Determinants of Profitability of Rice Farming in Peri-Urban Area, Bangkok, Thailand

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Abstract

Rice farming is not only beneficial for farmers, but also have a significant contribution to the share of agriculture in peri urban area of Bangkok. This study examined the profitability of rice farming and investigated some socio-economic factors affecting the profitability of rice farming in peri-urban area of Bangkok, Thailand. Questionnaires were administered to 60 rice farmers in Ladkrabang district, Bangkok, Thailand in October, 2015. To examine the profitability of rice production, the gross margin and cost benefit analysis were carried out. Data were analyzed using multiple regression analysis and descriptive statistics. The results showed that total cost for rice production was estimated at 6,083.39 Thai baht (THB) per rai, total income for rice production was estimated at 11,423.51 THB per rai, and gross margin for rice production was estimated at 5,340.12 THB per rai. The results revealed that the factors that significantly affected profitability of rice farming were gender, social status, number of family labor, land size and rice variety. It was recommended that farmers in the study area should be informed through extension services of the socio-economic factors influencing profitability of rice production so that the farmers can consider these factors in their production decision making process.

Keywords: profitability, rice profitability, rice farming, peri-urban farming, rice production

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Introduction

Rice is the major stable food for half of the human race (Imolehin and Wada, 2000). In the same way, rice is central to Thai society (Evenson *et al.*, 1996). Rice uses over half of the arable land labor force in Thailand. It is one of the main foods and sources of nutrition for most Thai citizens. In 2014, Thailand has population of 64.5 million people. Farmers accounted for 43% of the workers or 22% of the total population. The farmers' rice accounted for 3.7 million households (OAE, 2013).

Ladkrabang is the eastern suburbs of Bangkok, Thailand, presently featuring a mixture of agricultural, residential, commercial, and industrial land, as well as other lands used for transportation, warehousing, and water conservation. (Meesiri and Perera, 2011)

Although, land use in Ladkrabang are continuously changing, as a result of a rapid urbanization with the expansion of crowded areas; residential and commercial, agricultural land uses are still significant for the people's lives in this district. The total area of Ladkrabang district is 77,406.1 rai, whilst agricultural area is 24,876 rai (DCP, 2012), accounting for 32 % of total area. Presently, Ladkrabang has been announced as one of the five strategic areas for the rice production of Bangkok, Thailand. In addition, Ladkrabang district is the third largest rice production in Bangkok, with approximately 16,619 rai of rice farming. (Bangkok Agricultural Extension Office, 2014).

Rice farming in peri-urban area is not only beneficial for farmer, but also have a significant contribution to share of agriculture in peri-urban area of Bangkok. In addition, land owner has to consider the value of the land, it must take into consider the return under limited resources. This study is interested in the determinants of profitability of rice farming in peri-urban area

The broad objectives of this study are to examined the profitability of rice farming and investigate the socio-economic factors influencing the profitability of rice farming in peri-urban area of Bangkok, Thailand. Specifically, the specific objectives are as follows:
    I. Describe the socio-economic characteristics of rice farmer in peri-urban area
    II. Analyze cost and income in rice production in the study area
    III. Determine the influencing of profitability of rice farming in the study area

Methodology

Area of study

The study was conducted in Ladkrabang, Bangkok, Thailand. Ladkrabang is in the east of Bangkok. It is located between latitudes 13° 43′24″ N and longitudes 100° 47′ 3″ E (Figure 1). The territory covers an area of 123,859 square kilometers with a population of 170,070 people and a population density of 1,373.09 people per square kilometers. It is -divided into six sub-districts (Kwaeng) namely: Ladkrabang, Klongsongtonnon, Klongsamprawet, Lumplathio, Thapyao and Khumthong. (Bangkok Agricultural Extension Office, 2014).
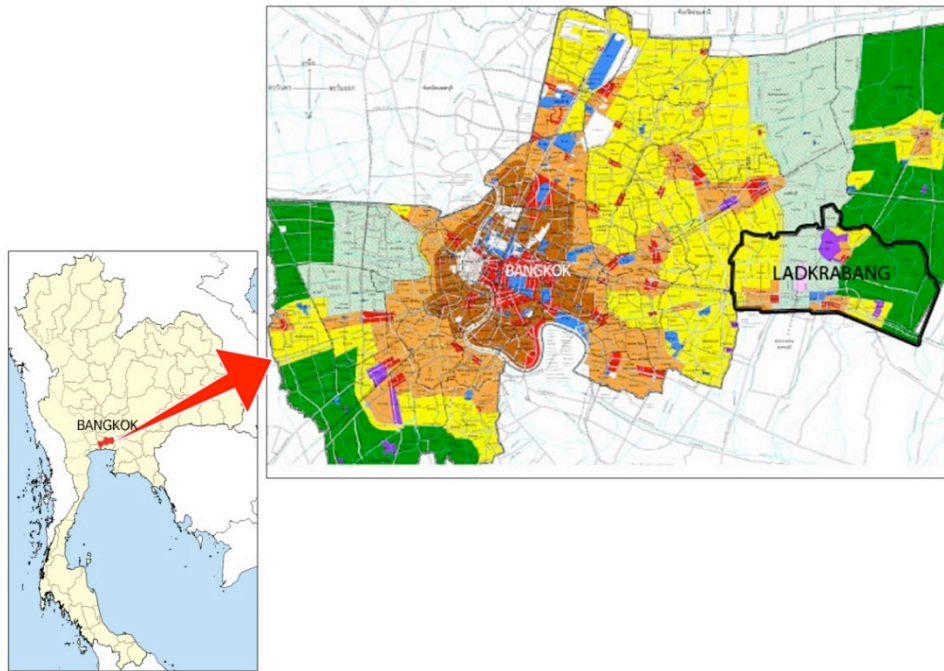
Figure 1: Location of Ladkrabang District in the Bangkok Metropolitan
(Source: Department of City Planning, 2013)

Population and sample of the study

The population for the study is comprised of all the rice farmers in Ladkrabang district, Bangkok. The sample was selected by random sampling techniques from 301 farmers who registered with the Department of Agricultural Extension in 2015. The 60 sample size was obtained from 20 % of the total registered farmers.

Data collection and analysis

The primary data were collected in a field survey through direct interview with rice farmers in Ladkrabang district in October, 2015 using questionnaires. Data was analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics (frequency, percentages, SD and means) were used to describe the socio-economic characteristic of respondents. Gross margin analysis were used to analyze cost and income in rice production, and multiple regression analysis were used to analyze a factor influencing rice profitability in the study area.

Measurement of variable

The independent variables of the study were the selected socio-economic characteristics (gender, age of rice farmers, the education level, marital status, social status, household size, number of family labor, years of farming experience, land size, land ownership, and rice variety). Whereas, profitability of rice production was considered as dependent variable was measured following standard procedure. Profitability of rice production was measured by computing Gross margin technique following Chidi *et al.* (2015) as:

Gross margin technique was employed to access the profitability of rice farmers in the study area by using Gross margin as a proxy. The profit of an enterprise is estimated as the difference between the total revenue (TR) and the total cost (TC)

Gross margin is stated as:

$$GM = TR - TVC$$

Where,
GM   = Gross margin (THB)
TR   = Total Revenue (THB)
TVC = Total Variable Cost (THB)

Profit given by

$$\pi = GM - TFC$$

Where,
π = Profit
GM   = Gross margin
TFC = Total Fixed Cost

Gross margin of a rice farmer is generally determined by comparing the variable costs of products.

Analytical Model

The multiple regression model is expressed implicitly as:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 +$$

$$\beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + E$$

Where,
Z_i = Profitability of rice farming (THB)
β_0 = Constant term
β_k = Coefficient to be estimated
X_1 = Gender
X_2 = Age of rice farmers in years
X_3 = The education level in years
X_4 = Marital status
X_5 = Social status
X_6 = Household size measured by the number of persons per household
X_7 = Number of family labor measured by the number of member involved in rice production
X_8 = Years of farming experience in years
X_9 = Land size in rai
X_{10} = Land ownership
X_{11} = Rice variety
E = Independent error term

Results and Discussion

Result of the socio-economic characteristics of the respondents:

The descriptive analysis on gender showed that there were more males (81.7%) than female (18.3%) who engaged in rice production in the study area. The implication is that most of male are the head of household. Result of the analysis indicated that age of the respondents between 51-65 years (53.3%) was in the highest rank, while respondents between 21-35 years (3.3%) was the least. On average, farmers' age was 54.4 years. This finding was consistency with the average age of Thai rice farmers. By implication, therefore, one could infer from this result that rice farmer in the study area are aging. Greater percentage (88.3%) of the rice farmer had highest education in a primary school level, while the least (1.7%) obtained senior high school level. This implies that most of the respondents had low level of education. Result on the marital status revealed that greater proportion 88.3% of the respondents were married, while (3.3%) were separated/divorced. This implies that married people were more involved in rice production than other categories of different marital status. Majority (80.0%) of the rice farmers were not member of organization. Result on family number demonstrated that greater proportion (63.3%) of the total respondents had the highest family number between 3-5 person and average four family members. Family labor number was one person. The result also indicated that most farmers in the study area had farming experience more than 20 years (63.3%), they had 30 years of farming experience. This is a clear indication that they were middle-aged farmers that can handle any of the cultural operations in rice production in Ladkrabang area. The result of the socio-economic characteristics of the respondents presented in table 1 indicated that majority of farmers (78.3%) had large land size greater than 19 rai while only 1.7% had small land size that ranged between 2.5-6.5 rai. Additionally, a high proportion of farmers (83.3%) rented land for rice production the main variety of rice was Pathum Thani1 (38.3%); this variety gave the highest yield in the study area comparing to other rice varieties, while RD47 (5.0%) gave was the lowest rate yield.

Table 1: Socio-economic characteristics of the respondents

Characteristics	Categories	N	Percentage	SD
Gender	Male	43	71.7	
	Female	17	28.3	
Total		60	100	.454
Age of rice farmers	21-35	2	3.3	
(Mean = 54.4 years)	36-50	18	30.0	
	51-65	32	53.3	
	>65	8	13.3	
Total		60	100	.722
Level of education	Primary school	53	88.3	
	Junior High school	6	10.0	
	Senior High school	1	1.7	
Total		60	100	.389

Characteristics	Categories	N	Percentage	SD
Marital status	Single	5	8.3	
	Married	53	88.3	
	Separated/divorced	2	3.3	
Total		60	100	.341
Social status	Group leader of farmer organization	3	5.0	
	Member of farmer organization	9	15.0	
	None	48	80.0	
Total		60	100	.541
Household size	<3	7	11.7	
(Mean = 4 persons)	3-5	38	63.3	
	>5	15	25.0	
Total		60	100	.596
Number of family	1-3	57	95.0	
labor	4-6	1	1.7	
Mean = 1 person)	>6	2	3.3	
Total		60	100	.381
Years of farming	<10	8	13.3	
experience	10-20	14	23.3	
(Mean = 30 years)	>20	38	63.3	
Total		60	100	.725
Land size	Small (2.5-6.5)	1	1.7	
(Mean = 33.58 rai)	Medium (6.6-19)	12	20.0	
	Large (>19)	47	78.3	
Total		60	100	.465
Land ownership	Land owner	10	16.7	
	Land rent	50	83.3	
Total		60	100	.376

Characteristics	Categories	N	Percentage	SD
Rice variety	RD41	17	28.3	
	RD47	3	5.0	
	RD51	11	18.3	
	Pathum Thani1	23	38.3	
	PL002	6	10.0	
Total		60	100	1.414

Source: Survey data analysis, 2015
Note:
6.25 rai= 1 hectare

Gross margin analysis of rice production:

Table 2 contains the gross margin analysis of rice production in the study area. The result revealed that rice production is quite profitable, and total variable cost accounted for 80% of the total cost. The gross margin per rai was estimated as 5,340.12 THB, while the total income was estimated as 11,423.51 THB.

Table 2: Gross margin analysis

Variables	Mean	Min	Max	SD
Total income	11,423.51	5,600.00	24,000.00	3227.79
Total cost	6,083.39	3,961.14	8,846.50	956.65
Total variable cost	4,975.75	2,690.99	6,950.00	864.32
Total fixed cost	1,107.64	60.00	2,000.00	364.94
Gross margin/rai	5,340.12	47.89	17,453.07	3154.69

Source: Survey data analysis, 2015

Socio-economic factors influencing rice profitability:

A multiple regression model was adopted for the analysis (Table 3) Based on the analysis the coefficients of determination (R^2) was 50.3%. this shows that about 50.3% of the variation in the dependent variable (profitability of rice farming) was due to the independent variable: Gender (X_1), Age of rice farmers (X_2), The education level (X_3), Marital status (X_4), Social status (X_5), Household size (X_6), Family labor (X_7), Years of farming experience (X_8), Land size (X_9), Land ownership (X_{10}) and Rice variety (X_{11}). The F-ratio (3.247) was significant at 1%; it can imply goodness of fit the model. The magnitude of R^2 (0.503) is in line with the a priori expectation because there are so many factors that influence profitability of rice farming.

Among all the explanatory variables Gender (X_1), Social status (X_5), Family labor (X_7), Land size (X_9), and Rice variety (X_{11}) significantly implied that the variables would greatly influence profitability of rice farming in the area. The coefficient of gender was negatively signed and statistically beyond 5% level of significance, implied that the female farmers were less profitability of rice farming than the male which was similar to a finding reported by Nwike and Ugwumba (2015) and Alene *et*

al. (2008). Many of the other difference between male and female farmers are not very significant, and there are more similarities than differences between the two groups. The regression coefficient of the social status was negatively signed and statistically at 5% level of significant related to profitability of rice farming. This finding was contrary to the result obtained by Galawat and Yabe (2012) showed that farmers who are member of an associations are more efficient and incur less profit-loss because these farmer participated in the "Farmer's School Course" and learned basic training on rice production. This result is in line with the finding of Idiong *et al.* (2007) that membership of cooperative provided the farmers the opportunity of sharing information on modern rice practices. They noted that membership of cooperatives was negative and implies improvement in technical efficiency of the farmers. Number of family labor had a positive influence on rice profitability and significant at 10%, this implied that family labor supports farmers during rice cultivation, increase labor trend to increase rice production (Roy and Hamid, 2014). However, Hoang and Yabe (2012) reported that the household with more members, which are in the range of working age, will decrease the profit efficiency because they can use more their home labor in rice production rather than using their rental labor force. The coefficient of the land size was positive and significant at 5%. This showed that (all thing being equal) cultivation of additional farmland or an increase in the farm size will increase profitability. This agreed with the findings of Julius and Chukwumah (2014), Basoru and Fasakin (2012) and Olubanjo and Oyebanio (2005). In addition, rice variety had a positive influence on rice profitability and significant at 10%. This implied that the profitability of fine rice varieties is more than coarse varieties due to the higher price besides less yield level (Latif *et al.*, 2015)

However, the explanatory variables; age of rice farmers, the education level, marital status, household size, years of farming experience, and land ownership rendered no significant influences on rice production in this area. This does not mean that the above variables did not have any effect on rice production, but the level of their significance fell below the level of confidence limits tested.

Table 3: Regression results of the socio-economic characteristics of the respondents on their profitability of rice farming

Variables	Coefficient	SE	t-stat	p-value
Constant	12694.153	20841.296	.609	.546
Gender (X_1)	-5007.510	2406.162	-2.081	.043 **
Age of rice farmers (X_2)	-470.839	1515.678	-.311	.758
The education level (X_3)	-3532.200	2922.920	-1.208	.233
Marital status (X_4)	123.407	3351.632	.037	.971
Social status (X_5)	-6491.487	1914.968	-3.390	.001 **
Household size (X_6)	-106.769	2068.105	-.052	.959
Family labor (X_7)	4834.048	2649.081	1.825	.075 *
Years of farming experience (X_8)	-1753.366	1779.857	-.985	.330
Land size (X_9)	7354.972	2350.760	3.129	.003 **

Variables	Coefficient	SE	t-stat	p-value
Land ownership (X_{10})	-7658.350	6506.374	-1.177	.245
Rice variety (X_{11})	1321.364	742.866	1.779	.082 *
R^2	.503			
Adjusted R^2	.348			
F-ratio	3.247***			

Note; ***, **, * are statistically significant atv1%, 5% and 10% respectively

Conclusion

Rice farming in peri-urban area, is especially important. In view of the findings, rice production was generally profitable in the study area as reflected in the gross margin estimated as 5,430.12 THB per rai respectively, if the rice farmers can control the production constraints. The result of the multiple regression analysis for profitability of rice farming revealed that gender, social status, number of family labor, land size, and rice variety were significant implied that these variable would likely influence profitability of rice farming in the area. Government should promote welfare gains from increasing women farmers' access to production input and support service to the levels available. This study also showed that farmers who do not join associations or cooperatives are more profitable than those who join because most farmers use experience to do than to participate in the group or member. The farmer group should be created by the group of farmers in order to exchange knowledge in the filed with each other. The government should encourage family labor to participate rice farming. However, there are some issues that related to policy in which the government should involve to support the farmers in order to maximize their profit for instance land consolidation to minimize the number of farm plots and the land size increasing. Rice variety is the key because most farmers in the area grew Pathum Thani1 rice which can be sold with the best price compared to other rice varieties. Furthermore, the government should provide knowledge regarding rice varieties that affect the profitability of farmers. These are the policy implications that the government should consider to sustain rice production in Ladkrabang and the country as well.

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