* (0.87)	1.66*** (0.90)	-1.11* (0.30)	-2.18* (0.51)	2.08* (0.44)	0.79** (0.44)
Fertilizers	0.32 (0.20)	- 0.26** (0.13)	-0.13* (0.06)	0.59* (0.10)	0.33* (0.16)	0.44* (0.10)
Chemicals	0.39* (0.14)	0.47* (0.16)	0.86* (0.15)	-0.51* (0.11)	0.35* (0.11)	0.34* (0.07)
Irrigation	1.19** (0.46)	1.49** (0.70)	1.45* (0.39)	0.81** (0.41)	1.43* (0.39)	0.48*** (0.27)
Labour	0.16* (0.05)	0.42* (0.08)	-0.11 (0.08)	-0.21* (0.07)	0.10* (0.05)	0.18* (0.07)
Capital	0.88 (0.79	-0.76* (0.24)	0.11*** (0.06)	-0.13* (0.05)	-0.20* (0.08)	-0.30* (0.11)
No. of observation	100	100	100	100	100	100
R^2	0.53	0.55	0.58	0.64	0.55	0.55
Adjusted R Square	0.50	0.52	0.55	0.62	0.52	0.52
"F" test	17.50	18.95	21.24	27.40	19.07	18.70

*Note: HQR: High Quality Rice, NR: Normal Rice, * Significant at one per cent, ** Significant at five per cent, *** Significant at ten per cent, Figures in parentheses indicate standard error of the coefficients*

The regression for seed, fertilizers, plant protection chemicals, labour and capital were significant at one per cent level, coefficient for irrigation was significant at five per cent level. The case of NR in the SA season, the calculated F value was 18.70 and adjustment R^2 at 0.52. The regression coefficients for fertilizers, plant protection chemicals, labour and capital were significant at on per cent level, coefficient for seed was significant at five per cent level and ten per cent level for irrigation.

In the case of NR, the calculated F value was 18.95 and adjustment R^2 at 0.52 for the WS season. The regression coefficients for plant protection chemicals, labour and capital were significant at one per cent level, coefficient for irrigation was significant at five per cent level and coefficient for seed was significant at ten per cent level. In the SS, the calculated F value was 27.40 and adjustment R^2 was higher at 0.62.

The results (Table 3) showed that per hectare output of HQR was about 16.42 per cent higher than NR in the winter-spring. The first, the contribution of technology effect to total change in per hectare output was observed to be 13.85 per cent. The second, concerning input level effect, the positive contribution of seedling (0.52%), fertilizers (0.02%), plant protect chemicals (0.10%), irrigation (1.54%), labour (0.06%) and capital (0.26%), respectively. Thus, the total input level effect was about 2.50 per cent. The third, the estimated change in output (total due to all sources) 16.34 per cent was almost equal to the actual change 16.42 per cent between HQR and NR in the WS

Table 3: Decomposition analysis of total change in rice input (Per ha)

SL.No	Items	Winter-Spring HQR over NR	Spring-Summer HQR over NR	Summer-Autumn HQR over NR
I	Total change in measured output	16.418	17.603	13.500
II	Sources of change			
1	Technological effect	13.848	16.319	12.198
2	Input level effect			
a	Seed (vnd)	0.519	-0.349	0.807
b	Fertilizers (vnd)	0.019	-0.003	0.064
c	Chemicals (vnd)	0.104	0.027	0.073
d	Irrigation (vnd)	1.539	1.571	0.226
e	Labour (vnd)	0.060	-0.008	0.017
f	Capital (vnd)	0.256	0.005	-0.085
III	Total due to input change	2.496	1.243	1.101
IV	Total due to all sources	16.344	17.562	13.298

Note: HQR – High Quality Rice, NR – Normal Rice

Table 3 also showed that per hectare output HQR, farmers was achieved about 17.60 per cent higher than NR in the spring-summer. The contributed of the technology effect to total change in per hectare output was essential 16.32 per cent. With regard to the input level effect, the positive contributions of plant protect chemicals (0.03%), irrigation (1.57%), labour (0.01%) and capital (1.24%) in the SS season. Negative contributions were found in case of seedling (- 0.35%), fertilizers (- 0.003%) and labour (- 0.01%). Thus, the total input level effect was about 1.24 per cent. The estimated change in output about 17.56 per cent was almost equal the actual change in output 17.60 per cent between HQR and NR in the spring-summer.

High quality rice in summer-autumn, farmers was about 13.50 per cent than that NR farmer. Primarily, the contribution of varietal effect to total change in per hectare output was estimated to be 12.20 per cent. The technologies effect operates through shift in coefficient governing the input-output relationship of production function, with the same level of per hectare inputs, the positive contribution of seedling (0.81%), fertilizers (0.06 %), plant protect chemicals (0.07%), irrigation (0.23%) and labour (0.02%). The negative contribution of capital is (-0.09%). Thus, the total input level effect was about 1.10 per cent in the SA. The estimated change in output 13.30 per cent was almost equal the actual change in output 13.50 per cent between HQR and NR in the summer-autumn.

CONCLUSIONS

There is a need to revitalize the activities of extension organization and intensifying activities propaganda and open training class about HQR cultivate to farmer in the Cuulong Delta.

New HQR varieties have important contribution to technological efficiency, which was demonstrated in production function. The high yield of rice in Cuulong Delta, which was, creates by new HQR varieties. This is a reason necessitate to concentrate on research and create new HQR varieties.

Farmers should be advised to go for proper area planning i.e. there is needs to encourage large farmers extend HQR area.

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Phân tích kinh tế tình hình sản xuất lúa phẩm chất cao ở ĐBSCL, Việt Mam

Lúa gạo cung cấp lương thực cho một nửa dân số thế giới. Tiêu dùng lúa gạo trên thế giới ngày một tăng lên theo tốc độ tăng của dân số thế giới. Nhu cầu lúa gạo của thế giới năm 2010 ước lượng 482 triệu tấn. Ngành sản xuất lúa gạo đóng vai trò quan trọng trong kinh tế của Việt Nam, giải quyết gần 70% lực lượng lao động ở nông thôn, đóng góp 67% thu nhập của nông hộ. Với chính sách ưu tiên đầu tư nghiên cứu, đến nay có rất nhiều giống lúa mới được tạo ra cho năng suất, chất lượng cao. Giống lúa chất lượng cao đã ảnh hưởng rất lớn đến việc mở rộng diện tích sản xuất, sản lượng lúa ở ĐBSCL. Từ năm 1995-2008, diện tích lúa chất lượng cao ước lượng tăng bình quân 2.28%, năng suất tăng bình quân 1.72%, sản lượng tăng bình quân 4.03% mỗi năm. Năng suất và sản lượng tăng lên nhờ đóng góp của các tiến bộ kĩ thuật, đặc biệt là đóng góp của các giống lúa chất lượng cao. Những đóng góp đó thể hiện ở năng suất của giống lúa chất lượng cao, cao hơn lúa thường trung bình 14.12% cho mỗi hectare. Điều này nói lên tầm quan trọng trong đầu tư nghiên cứu và áp dụng tiến bộ kỹ thuật trong sản xuất lúa. Chính vì thế cần thiết quan tâm và đầu tư hơn nữa vào công tác nghiên cứu lai tạo, tạo ra các giống lúa mới cho năng xuất, chất lượng cao phục vụ sản xuất.