Socio-Economic Factors Influencing Rice Production in Peri-Urban Area, Bangkok, Thailand

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The economic growth and rapidly increasing population in Bangkok metropolitan region contribute to expansion of urbanization to peri-urban area. This expansion has an effect to the alteration of agriculture land use to industrial utilization. However, the City Planning Regulation imposed on rural conservation and agricultural land, which are green areas, in order to prevent the over expansion of a city area. Ladkrabang District is a peri-urban area which was designated to be an agricultural land. This area is suitable for rice production of Bangkok consisting of 16,619 Rai of rice production area, which is the third largest rice production in Bangkok. Therefore, the objectives of this study are 1) to investigate the socio-economic factors of rice farmer in peri-urban area, Bangkok, Thailand, 2) to examine the effects of some socio-economic factors of rice production in peri-urban area, Bangkok, Thailand. The study was carried out in Ladkrabang districts, a peri-urban area of Bangkok. A simple random technique was adopted for sample selection, while semi-structured questionnaires were employed for data collection. A total of 60 rice farmers were used for the study. Descriptive and multiple regression statistics were used to analyze the data. The results from this study reveal socio-economic factors of rice production farmers, and socio-economic factors of rice production in peri-urban area. These findings are greatly beneficial for relevant agencies in order to apply to rice farmer extension in peri-urban area.

Keywords: rice production in peri urban, peri-urban rice farming, farm size, peri-urban farmer, Ladkrabang

Introduction

Urbanization is growing in both developed and developing countries. The transition to urbanization has been marked by conversion of agricultural land into land allocated for industrial projects and urban real estate development. The urban land expansion is associated with a decline in agricultural land use intensity (Jiang *et al.,* 2013). Nabb *et al.* (2013) indicated that agricultural lands are most affected by rapid urbanization. Both the urban expansion on

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agricultural land and agriculturalland use intensity affect agricultural production (Jiang *et al.,* 2013).

In Thailand, agricultural areas are undergoing changes, as a result of a rapid urbanization. A rapid urbanization is a significant driving force for land use conversion that leads to unsustainable agricultural land use (Sangawonge *et al.,* 2001). Urban area in the country grew at average annual growth rate of 1.4%, urbanlization is dominated by the Bangkok urban area, accounted for nearly 80% of the total urban area in the country (United Nation, 2015). The areas for agriculture in Bangkok and suburbs have been occupied.

However, the Bangkok Comprehensive Plan 2013 was designed green belts to protect agricultural land for the city. The Ladkrabang district, peri-urban area is located in the outer part of Bangkok Metropolitan Area; a part of the district is located in the green belt. The main purpose of green belt zone is to conserve an agricultural zone in the periphery of the city and to protect inner-city areas from floods by acting like a sponge to retain excess storm water (DCP, 2000). Meesiri (2011) reported that Ladkrabang district has experienced different kinds of development that have physically transformed it from a pristine agricultural area to a partly built-up area. As a result of the changed focuses of successive plans, the Ladkrabang district presently features a mixture of agricultural, residential, commercial, and industrial land, as well as other lands used for transportation, warehousing, and water conservation.

Although, land use in Ladkrabang has been changed, agricultural land uses still significant for the lives of people in this district. The total area of Ladkrabang district is 77,406.1 rai, agricultural area is 24,876 rai (DCP, 2005), accounted for 32 % of total area. Presently, Ladkrabang has been announced as one of the five strategic areas for the rice production of Bangkok, Thailand (Bangkok Agricultural Extension Office, 2014). Ladkrabang district is the third largest rice production in Bangkok, with approximately 16,619 rai of rice farming. With growing urbanization, interestingly, who are rice producer in peri-urban area, what are the socio-economics characteristics of farmer in peri-urban area and rice production.

Socio-economic factors play a key role in rice cultivation. Effective rice production nowadays does not depend entirely upon environmental factors, but also the farmer's socioeconomic status, which influences their cropping operation capacity (Wijnhoud *et al.,* 2003; Saisema and Pagdee, 2015). For these reasons, this study mainly deals with the economic and social characteristics of the rice farmers. This study was designed to examine the socio-economic dimensions of rice production in peri-urban area of Bangkok, Ladkrabang district. Therefore, the objectives of this study are: 1) to investigate the socio-economic factors of rice farmer in peri-urban area 2) to determine the

socio-economic factors influencing rice production in peri-urban area using multiple regression analysis.

Materials and methods

The study area

The study was conducted in Ladkrabang, Bangkok, Thailand. Ladkrabang is one of the 50 districts of Bangkok, located in the east of the town. Ladkrabang is a district in the eastern of Bangkok covering approximatelly 123,459 km^2. (Fig 1) Ladkrabang is at a moderate sea level height is 1.5-2 meters. As a result, in the past, Ladkrabang became agricultural area due to ample lands. There is a network of numerous cannals such as Saensab, Prawetburirom, etc. running through this area. Most population settle along both sides of canals which were used as primary transportation. Currently, land use is changed from agriculture to be accommodations in order to support the expansion of Bangkok population to the eastern suburbs side areas.
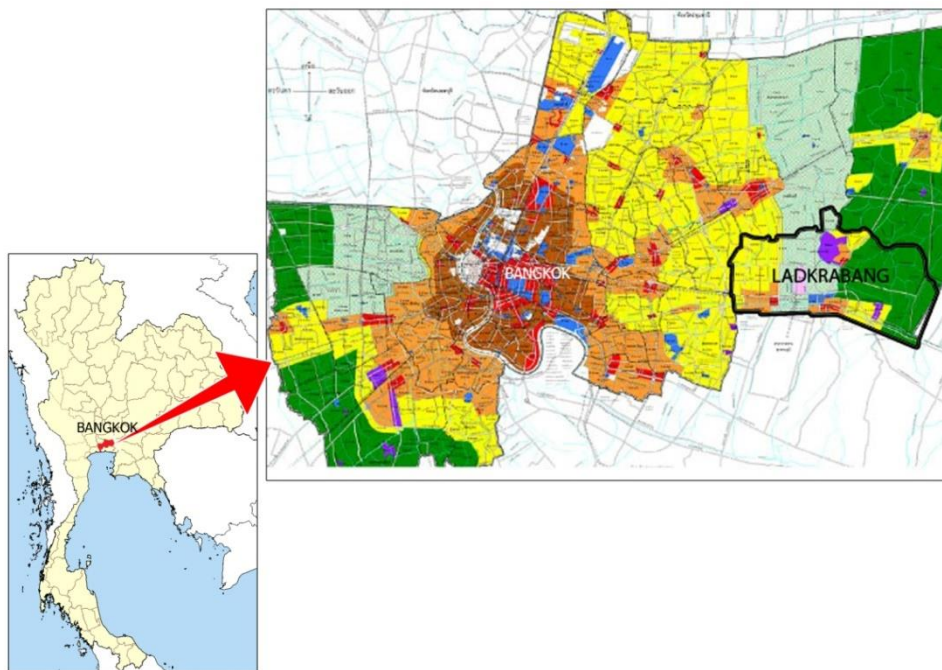

Fig. 1 Map of Ladkrabang, representative of Bangkok Comprehensive Plan 2013

Ladkrabang connects to the various territories in Bangkok. The northern part connects to Minburi and Nongchok districts, Bangkok. The west area is adjacent to Prawet and Saphansung districts, Bangkok. The east side connects to Mueang distruict, Chachoengsao Province, and the southern side is next to Bangphli and Bangsaothong districts, Samutprakan Province. Ladkrabang is divided into 6 sub-districts (Kwaeng) namely: Ladkrabang, Klongsongtonnon, Klongsamprawet, Lumplathio, Thapyao and Khumthong.

The total area of Ladkrabang district is 77,406.1 rai, agricultural area is 24,876 rai. Rice farming is 16,619 rai of total agricultural land, accounted accounted for more than 66% of the agricultural land. Most of the farmers produced off-season rice, with two harvests per year.

Sampling and Sample Size

The target population was rice farmers in Ladkrabang district, Bangkok. There are 301 farmers who registered with the Department of Agricultural Extensionin in 2015. A random sampling technique was applied. The 60 sample size was obtained from 20 % of the total registered farmers.

Data Analysis

Questionnaires were administered to rice farmers in October, 2015 to measure rice production. The questionnaires were a main tool of data collection. Descriptive statistics and multiple regression analysis were the main analytical techniques. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Frequency, percentages, and means were used to describe the socio-economic characteristic of respondents. Multiple linear regression models were employed to analyze a factor influencing rice production in the study area.

Analytical Model

The regression model is expressed implicitly as:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + E$$

Where,
Z_i = Quantity of rice produced (tons)
β_0 = Constant term
β_k = Coefficient to be estimated
X_1 = Gender

X_2 = Age of rice farmers (years)
X_3 = The education level (years)
X_4 = Marital status
X_5 = Social status
X_6 = Household size measured by the number of persons per household
X_7 = Family labor measured by the number of member involved in rice production
X_8 = Years of farming experience (years)
X_9 = Farm size (rai)
X_{10} = Land ownership
X_{11} = Rice variety
U   =independent error term.

Results

Socio-economic characteristics of respondents:

The results on Table1 revealed that majority (81.7%) of the rice farmers was male with an average four family members, and family labor number was one person. On average, the farmers' age was 54 years, this consistency with the average age of Thai rice farmers. 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.

Age is very important in the study because it is one of the characteristics that can be used to classify rural population into targetable groups for development interventions. Gul (2008) pointed out that old age might pose problem in agriculture because most of the work is physically demanding. Greater percentage (88.3%) of the rice farmers had maximum eduation in a primary school level.

The most of rice farmers were married. Majority (80.0%) of the rice farmers were not members of organization. With regard to farm size, based on the category of farm size from Rahman et al. (2013) which devided into five categories of farmers identified; landless (<0.20 ha), marginal (0.20-0.40 ha), small (0.40-1.01 ha), medium (1.01-3.03 ha) and large (>3.04), it is found that 78.3% of respondents of the study area occupied large land and a high proportion of farmers (83.3%) rent land for rice production. The main variety of rice was Pathum Thani1 (38.3%); this variety is highest yielding in the study area when compared to other rice varieties. And average, quantity of rice produced was 28.42 tons.

Table 1. Socio-economic characteristics of the rice farmers

Characteristics	Frequency	Percentage
Gender		
Male	49	81.7
Female	11	18.3
Total	60	100
Age of rice farmers (Mean = 54 years)		
21-35	2	3.3
36-50	18	30.0
51-65	32	53.3
>65	8	13.3
Total	60	100
Level of education		
Primary school	53	88.3
Junior High school	6	10.0
Senior High school	1	1.7
Total	60	100
Marital status		
Single	5	8.3
Married	53	88.3
Separated/divorced	2	3.3
Total	60	100
Social status		
Group leader of farmer organization	3	5.0
Member of farmer organization	9	15.0
None	48	80.0
Total	60	100
Household size (Mean = 4 persons)		
<3	7	11.7
3-5	38	63.3
>5	15	25.0
Total	60	100
Family labor (Mean = 1 person)		
1-3	57	95.0
4-6	1	1.7
>6	2	3.3
Total	60	100
Years of farming experience (Mean = 30 years)		
<10	8	13.3
10-20	14	23.3
>20	38	63.3
Total	60	100
Farm size (Mean = 33.58 rai)		
Small (2.5-6.5)	1	1.7
Medium (6.6-19)	12	20.0
Large (>19)	47	78.3
Total	60	100

		Table 1 continued
Characteristics	**Frequency**	**Percentage**
Land ownership		
Land owner	10	16.7
Land rent	50	83.3
Total	60	100
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
Quantity of rice produced (Mean = 28.42 tons)		
<20	22	36.7
20-40	29	48.3
41-60	6	10.0
>61	3	5.0
Total	60	100

Source: Survey data analysis, 2015

Note:

6.25 rai= 1 hectare

RD41 means mixed rice varieties of CNT85059-27-1-3-2 / Suphan Buri 60 // RP217-635-8

RD47 means mixed rice varieties of Suphan Buri 1 / IR64 // CNT86074-25-9-1

RD51 means mixed rice varieties of Khao Dawk Mali 105 / IR49830-7-1-2-2

Pathum Thani1 means mixed rice varieties of BKNA6-183-2 // PTT8506-3-21

PL002 means mixed rice varieties of CNTLR81122-PLS-37-2-1 / SPRLR81041-195-2-1 // IR56

Socio-economic factors influencing rice production:

Table 2 shows the result of the socio-economic factors influencing rice production and present the results of multiple regression of the double log form testing the effects of socio-economic variables: gender (X_1), age of the 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), farm size (X_9), land ownership (X_{10}), and rice variety (X_{11})

The F-ratio (70.358) was significant at 1% implying goodness of fit of the model. The R^2 (0.942) indicated that 94.20% of the variation in the dependent variable (rice production) was due to the independent variable studied. The magnitude of R^2 (0.942) is in line with the apriori expectation because there are so many factors that influence rice production.

Among all the explanatory variables age of the farmers, household size, family labor and farm size were significant implying that these variables would greatly influence productivity of rice farmers in the area. Age of rice farmer

would influence rice production negatively, implying that the older the rice farmers the less the vigour for farming, implying that the older mangrove rice farmers were more productive than the younger ones, similar finding was reported by Ayoola *et al.* (2011) and Balde *et al.* (2014). Household size has has a negative influence on rice production, this may implied that the large family may not permit rice farmer to invet in new technology for rice farming, then their output decrease, This seems to be consistent with the results of previous studies by Bruce *et al.* (2014). While family labor has a positive influence on rice production, this implying that family labor supports farmers during rice cultivation, increase labor trend to increase rice production (Roy and Hamid, 2014). Farm size has a positive influence on rice production; the output of rice will increase if the rice farmer's increases farm size this agrees with the finidng of Ajah and Chukwumah (2014).

However, the explanary variebles; gender, the education level, marital status, social status, years of farming experience, land ownership and rice variety were 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 2. Regression results of the socio-economic factors influencing rice production

Variables	Coefficient	SE	t-stat	p-value
Constant	1.654	9.957	.166	.869
Gender (X_1)	-0.000005	1.972	.000	0.999
Age of rice farmers (X_2)	-.180	.091	-1.978	.054*
The education level (X_3)	.226	2.091	.108	.914
Marital status (X_4)	.808	2.333	.346	.731
Social status (X_5)	1.583	1.399	1.132	.263
Household size (X_6)	-2.640	1.458	-1.810	.076*
Family labor (X_7)	1.257	.652	1.927	.060*
Years of farming experience (X_8)	.086	.058	1.490	.143
Farm size (X_9)	.843	.038	22.399	.000***
Land ownership (X_{10})	.811	.998	.812	.421
Rice variety (X_{11})	.522	.527	.990	.327
R^2	.942			
Adjusted R^2	.928			
F-ratio	70.358***			

***Significant at 1%, **Significant at 5%,*Significant at 10%,
Source: Survey data analysis, 2015

Conclusion

The aim of the study is to investigate the socio-economic factors of rice farmer in peri-urban area, Bangkok, Thailand and examine the effects of some

socio-economic factors of rice production in peri-urban area, Bangkok, Thailand. Data of some socio-economic characteristics were collected from the rice farmers and analyzed using multiple regression analysis and descriptive statistics. The study showed that rice farmers in this area is large farmer with holder by male, the average age of a farmer is 54. The farmer's posse's moderate household size and only one person of family member participate in rice production. They had 30 years of farming experience. Majority of them were not members of organization. Most of the farmers produced off-season rice, with two harvests per year. The main variety of rice was Pathum Thani. And most of farmers in this area rent land for rice production. And average, quantity of rice produced was 28.42 tons. Results from regression model indicated that the age of the farmers, family number, family labor and farm size significantly influenced the production of rice.

The results shows that the value of R^2 (.942) indicated that socio-economic factors could explain rice production in this area by 94.2%. Therefore, policy maker and planners should be conscious of farmers' socio-economic variable in the planning and implementation of projects aimed at improving rice production. Again, the result also showed that some of the socio-economic variables influencing rice output were more important than other hence any effort to improve rice production should take cognizance of that. For example, the variables that were significant in the study were the major determinants of rice output while the non-significant variables were the minor determinants. In view of the findings, the paper recommended that the socio-economic characteristics that influenced the output of rice should be properly addressed in the formulation of policies and programmes that are aimed at improving the output of rice the study area.

Acknowledgement

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