



Farming Practices Assessment and Economic Analysis of Organic Rice Farming in Cambodia: Case Study of a Commune in Preah Vihear Province

CHANMONY SOK*

Graduate School of Agriculture, Tokyo University of Agriculture, Japan

Email: Chanmony0223@gmail.com

TOMOHIRO UCHIYAMA

Faculty of International Agriculture and Food Studies, Tokyo University of Agriculture, Japan

NINA N. SHIMOBUCHI

Faculty of International Agriculture and Food Studies, Tokyo University of Agriculture, Japan

Received 15 December 2018 Accepted 31 October 2019 (*Corresponding Author)

Abstract Through the Cambodian government program, adoption of organic rice farming started in 2003. Although some farmers re-converted back to conventional rice farming, there are still some farmers who have continued producing organic rice under contract farming and non contract farming. This study aims to (1) clarify the cultural practices of organic rice farming; (2) compare the productivity and profitability of organic rice under contract farming and non-contract farming, and (3) identify the perception of farmers towards organic rice farming and reasons why they have continued. This study interviewed 85 randomly selected farmers in a commune of Preah Vihear province and further divided them into three types: 32 contract farmers, 32 non-contract farmers, and 21 organic rice contract farmers who partly sold produce outside the contract. Results showed that although transplanting and direct-seeding were prevalent, direct-seeding was the most common practice due to limited labor and rice field location. With regards to productivity and profitability, organic rice contract farmers had more yield and earned more profit than non-contract farmers. Moreover, farmers practicing transplanting had higher yield than those of direct-seeding. However, availability of exchange labor seemed to be a critical factor for farmers to gain profit. The reasons for farmers to continue doing organic rice farming were higher income, better health and contribution to conserve the environment. The reasons for engaging in contract farming were receiving stable and high price and gaining new knowledge. This study hopes to initially contribute to the further development of organic rice farming in Preah Vihear province.

Keywords contract farming, cost and return analysis, cultural practices, organic rice, perception

INTRODUCTION

In Cambodia, agriculture contributed to 28.6% of GDP (2015), while contribution of rice alone accounted for 10%. Recently, the demand for organic products (e.g. organic rice) is significantly increasing due to the increasing number of local people who prefer to consume safe food and live a healthy lifestyle. Moreover, organic rice production for export to European countries is increasing year by year. However, the adoption of organic rice practice only started in 2003. Thus, it is undoubtedly a latecomer on the international organic agriculture scene (COAA, 2011).

Taing (2008) mentioned that social and economic benefits of organic rice farming are not yet sufficiently clarified. During the first few years, Cambodian rice farmers produced organic rice with surprising success, and many organic rice cooperatives were established throughout the main rice production areas in Cambodia. However, many organic rice farmers diminished in scale, and

many organic rice farmers re-converted to conventional farming even though Taing (2008) and Sa (2011) reported that organic farming could increase farmers' rice yield and profit.

According to Preah Vihear Provincial Department of Agriculture (2017), there are agricultural cooperatives that still produce organic rice in a natural way without external inputs such fertilizers and pesticides in Preah Vihear province. In 2017, this province produced almost 30,000 tons of organic rice from 5,162 smallholder farmers who engaged in contracts with three different private companies (contractors).

OBJECTIVE

This study aims to (1) clarify the cultural practices of organic rice farming; (2) compare the productivity and profitability of organic rice under contract farming and non-contract farming, and (3) identify the perception of farmers towards organic rice farming and reasons why they have continued.

MATERIALS AND METHODS

This study was conducted in a commune of Preah Vihear Province, which is the second largest agricultural area in Cambodia. The main commodities are rice, rubber, and cashew nuts. It is located in the Northern area of the country and shares international border with Thailand and Laos. This province is also considered as the "Kingdom of Organic Rice." Most people are farmers who grow rice during wet season only because of no irrigation or canals. On another hand, the selected commune had a population of 8,296 person (2016) and covered a total area of 36,535 ha of mostly hilly forest, located 396 km. from Phnom Penh City. This commune was selected because many farmers are cultivating organic rice (Provincial Department of Agriculture, 2017).

Primary data were collected through questionnaire survey of randomly selected organic rice farmers and key-informant interviews (e.g. agriculture officers and other stakeholders) in March and August 2017. A total of 85 organic rice farmers were interviewed and further divided them into three types: 32 contract farmers, 32 non-contract farmers, and 21 organic rice contract farmers who partly sold their produce outside the contract (hereafter, mixed farmers).

Descriptive analysis and cost and return analysis were utilized in this study.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Selected Organic Farmers

New farmers who engage in contract farming are usually required to pay 50% of certification fee, while the other 50% is paid by the private company (contractor). However, during the introduction of contract farming in 2017, an NGO extended support to all contract farmers through payment of the farmer's share to the certification fee. Moreover, contract farmers were provided organic rice seeds and training sessions on organic rice standards, certification application process, organic cultivation, and internal control system.

Table 1 Socio-economic characteristics of selected organic farmers (n=85)

Items	Contract farmer	Non-contract farmer	Mixed farmer ¹
Number of household (HH)	32.0	32.0	21.0
Average age (years old)	37.8	39.9	34.8
Average family size (person)	5.3	5.7	5.5
Average education (years)	4.9	4.7	4.4
Average farming experiences (years)	19.8	22.6	18.7

Source: Field survey, 2017

Note: Mixed farmers refer to those farmers who engaged in contract farming but sold part of their organic rice produce outside the contract.

Table 1 shows the general profile of the three groups of farmers. The average household was about five members in each group. Non-contract farmers were the oldest and had the longest farming experience among the groups. On another hand, contract farmers had the highest educational attainment.

Cultural Practices

The field survey revealed that selected farmers commonly cultivated white rice variety (known as Neang Om and Neang Ouk in Khmer language). This variety has long maturity (specifically, 8 months) and is suitable for wet season and land condition in the study area. Farmers commonly start land preparation from May and do harvesting between late-November and early December.

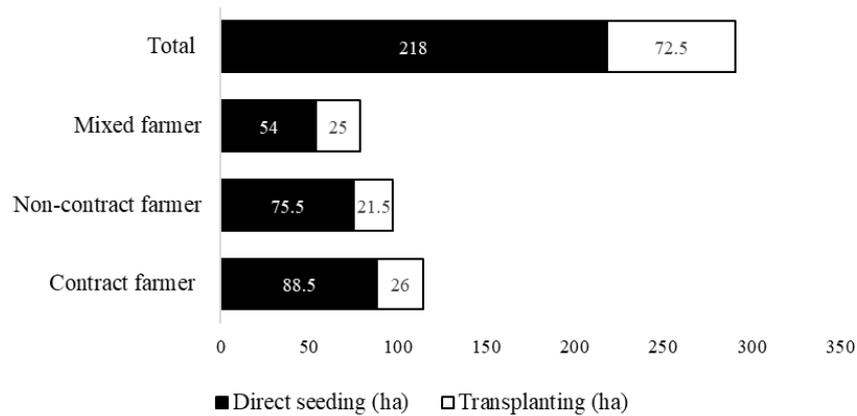


Fig. 1 Total land size by farmer type and crop establishment
 Source: Field survey, 2017

As shown in Fig. 1, all groups practiced both types of crop establishment (e.g. direct-seeding and transplanting). Particularly, all farmer respondents preferred direct-seeding due to shortage of labor and the long distance of rice paddy field from home.

Table 2 Cultivation practices by farmer group and crop establishment

		Transplanting		
Cultivation stage		Contract farmer	Non-contract farmer	Mixed farmer
Pre-cultivation	Farm location	Near home	Near home	Near home
	Seed (kg/ha)	73.95	78.62	81.37
Cultivation	Land preparation	3 times	2 times	Less than 3 times
	Seedling age	18- 21 days	More than 20 days	3 weeks
	Space between line and row	20-25 cm	<20cm	25-30cm
	Transplant (seedling per hill)	1 seedling	2 or 3 seedlings	1 seedling
	Seedling depth into soil	2-3 cm deep	>3cm	2-3cm
	Weed control	Hoes and hand	Hoes and hand	Hoes and hand
	Pest control	Spiders and frogs	Spiders and frogs	Spiders and frogs
Irrigation	Rainfed	Rainfed	Rainfed	
		Direct-seeding		
Pre-cultivation	Farm location	Far from home	Far from home	Far from home
	Seed (kg/ha)	148.28	150.03	125.21
Cultivation	Land preparation	3 times	2 times	Less than 3 times
	Weed control	Hoes and hand	Hoes and hand	Hoes and hand
	Pest control	Spiders and frogs	Spiders and frogs	Spiders and frogs
	Irrigation	Rainfed	Rainfed	Rainfed

Source: Field survey, 2017

It should be noted that non-contract farmers had limited or no special trainings, thus most of them followed their own cultivation practice. On the other hand, contract farmers and mixed farmers attended some short trainings organized by the NGO, agricultural cooperative union and/or contract companies on organic rice cultivation in order to get international organic certification. Table 2 shows the differences in cultivation practices by farmer group and crop establishment. The main differences found were seed input and land preparation. First, non-contract farmers selected seeds for next production by themselves, so seeds were not genetically selected. The selection was based on the physical aspect of the rice plant and seed (e.g. thickness and weight). Before sowing, the unhealthy grains are taken out. However, although contract farmers were initially provided with organic rice seeds for free by the contractor in 2017, they had the option to buy or keep seeds for the next cropping. Second, with regards to land preparation, contract farmers did three times, while non-contract farmers did two times.

During harvesting, all the farmers harvested by hand and sun-dried rice grain on the field. This practice significantly affected grain quality. All farmers utilized threshing machine.

Production Cost of Organic Rice Farming

The analysis was done separately in three groups namely contract farmer, non-contract farmer, and mixed farmer. Each group was divided into two different kinds of cultivation practices such as direct-seeding and transplanting. It should be noted that all the cash cost and non-cash cost such as family labors cost, exchange labors cost, and depreciation cost on farm assets were included in the calculation. Family labor cost, exchange labor cost, and seeds cost were considered as non-cash costs. Family or exchange labor cost was estimated as 2.5 USD per person (about half day or 4 hours).

Table 3 Total labor cost of organic rice production

Items	Contract farmer				Non-contract farmer				Mixed farmer			
	Direct-seeding		Transplanting		Direct-seeding		Transplanting		Direct-seeding		Transplanting	
	Family labor	Exchange labor	Family labor	Exchange labor	Family labor	Exchange labor	Family labor	Exchange labor	Family labor	Exchange labor	Family labor	Exchange labor
1st plowing	5.75	-	6.37	-	5.60	-	5.98	-	5.38	-	5.70	-
2nd plowing	5.44	-	5.29	-	-	-	-	-	4.98	-	5.55	-
Harrowing	2.49	-	2.53	-	2.52	-	2.44	-	2.36	-	3.20	-
Direct-seeding	9.95	-	-	-	9.79	-	-	-	9.73	-	-	-
Transplanting	-	-	11.82	108.36	-	-	11.66	109.30	-	-	12.75	105.63
Weeding	34.05	-	31.79	-	21.79	-	29.85	-	29.21	-	30.87	-
Harvesting	13.84	111.16	14.46	110.23	13.22	111.94	12.90	107.28	12.51	106.90	15.03	108.74
Threshing	17.41	5.91	17.10	5.13	15.55	4.35	15.86	4.04	11.64	7.52	10.02	5.59
Transportation	5.21	-	4.90	-	5.21	-	4.98	-	4.43	-	3.93	-
Total	94.14	117.07	94.26	223.73	73.67	116.29	83.66	220.62	80.24	114.41	87.03	219.97
	211.21		317.99		189.97		304.28		194.65		307.00	

Source: Field survey, 2017

Unit: USD/ha

Table 3 shows that farmers did not have enough capability to hire and pay many laborers to do transplanting and harvesting, so farmers commonly used exchange labor. The result of the study revealed that the total labor cost of contract farming was about 211.21 USD/ha and 317.99 USD/ha of direct-seeding and transplanting, respectively. The total labor cost of direct-seeding and transplanting of contract farming were higher than the other two groups. Harvesting time had the highest share of labor inputs because it was done by hand.

Table 4 shows that contract farmers and mixed farmers spent higher fuel consumption during land preparation than non-contract farmers because non-contract farmers did only two times in land preparation while other groups three times in land preparation. Hand tractor was the highest fixed cost for all groups. The total fixed cost is equivalent to depreciation cost, which calculated using the straight-line method of depreciation (Rahman et al., 2013).

Table 4 Total variable cost, fixed cost, and production of organic rice production

Items	Contract farmer		Non-contract farmer		Mixed farmer	
	Direct-seeding	Transplanting	Direct-seeding	Transplanting	Direct-seeding	Transplanting
NHH	32	18	31	22	21	13
Variable cost						
Fuel consumption of ¹						
1st plowing	5.27	5.38	5.45	5.38	5.31	5.45
2nd plowing	4.57	4.47	-	-	4.60	4.53
Harrowing	3.01	2.98	2.99	2.98	3.05	3.02
Transportation	9.23	7.20	9.53	7.83	9.10	7.83
Seed ²	44.26	22.07	44.79	23.47	37.38	24.29
Threshing ³	18.15	19.09	16.94	17.36	17.19	17.56
Fixed Cost						
Hand-tractor	57.12	54.58	66.57	53.81	62.32	54.80
Sickle	0.32	0.27	0.34	0.33	0.31	0.33
Hoe	0.58	0.47	0.55	0.56	0.51	0.56
Blue sheet	5.53	5.07	5.61	4.36	5.56	4.36
Sack	5.03	5.29	4.69	4.81	4.76	4.86
Total Labor cost	211.21	317.99	194.79	309.26	194.65	307.00
Total production cost	364.28	444.87	352.24	430.14	344.74	434.60

Source: Field survey, 2017

Unit: USD/ha

Note: 1. Diesel cost was 0.7 USD per 1L.

2. Seed cost was 0.3USD per kg.

3. Threshing cost 1/30 of total production paddy rice.

Productivity and Profitability of Organic Rice Production

Regarding profitability, this study examined several indicators such as gross revenue, total cash income, and net profit of organic rice production in each group. Gross revenue was calculated by yield (tons/ha) multiplied with the price (USD/ton). There are two different ways to examine profitability such as net profit which was calculated by gross revenue minus total production cost, and total cash income which was calculated by gross revenue minus total production cost and minus non-cash cost. The cost of certification was not included in the calculation because no farmer paid since it was subsidized by the contractor and NGO.

Table 5 Net profit of organic rice farming production

Items	Contract farmer		Non-contract farmer		Mixed farmer	
	Direct-seeding	Transplanting	Direct-seeding	Transplanting	Direct-seeding	Transplanting
Yield (tons/ha)	2.19	2.30	2.04	2.09	2.07	2.12
Paddy price (USD/ton)	243.47	242.38	185.52	184.94	208.78	203.32
Gross revenue	533.05	557.90	379.13	387.26	432.74	430.66
Total variable cost	84.50	61.20	79.69	57.02	76.62	62.69
Total fixed cost	68.58	65.68	77.76	63.86	73.46	64.91
Total labor cost	211.21	317.99	194.79	309.26	194.65	307.00
Total noncash cost ¹	255.47	340.06	234.75	327.75	232.03	331.29
Total production cost	364.28	444.87	352.24	430.14	344.74	434.60
Total cash income ²	424.24	453.09	261.64	284.87	320.03	327.35
Net profit ³	168.77	113.04	26.89	(42.87)	88.00	(3.94)

Source: Field survey, 2017

Unit: USD/ha

Note: 1. Total noncash cost = Seed cost+ Labor cost

2. Total cash income = Gross revenue - (Total production cost - Total noncash cost)

3. Net profit = Gross revenue - Total production cost

Table 5 shows that contract farmers received the highest price and yield among the groups on both cultivations. These are the reasons why contract farmers could generate gross revenue more than other farmer groups. Even contract farmers had higher production cost than others, contract farmers still earned higher net profit and cash income. In general, farmers earned higher total non-

cash income in transplanting than direct-seeding. On the other hand, farmers could earn more net profit in direct-seeding rather than transplanting because transplanting need much more labor requirement. Moreover, non-contract farmers and mixed farmers were not able generate net profit in transplanting.

Farmer Perception

In general, the main reasons for farmers to engage in organic rice were no fertilizer expense, receive high price, and have healthy farming life. With regards to their perception of contract farming, each group had different reasons. Contract farmers engaged in contract farming because they could receive stable and high price, learn new techniques, and share experiences with other farmers. On the other hand, non-contract farmers did not believe on contract farming system, and they preferred to easily sell to many buyers at different prices with no restrictions. For mixed farmers, they engaged in contract farming to learn new techniques but were not sure if their produce will be regularly sold at a high price.

CONCLUSION

This research found the existence of three types of farmers, namely contract farmers, non-contract farmers and mixed farmers. All farmers cultivated organic rice once a year, particularly during wet season. With regards to crop establishment, direct-seeding was more practiced than transplanting because of lesser labor requirement. Harvesting was commonly done by hand.

With regards to profitability, all organic rice farmers earned positive total cash income, but contract farmers got the highest income. In general, contract farmers on both cultivations can increase their income with higher yield and higher price compared to other farmers. Transplanting cultivation can produce higher yield but require more labor inputs than direct-seeding. In case farmers do exchange labor, transplanting can give farmers more profit. In contrast, if there are no exchange labors, it is better for farmers to do direct-seeding with less labor input.

Although the main reasons for farmers to engage in organic rice were the same (e.g. no fertilizer expense, receive high price, and have healthy farming life), their perception of contract farming varied. Contract farmers engaged in contract farming because they could receive stable and high price, learn new techniques, and share experiences with other farmers. On the other hand, non-contract farmers did not believe on contract farming system, and they preferred to easily sell to many buyers at different prices with no restrictions.

For further study, there is a need to assess the existing organic rice certification and contract farming models, specifically clarify the impact of organic rice contract farming model to small-scale farmers' livelihoods; and to determine the most suitable organic rice contract farming model.

REFERENCES

- Cambodian Organic Agriculture Association. 2011. Organic agriculture and food processing in Cambodia: Status and potentials. Cambodian Organic Agriculture Association, 5, Cambodia.
- MAFF Cambodia. 2016. Annual report 2016. Ministry of Agriculture, Forestry and Fisheries, Cambodia.
- Preah Vihear Provincial Department of Agriculture, Forestry and Fishery. 2017. Annual report 2017. Ministry of Agriculture, Forestry and Fisheries, 9-13, Cambodia.
- Rahman, A. Latifunnahar, M. and Alam, M. 2013. Financial management for custom hire service of tractor in Bangladesh. *International Journal of Agricultural and Biological Engineering*, 6 (3), 29.
- Sa, K. 2011. Organic rice farming systems in Cambodia: Socio-economic impact of smallholder systems in Takeo Province. *International Journal of Environmental and Rural Development*, 2 (1), 115-119.
- Taing, K. 2008. Economic analysis of organic-culture rice in rural household economy: Case studies in Tram Kork and Chumkiri district. Master thesis, Royal University of Agriculture, 66-72, Phnom Penh, Cambodia.