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Farmer and Farm Characteristics Affecting Rice Production on Large Agricultural Plot Scheme: A Case of Khlong Khuean District, Chachoengsao Province, Thailand

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Large agricultural plot scheme (LAPS) is an important strategy of the Thai government to enhance the competitiveness of small-scale farmers, by encouraging them to establish neighbor agricultural land groups to share plan for cropping and marketing development throughout the supply chain. This study aimed to describe the characteristics of participating farmers in large agricultural plot scheme, and attempted to investigate the effect of some economic and social factors which related to the production of the rice farming. The sample used in this study was 229 rice farmers who are participated in a large agricultural plot scheme in Khlong Khuean district, Chachoengsao province, based on data collected from rice farmers participating in a promotion to major in 2016. Descriptive analysis and linear regression model were applied to analyze the data. The results showed that most of the farmers were male (69.9%). The average age of a farmer was 51-60 years old (37.6%). Most farmers had own land less than 10 rai (52.8%), and they rented the land less than 10 rai (46.3%). The cultivated land is non-irrigated area (76 %) and irrigated area (31.4%). An average rice output was 11-20 tons per rai. The result from regression analysis revealed that the factors affecting rice farmers under the large agricultural plots project were the size of the land, and rice in irrigated areas which were statistically significant at 5% (Kebbeh M. et al., 2003). The results of this study provide useful information for relevant authorities working in the government scheme for rice farmers in order to increase farmers' productivity.

Keywords: Rice production, Large Agricultural Plot Scheme, small-scale rice farmer, Chachoengsao.

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Introduction

Rice is an important food crop in Thailand accounted for over 60 percent of Thailand's population which are farmers. Rice alsoplays a key role for the food security and cash income of Thai small-scale farmers (Utaranakorn and Yasunobu, 2016). Moreover, Thai rice creates a reputation around the world and make a lot of income to the country each year that help save and sustain the country's economy during the crisis. (Thai Rice Foundation under Royal Patronage, 2016). Recent reports, however, indicated that efficiency in smallholder rice production remained very low. Rice farmers do the farm by themselves also known as a small rice farmer (Jitsanguan, 2001). The majority of Thailand rice growers are small-scale rice farmer who are exposed to the competitives situation fierce from many change farmers (Chavalvut and Athipanan 2001) such as trade condition and climate change.The group made its way to make agriculture competitive retail.

In this regards, the Thai government has undertaken various strategies to further increase rice production, enhance the competitiveness of small-scale rice farmers by encouraging them to establish neighbor agricultural land groups to share plan for cropping and marketing development throughout the supply chain. Accordingly, in 2015 Thai government has launched the Large Agricultural Plot Scheme (LAPS) policy (Ministry of Agriculture and cooperative, 2014). The objectives of LAPS policy were: to support the rice farmers with agricultural producers gathered together, to join the management since the combination of production, to joint procurement of inputs as well as distribution share. This policy will enable rice farmers to reduce production costs, increase productivity and competitiveness in the market and a discussion of the rice farmers causing harmony. The structures of the project consists of four areas namely 1) the project encouraging to produce rice for niche market, 2) decreasing area of a double-crop field, 3) alternative agriculture network project, and 4) modification to crane plant project. LAPS of rice will plan in 11 target provinces from 76 provinces in Thailand.

The government will select the target area as a target site for LAPS project and then set the supporting procedure as follows: 1) select the appropriate area and establish a farmer group whose members are willing to participated in LAPS, 2) ability management of field manager, 3) set up targeted strategic and operational plans, 4) site-specific technology, 5) set up the standard production, 6) develop infrastructure and the use of agricultural machinery, 7) operate activities to increase revenues and market linkages, and 8) apply philosophy of sufficiency economy in operation. (Office of Agricultural Economics. 2014).

Chachoengsao Province is the only area in the east of Thailand that was selected as a target area under the LAPS, and consists of 764,049 rai in the utilization of agricultural land in the rice paddies that is the second area in the east of Thailand (Office of Agricultural Economic, 2015). Khlong Khuean District in Chachoengsao Province is composed of 6 villages and the number of rice farmers as a member of the project is 229 in total, with total cultivation area of 5,000 rai (Khlong Khuean District Agricultural Office, 2016).

Interestingly, rice production under the LAPS project needs to be investigated in order to develop an appropriate strategy. In the literature reviews, attention has been paid to analyzing the affect of socio-economic factors in rice production. It can influence the use of the technology needed to increase rice production (Srisompun and Isvilanonda, 2012; Saisema and Pagdee, 2015). Wijnhoud *et al*., (2003) indicated that effective rice production depends on the farmer's socio-economic status, which influences their cropping operation capacity (Saisema, and Pagdee, 2015). Ajewole and Aiyeloya (2004) noted that socio-economic characteristics enable planners and policymaker to appreciate and develop more user-friendly policies and strategies that will enhance productivity. Afolami (2012) and Ajah and Nmadu, (2012) concluded that farmer and farm characteristics affecting rice production. Nevertheless, the studies on the affect of a socio-economic factors of rice farming under the government projects are limited.

In order to improve the work, the major factors that affect rice yield should be considered (Saisema, and Pagdee, 2015). As such, this study paid attention to investigate the characteristics of participating rice farmers in LAPS and attempted to investigate the effect of some economic and social factors that related to the rice farming production. The sample used in this study was 229 rice farmers who participated in a LAPS project in Khlong Khuean district, Chachoengsao province. This research finding can contribute to the government to develop strategies on farm production management.

Materials and methods

The study was conducted in Khlong Khuean district, Chachoengsao province, Thailand because rice is the most important economic crop for farmers in this area. Additionally, this area was selected as a pilot area for the implementation of LAPS. There were farmers from six villages agrees to farm under the LAPS implementation guideline.

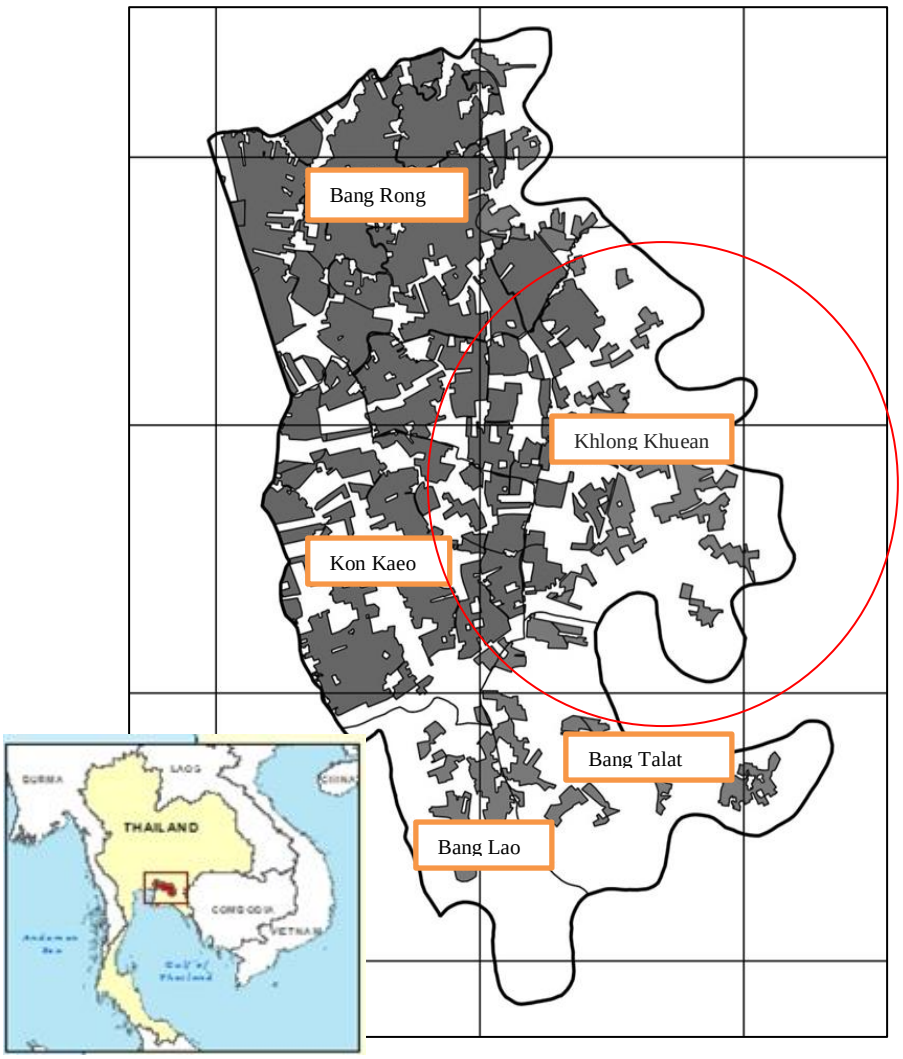

Fig. 1 Map of Khlong Khuean District consisting of 6 villages
Source: Adjusted from Land Development Department (2016) (http://www.ldd.go.th/)

Sampling and Sample Size

Rice farmers in Khlong Khuean district, Chachoengsao province, Thailand are the target population and sample size of this study. There are 229 rice farmers from six villages registered with rice production on LAPS scheme project in July 2016 with the total cultivation areas of 5,000 rai. (Khlong Khuean District Agricultural Office, 2016)

Data were gathered from farm registration database containing the following details: name, identification number, address, and the rice cultivation

area land, rice variety, cultivated in or out of irrigated area, rice production, and registration date of 229 rice farmers in Khlong Khuean district, Chachoengsao province.

Descriptive analysis namely, frequency, percentage, and mean were used to describe the socio-economic characteristics of rice farmers participated in LAPS. Regression model was employed to analyze factors influencing rice production under the government strategy, LAPS.

Analytical regression model expressed implicity variables as below;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \mathcal{E}$$

When, Y = Rice Output (Tons)
β_0 = Constant term
β_k = Coefficient to be estimated
X_1 = Gender
X_2 = Age of rice farmer
X_3 = Farm size (rai)
X_4 = Land Ownersip area (rai)
X_5 = Irrigated area (rai)
$\mathcal{E}$ = Error of model

Results

Farm and Farmer characteritics

Table 1 shows the characteristics of rice farmers who participated in LAPS in Khlong Khuean district, Chachoengsao province. The majority of respondents were male (69.9%), whilst 30.1% were female. The average age of a farmer was 51-60 years old (37.6%), with the maximum age at 84 years old and minimum age at 25 years old. The majority of rice farmers (43.2%) had their own cultivation land with average 11.16 rai. About 40.2% of farmersrented land for their rice farming with average 14.05 rai, and 16.6% of them are both owned their own land and rented land for their rice farming with average 35.13 rai.

For irrigated cultivated land, it was found that the majority of rice farmers practiced rice farming in irrigated land (72.5%) with average 19.71 rai. As for rice variety, most of the farmers applied RD9 rice variety in their rice farming. The RD9 is the first improved variety with resistance to the insect and widely grown in the farmers' field since it appropriate variety in irrigated area (Bureau

of Rice Research and Development, n.d). An average rice production of rice farming was 11-20 tons per rai.

Table 1 Characteristics of the rice farmers in the study area

Characteristic	Frequency	Percentage
Gender		
Male	160	69.9
Female	69	30.1
Total	*229*	*100*
Age of rice farmer (Mean = 54.38 years)		
<30	1	0.4
31-40	17	7.4
41-50	72	31.4
51-60	86	37.6
61-70	40	17.5
>70	13	5.7
Total	*229*	*100*
Cultivated land ownership		
Owned (rai) (Mean = 11.16 rai)	99	43.2
Rented (rai) (Mean = 14.05 rai)	92	40.2
Owned and Rented (rai) (Mean = 35.13 rai)	38	16.6
Total	*229*	*100*
Irrigated cultivated area		
Irrigated area (rai) (Mean = 19.71 rai)	166	72.5
Non irrigated area (rai) (Mean = 5.69 rai)	57	24.9
Irrigation+NonIrrigation area (Mean = 43.17 rai)	6	2.6
Total	*229*	*100*
Rice variety RD9	100	100.00
Rice production (Tons) (Mean = 23.27 tons)		
<10	38	16.6
11-20	84	36.7
21-30	54	23.6
31-40	32	14.0
>40	21	9.2
Total	*229*	*100*

Source: Survey data analysis, 2016

Factors influencing to rice production

The table 2 shows the result of farm and farmers characteristics of rice farmer and farm characteristics affecting rice production on LAPS. According to the data from farm register database, this study selected five variables were considered to have an effect on rice production, namely; gender, gender (X_1), age of rice farmer (X_2), total cultivation areas (X_3), land owner (X_4), irrigated area (X_5).

The result found that the R^2 value was 0.985 indicated that 98.50% of the variations in the output of rice of farmers who participated LAPS can be explained by the included variables. The F-Ratio (2953.390) was significant at 1% which implieed that the data attests to the overall significant of the regression equation. Age of rice farmers, total cultivation land, land ownership, and rice farming in irrigated area were significant to the output of rice in the study area. The coefficients of gender was negative, but it is not significant with the output of rice.

The coefficients for an age of rice farmer was negative and significant at 10% level of probability. This implied that the increase in age of rice farmer by 10% will reduce the output of rice by 0.024%. Similarly, the coefficients for land ownership was negative and significant at 10% level of probability. This implied that farmers who had land ownership for rice farming increase by 1% will reduce the output of rice by 0.289%. For rice farming in irrigated area, the the coefficients was positive and significant at 10% level of probability. This implied that farmers who increase rice cultivation in irrigated area by 1% will increase the output of rice by 0.344%. As far as, the coefficient for farm size was positive and highly significant at 1% level of probability. This implied that 1% increase in cultivation land will increase the output of rice by 0.9%.

Table 2 Regression analysis of the factors affecting rice farmers under the LAPS project

Variables	Cofficient	SE	t-stat	p-value
Constant	1.165	.810	1.438	.152
Gender (X_1)	-.024	.240	-.098	.922
Age of rice farmer (X_2)	-.020	.011	-1.814	.071*
Farm size (rai) (X_3)	.904	.008	110.727	.000***
Land ownership (rai) (X_4)	-.289	.160	-1.806	.072*
Irrigated area (rai) (X_5)	.344	.199	1.727	.085*
R^2	.985			
Adjusted R^2	.985			
F-Ratio	2953.390***			

***Significant at 1%, * Significant at 10%.

Discussions

The majority characteristics of rice farmers who participated in LAPS in Khlong Khuean district, Chachoengsao province were male, aged between 51-60 years old. This is consistent with the general characteristics of Thai farmer: male and old aged. The documentary by FAO (2000) stated that only the old generation is staying with the rice farming. It was noticed that the farmers in

the study area had an average age higher than the average age of those in Thailand (46.01 years old) (Kumps, L. 2015). The result is also consistent with research in socio-economic of rice farmer which most of the farmer were male (for example Ayoola *et al.*, 2011, Kennvidy, 2011 and Fakkhong, and Suwanmaneepong, 2015).

The majority of farmers had their owned land less than 10 rai or 1.6 hectares. This finding represented small-scale rice farmer which have less than 2 hectares of cropland as defined by World Bank (2003) (Thamthanakoon, 2015). And their cultivation land area was in irrigated area. These characteristics belong to the criteria of LAPS, which is the small scale farmer and cultivated irrigated areas. An average rice production of rice farming was 11-20 tons per rai. This finding indicated that rice yield in the study area is higher than the average yield of RD9 rice variety of the country (6.57 ton/rai; Bureau of Rice Research and Development, n.d).

The result of factors influencing the output of rice production by using the regression revelaed significant variables: total cultivation areas, cultivation in irrigated area, and age of rice farmer. The total cultivation area had a positive significance to the output of rice production that means when rice farmers have many cultivation areas the output of rice production, output will increase as well. This is confirmed the statement of Joseph *et al.*, (2012) indicated that the size of land measures affecting rice yield.

The age of rice farmer had a negative significance to the output of rice. This implied that old-aged rice farmers will reduce rice production. It may imply that old-aged farmers used their own experience for rice farming, even though the situation around rice farming have been changed, as the rice yield reduced. This confirmed by Truong Thi Ngoc Chi and Yamada (2002) stated that old age farmers did not believe new technology and only believe in their own experience.

Surprisingly, farmers who had their own land had a negative significantce to the output of rice. This may be implied that farmers who had the own land tended to be more inefficient than those who rent the land as indicated by Mailena *et al.*, (2014). As far for the rice farming in irrigated area demonstrated negative significance to the rice production. This implied that increase in rice farming in irrigated area will reduce rice production. An irrigated area and non-irrigated area were important for rice farmers because outputs have been a difference (Gailyson *et al.*, 2011). Moreover, among the independent variable test, farm size was a positive and highly significant to the output of rice. This result showed that the output of rice will increase, if rice farmers increase farm size. This finding also agrees with the outputs of numerous research such as Basoru and Fasakin (2012) and Julius and Chukwumah (2014).

Conclusion

This study aimed to examine farmer and farm characteristics affecting rice production on Large Agricultural Plot Scheme (LAPS), selected a case of Khlong Khuean District, Chachoengsao Province, Thailand. LAPS is Thai government project established to support small rice farmers to reduce production costs, increase productivity and competitiveness in the market. Data was gathered from farm registered database with containing the information of 229 rice farmers who are members of the project having total cultivation area of 5,000 rai.

The result showed that most of the farmers were male. The average age of a farmer was 51-60 years old. The majority of rice farmers had their own cultivation land with average 11.16 rai, followed by rented land with average 14.05 rai, and a few farmers were both owned and rented land for their rice farming with average 35.13 rai. The majority of rice farmers who practice rice farming in irrigated land had average 19.71 rai. Most of the farmer applied RD9 rice variety in their rice farming. RD9 isappropriate variety in irrigated area with average rice production of rice farming was 11-20 tons per rai.

Results indicated that the total cultivation areas, cultivation in irrigated area, and ages of rice farmer were significantly influenced the rice output. The result provided some policy implications in rice production under LAPS such as the R^2 value at 0.985 indicated that farm and farmers characteristics have a crucial influence on the output of rice. Hence, related organization should concerned with farm and farmer characteristics in the implementation of LAPS project in order to improve rice production in the study area. Moreover, the result demonstrated that age of rice farmer, total cultivation land, land ownership and growing rice farming in irrigated area were significant to the rice output in the study area. These factors should be properly addressed in the LAPS strategy formulation to improve the output of rice in the study area.

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