



Building Capacities for Change: Farmers Moving Away from Conventional Rice Farming in Prachinburi Province, Thailand

Nicolas Faysse^{a*} and Kassirin Phiboon^b

^a Cirad, G-Eau Research Unit, Montpellier University, Montpellier, France, and Asian Institute of Technology

No. 58 Moo 9, Km. 42, Paholyothin Highway, Klong Luang, Pathum Thani 12120, Thailand

^b Thai Water Partnership, Bamrung Muang Road, Pom Prap Sattru Phai, Bangkok 10100, Thailand

*Corresponding author. E-Mail address: faysse@cirad.fr

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Abstract

Rice farming systems in the irrigated areas of central Thailand, unlike other parts of the country, have undergone limited changes over the past two decades. These systems are based on two rice crops per year. Generally, they are characterized by the intensive use of chemical fertilizers and pesticides. Most of these rice farming systems provide full-time employment to farmers. However, the sustainability of these rice farming systems has been undermined by two factors: the decision to end policies to support rice prices on the domestic market and the aging farming population. The study analyzes the experience of farmers located in Prachinburi Province, who began changing their farming systems in order to move away from conventional rice production. Thirty-eight of these farmers were interviewed, about their objectives, the process of change, and the impacts of these changes. One group of farmers started growing non-rice crops and another group began to produce organic rice collectively. Profitability has increased, but many farmers see also these changes as an opportunity to increase home consumption. In addition, the changes have made the farming systems more flexible. These developments help rice farmers in central Thailand build their capacities for change to be able to adapt to ongoing evolutions of the agricultural sector. However, upscaling these changes in farming systems and in farmers' capacities will require wide-ranging support.

Keywords: Conventional Rice, Diversification, Organic Rice, Thailand

Introduction

In many regions of Thailand, farms have undergone major changes in the past few decades. The first wave of changes concerned the farming systems' evolution. Farmers have adopted new farming practices or sized new marketing opportunities (Becchetti et al., 2012; Gedgaew et al., 2017). Frequent changes in farming systems have occurred in the dynamic value chains such as fish and shrimp farming or the dairy sector (Lebel et al., 2010; Aiumlamai et al., 2012). Rice is the main crop in Thailand, with 53% of farmland, i.e. 11.3 million ha allocated to rice production in 2017 (Ministry of Agriculture and Cooperatives, 2018). Profitability per ha of rice production in rainfed areas has been relatively low compared to other crops. Consequently, in the last 40 years, many farmers shifted from rice to non-rice crops (Rambo, 2017) or started growing crops after rice, especially in upland areas (Promkhambut & Rambo, 2017). Some farmers also began to grow organic rice (Panyakul, 2016).

A second wave of changes concerned the role of agriculture in rural areas. In many villages in the Northern and Northeast Regions, farming is no longer a major income-generating activity (Yuko & Rambo, 2017) and its social role is less important. This phenomenon can be described as a de-agrarianization process (Dayley & Sattayanurak, 2016; Rigg et al., 2012). A third type of change is characterized by the fast aging population (both farm owners and farm laborers) in Thailand. In 1993, 15.6% of farm holders were under 35 and 12.6% were above 65. By 2013, the percentages were 6% and 19%, respectively (National Statistical Office of



Thailand, 1993; 2013). In a village in the Northeast Region of Thailand, the average age of farmers was 55 in 2008, compared to 25 years ago, when the average age was 36 (Rigg et al., 2012). Many aged farmers sell only a small amount of their production and use most for home consumption (Rigg et al., 2018). These semi-subsistence farmers (Davidova et al., 2012) may be interested in innovations such as organic farming, but generally they are keen to use them in order to increase home consumption (Rattanasuteerakul & Thapa, 2012). Some aged farmers also continue farming because of its cultural value (Rigg et al., 2018).

These trends to increase profitability and home consumption are not actually specific to Thailand. These trends have also been observed in transition economies, in particular, in Eastern Europe (Davidova et al., 2012). In Bulgaria in the 2000s, farming for home consumption increased on smallholder farms because many farmers were aging and received only modest pensions (Kostov & Lingard, 2002). These phenomena can also be observed in Japan (Hisano et al., 2018).

In Thailand, these changes have been observed mainly in the Northeast and the Northern Regions. These changes have had less of an impact on the rice farming systems in the irrigated areas of central Thailand, i.e. the central plains and delta area of the Chao Phraya River Basin and the delta areas of the Bang Pakong and Mae Klong River Basins. Rigg et al. (2008) described a de-agrarianization process in areas near industries in Ayutthaya Province. However, in other irrigated areas of central Thailand, rice farming systems have remained largely unchanged since the shift to double rice farming in the late 1990s (Molle & Srijantr, 2003). In these areas, farmers grow rice using conventional practices with large amounts of chemical fertilizers and pesticides (Srisopaporn et al., 2015). Generally, at least one member of the family works full-time on the rice farms (Srisopaporn et al., 2015; Aguilhon, 2017).

There are three main explanations for the limited changes that have taken place in these rice farming systems over the past two decades. First, the range of crops that can be grown is limited due to flood risks (Kasem & Thapa, 2011; Panichvejsunti et al., 2018). Second, constraints to diversification were reported such as labor constraints, insufficient irrigation water, unsuitable soil, lack of knowledge, or difficult access to markets (Molle & Floch, 2007; Kasem & Thapa, 2011). Transition to organic rice is also difficult. For instance, the rice yields often decrease during the transition period. Farmers may also face difficulties in obtaining certification and in getting a premium price to compensate for lower yields and higher labor costs (Setboonsarng & Acharya, 2015). All these constraints reveal the limited flexibility of rice farming systems in these areas. Third, double rice farming was fairly profitable compared to alternative crops when the government supported rice prices on the domestic market (Kasem & Thapa, 2011; Panichvejsunti et al., 2018; Ricks, 2018). For all these reasons, rice farmers in these areas have generally continued to grow rice using conventional practices.

However, two factors have reduced the profitability of rice farming in these areas. First, since the government ended a series of policies to support rice prices on the domestic market in 2015 (Ricks, 2018), the farm gate price for rice has fallen. The farm gate price for rice fell from approximately 15,000–20,000 Thai baht/ton (In May 2018, 1 US dollar = 31.8 Thai baht) during the last price support scheme in 2014 (Siamwalla et al., 2014) to 6,000–7,000 Thai baht/ton for early maturing varieties in 2017 (Prayukvong, 2018). Second, the population of rice farmers is aging. Thus, farmers rely increasingly on external labor which pushes up production costs (Poungchompu et al., 2012; Formoso, 2016).

It is important to identify how the rice farms in these areas can adapt to ongoing changes. In particular, the decreasing profitability of conventional rice and the need to cater for an aging farming population for whom



farming still generates income as well as produce for home consumption. The present study analyzes the experience of two farmer groups whose farms are located in the irrigated areas of Prachinburi Province. These farmers are striving to move away from conventional rice farming. One group of farmers started growing non-rice crops and another group began growing organic rice collectively. The study assesses the changes, their impact on profitability, and the use of crops for home consumption or sale.

Methods

In the irrigated areas of Prachinburi Province, farmers mostly produce rice (22,080 ha in 2017) and fish and shrimp bred together (2,820 ha in 2017) (Pannon, 2018). Most irrigated areas are located within Bang Phluang irrigation scheme. Within this scheme, rice farmers grow two rice crops per year. They use early maturing rice varieties which are sold for agro-industrial processing. Farmers generally buy rice of better gustative quality for their own consumption. In this irrigation scheme, farming still provides the main source of income for farming households (Aguilhon, 2017), and rice farming systems have changed little over the past two decades.

The study was conducted in Bang Phluang irrigation scheme and in particular in three sub-districts: Bang Taen in Ban Sang District and Bang Kung and Dong Krathong Yam Subdistricts in Srimahapot District. These areas were selected because, in contrast to the large majority of rice farmers of the Bang Phluang irrigated scheme, there some farmers had started to move away from conventional rice farming.

In 2018, authors interviewed 38 of these farmers. First, interviews were done with 15 farmers who were growing non-rice crops on land previously used for rice. The farmers were identified in consultation with village headmen, farmers and local offices of the Ministry of Agriculture and Cooperatives. The 15 farmers had never worked together. Second, 23 members of an organic group of 29 farmers were interviewed. In each group, farmers were asked about the process of change, the difficulties faced and how they tried to solve them. An estimation was made of the net economic value of agricultural production from the farm plots affected by the changes in 2017. This estimation was based on the farmers' own assessment of the share of produce sold and on prices at village level (if some produce was not sold). Farmers were also asked to indicate the quantity of produce used for home consumption and the amount marketed. Lastly, a workshop was organized with each of the two groups. During these two workshops, preliminary findings were presented and discussed.

Results

1. The Process of Change

On 36 of the 38 farms, at least one member of the family farmed full-time. Therefore, these farms were not part of a de-agrarianization process as observed in villages in the Northeast of Thailand. The organic rice group was established in 2015 and received support from a beverage company, as part of a corporate social responsibility program. The group received support for training on organic farming practices, setting up a participatory guarantee scheme for certification (Home et al., 2017), and marketing. In 2018, the group produced 26 tons of milled organic rice: 24 tons were sold to the beverage company at a premium price and the rest was sold to local organizations or kept to produce rice noodles. In 2018, the public Institute of Organic Crops started the procedure to certify the organic group on the basis of third-party certification.

In the second group, the number of farmers that had started diversifying had increased in previous years. Between 1990 and 2014, only seven farmers had started diversifying, but eight farmers had done so between 2015 and 2017. This increase is due to two factors. First, following the end of the national scheme to support rice prices in 2015, the Thai government repeatedly stated that similar schemes would not be implemented in the future. Thus, farmers did not expect that the profitability of conventional rice would improve in the coming years. Second, farmers in the study area were used to dealing with shortages of fresh water for irrigation during the dry season (November–April) because of saline intrusion from the sea to Prachinburi River. In 2017, the Naruebodindrachinta Dam started operating. As a result, in 2017 and 2018, fresh water was released during the dry season. Therefore, saline intrusion did not occur in the study area and farmers felt that they would be less exposed to the problem of using brackish water for irrigation in the future.

In both groups, most changes were made on land owned by the farmers (Table 1). Only five farmers initiated changes on rented land. They did so because they rented land from relatives and were confident that the rental agreement would continue in the future. Farmers that grew organic rice were still producing conventional rice on other plots and growing other crops in small quantities (vegetables and banana). Farmers that had diversified their cropping patterns grew a wide variety of crops (e.g. seasonal vegetables, fruit trees, herbs, bamboo, lotus, and mushroom). Banana and local plants (e.g. neem trees, moringa trees) were the most commonly grown crops because these crops could be cultivated in various types of soil, did not require intensive farm work and were easy to market. Farmers avoided growing a single crop in order to decrease production and marketing risks. The farmers also increased animal production (e.g. fish, pig, chicken, duck, and cattle).

Table 1 Average Characteristics of Farms and Farmers

Farmer Group	Age	Owned	Rented	Farm Production (ha)		
		Land (ha)	Land (ha)	Conventional Rice (ha)	Organic Rice (ha)	Non-Rice Crops (ha)
Diversification Group (15 Farmers)	57	4.21	4.77	Owned: 3.24 Rented: 4.67	0	Owned: 0.95 Rented: 0.10
Organic Group (23 Farmers)	53	3.04	3.18	Owned: 1.85 Rented: 2.89	Owned: 0.93 Rented: 0.27	Owned: 0.26 Rented: 0.02

Ten out of the 15 farmers who had started to diversify received support from a program promoting self-sufficient farming implemented by the Ministry of Agriculture and Cooperatives. This concept had emerged in the 1990s and was designed to encourage small-scale farmers to avoid intensive monocropping. Small-scale farmers were encouraged to grow a variety of crops, to use limited amounts of chemical fertilizers and pesticides, and to produce food for home consumption (Kasem & Thapa, 2012; Schaffar, 2018). The program to promote self-sufficiency supported farmers who had already started diversifying and who had a pond. The farmers interviewed, who had enrolled in the program, attended training courses and received farm inputs such as tree seedlings, chicken breeding equipment, and animals. However, the material support provided was of very limited value compared to the high investments made by farmers to protect their fields from flooding and to improve their irrigation network (see below).

2. Differing Goals and Practices

The share of the net economic value generated by production and dedicated to home consumption varied from 0% to 76% with an average of 16% on the studied farms. Two groups were identified on the basis of this



share. For the first group of farmers (including 10 that had diversified and 17 that grew organic rice), the quantity of produce destined for home consumption was less than 20% of the net economic value produced in the areas where farming practices had changed. One of the farmers was 53 years old and farmed full-time. He started growing mushrooms and breeding animals (chickens, ducks, pigs, etc.). He was constantly trying to find marketing channels that offered good prices. Another full-time farmer, who was 48 years old, first started growing organic rice on 0.3 ha in 2016. He obtained high yields and was satisfied with the profits. Therefore, in 2018, he expanded the area for organic rice to a total of 2.7 ha.

For the second group of farmers (five had diversified and six grew organic rice), the quantity of produce used for home consumption was more than 20% of the net economic value of the production in areas where changes had been made. One 66-year old farmer started growing a wide range of crops (bananas, mangos, pomelos, chili, eggplants, and local vegetables) on 0.8 ha in 2017. He also worked at the local administration office in the sub-district. Another 62-year old farmer adopted organic rice practices on 1.6 ha in 2016 because she wanted to eat rice that was not contaminated by pesticides. She also worked in a small food-processing unit. She hired laborers for most of the farming activities.

Table 2 presents the main characteristics and farming practices for the two farmer types. Farmers that focused on marketing generally worked in the fields and tested new farming techniques. By contrast, farmers that produced for the market and for home consumption were generally retired or had other sources of income. Six of them only visited their fields occasionally and did little to test new farming techniques

Table 2 Average Characteristics of Farm Types: “Focus on Marketing” and “Marketing and Home Consumption”

Type of Farmers	Focus on Marketing (27 Farmers)	Marketing and Home Consumption (11 Farmers)
Age (in 2017)	52	59
Overall farmed area (ha)	8.2	6.3
Area of land allocated to diversification or organic practices (ha)	1.4	1.0
Percentage of the value of produce used for home consumption (in fields affected by the changing practices)	7.4%	38.8%
Average yield of unmilled organic rice in 2017 (kg/ha)	2,890	2,020
Value of organic rice production in 2017 (two crop cycles), taking into account production costs (Thai baht/ha)	44,800	21,500
Value of non-rice crop production in 2017 (including annual production costs, but not initial investments) (Thai baht/ha)	147,000	17,000

Interviewed farmers had to deal with a large range of issues before adopting new practices as part of the process of change. First, farmers wanting to diversify production had to limit the risk of flooding. This involved one of the following actions: i) raising the fields (by adding bought-in soil or soil extracted from digging a pond); ii) building dykes around the fields; or iii) growing plants capable of resisting minor flooding, such as coconut trees. Second, farmers had to make sure they had access to sufficient water during the dry season. They were generally members of water user associations, but the latter were reluctant to operate collective pumps for a small number of farmers outside the rice irrigation period. Farmers close to Prachinburi River improved their pumping systems in order to pump directly from the river. Farmers further away dug a pond or well. Some farmers installed sprinklers or drip irrigation to decrease irrigation requirements or grew crops requiring limited amount of irrigation water. These actions were costly in terms of investments. Farmers paid on average 143,000



Thai baht per ha for raising land, roughly 10 times the annual net benefit from conventional rice farming in the area (the profitability of conventional rice – two cycles per year – was 15,700 Thai baht per ha on average per year in 2017 in the study area, Aguilhon, 2017). The four farmers who invested in pumps and pipes had to pay on average 57,000 Thai baht per ha.

3. Profitability

Interviewed farmers obtained an average yield of 3,700 kg/ha of unmilled rice per cycle when using conventional practices. Organic rice yields obtained in 2017 were lower on average (Table 2). The farmers had recently shifted to organic production and 12 of them still had difficulty controlling weeds. However, shifting to organic rice reduced production costs and generated a market premium. Thus, the economic value of organic rice was higher than the average net incomes obtained from conventional rice in the area. Organic farmers of the first type (those who focus on marketing) obtained a much higher economic value as a result of higher yields and lower production costs in comparison with farmers of the second type. Many farmers of the first type had their own tractors and used their own labor to work on the farm. In contrast, organic rice farmers of the second type hired laborers for many farming activities and had to pay an operator to plough their fields.

However, four farms that had shifted to organic rice generated an income that was similar to that of conventional farming. Members of these households were engaged in lively discussions about whether to go on farming organically. A member of the organic group eventually stopped growing rice and started shrimp production which is a much more risky but potentially far more profitable enterprise than organic rice. In 2018, prospects of increased incomes were good largely due to the construction of a rice mill funded by the beverage company which meant the group would be able to sell more organic rice at a premium.

Table 2 also shows the net profits (excluding initial investment costs) for farmers that had diversified in 2017. For these farmers, the net profit increased substantially compared to conventional rice production. On five farms, trees were still young which meant that incomes should increase in the future. Taking into account initial investment costs (flood control, irrigation system, seedlings, etc.), the farmers who had started diversifying should be able to generate higher profits than if they had continued growing conventional rice after an average of four years. Anyway, farmers expressed the fact that they had not taken investment costs into account to assess the profitability of their changing practices.

Discussion

1. Building Capacities for Change

The second type of farmers significantly increased their capacity to produce food for home consumption. This corresponds to the self-sufficient economy approach. The self-sufficiency concept was introduced when farmers' aging was not a major issue. However, it is increasingly perceived as being relevant for aging farmers (Hirokawa, 2014). The difference in the farmers' approaches between one focusing on achieving self-sufficiency, on the one hand, and one focusing on increased profitability, on the other, has also been identified in agricultural cooperatives in Thailand (Faysse & Onsamrarn, 2018). However, as in the case of interviewed farmers, many of these cooperatives considered that both objectives were important.

The shift to organic rice and non-rice crops did not guarantee a long-term increase in benefits compared to conventional rice farming. Farmers who had started diversifying had invested heavily. There is a chance that these farmers may eventually lose out because of a drop in market prices or because of a disaster that could damage their



new production system, e.g. flooding. Despite this uncertainty, farmers in the organic and diversification groups increased their capacity to change their farming systems. The investments that farmers of the diversification group made in flood control and improved access to irrigation water enabled them to have more flexible farming systems, i.e., farmers could opt to produce a much wider range of products. As far as capacity building is concerned, farmers in the organic rice group had developed collective action and strengthened their networks with support organizations. As in the group of organic farmers studied by Plews-Ogan et al. (2017), farmers considered the collective dimension to be an important part of the process of change, especially since they were planning further collective action to manage a rice mill and obtain third-party certification. This greater flexibility of farming systems and the development of farmers' capacities for collective action contribute to build their capacities for change in order to face constraints that could emerge in the future (e.g. drop in market prices) and to seize new opportunities (e.g. an increased demand for certified agricultural products).

2. Support Policies

In 2015, the Ministry of Agriculture and Cooperatives launched a policy called "large-scale schemes". Its goal was to support farmers' groups to produce and market a single crop. It aimed to increase profitability, by reducing production costs, increasing yields and income, and organizing collective action between farmers (Thirapong, 2017). Initial assessments reported limited outcomes, especially for farmers growing conventional rice (Duangbootsee, 2018). The two options studied here may provide interesting alternative opportunities for the irrigated areas of the central zone in Thailand. During the two workshops, farmers expressed differing needs for support. One farmer from the diversification group pointed out that they needed better access to irrigation water. Farmers keen to market their produce were interested in receiving support for better access to credit and markets.

Moreover, many farmers in the low-lying lands of Prachinburi Province were vulnerable when it comes to securing a long-term access to land. According to data from the Ministry of Agriculture and Cooperatives, 64% of farmland in the Srimahapot District was rented. Most rental contracts were either not signed or had only been signed for the duration of one year (Aguilhon, 2017). Security of tenure was not a major issue for farmers growing conventional rice. However, it was a major limitation when farmers wanted to move away from conventional rice production. Farmers were unwilling to invest in costly infrastructure to diversify or improve soil and make ridges to grow organic rice if they had no guarantee that they would still be farming the same plots in the future. Increasing the security of land tenure could play an important role in the process of change for farmers who do not own lands or own a small part of the land they farm. The 2016 Land Lease Act schedules a minimum duration of two years for a rental contract. This is too short for farmers who want to make a commitment to organic farming or invest in flood protection. Moreover, the provisions of this act were not actually implemented in the study area. Increasing the security of land tenure might involve setting a longer minimal rental period and ensuring that legal prescriptions are implemented.

Conclusion

The study area, like many other rural areas in Thailand, was affected by two major trends: an economic trend, i.e. the decreasing profitability of conventional rice farming, and a social trend, i.e. the aging rural population. As a result, some farmers had taken initiatives to move away from conventional farming. They had two main goals: to increase profitability and home consumption. Farmers' practices differed according to the relative importance they attributed to each goal. Ultimately, the same processes of change (the production of



non-rice crops or organic rice) have potential for two categories of farmers: farmers who strive to earn a living from their farm and farmers who do not want to invest much time or money in their farm activities because they are old or have other income-generating activities.

The changes studied here are just two examples of the opportunities for evolution for rice-based farming systems in the irrigated areas in the central zone of Thailand. The situation calls for a reassessment of farm structures, the agricultural production system and the roles of these irrigated areas. These areas still have a major economic role. However, these areas now have an increasingly important social role, namely, to provide a complementary income for an aging population. They also have an increasing environmental role because, during flood events, the government plans to use these areas for flood expansion in order to protect urban areas (Trakuldit & Faysse, 2019). In order to help farmers seizing more opportunities, all these dimensions should be considered both at farm level and regional level.

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