

**Future Resilience and Sustainability of Thailand Agriculture:
Studies on Farming Succession and Crop Choice in Southern Region**

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Abstract

In the last few decades, the agricultural sector in Thailand has faced the problems of an aging population and labor shortage, which has tended to rise, as well as the lack of successors for farms. This dissertation aimed to examine the effects of these problems in the Southern region of Thailand in order to discuss the pathway for the future resilience and sustainability in Thailand's agriculture.

Chapter 1 discussed the objectives of this dissertation. The background of the problems and the research concerns were introduced in the context of the definitions of resilience in agriculture.

The problem of labor shortages was also found to significantly affect many types of crops. Labor shortages in the farming sector would be a national concern because they would not only lead to an increase in the costs involved in human labor, but also affect the timely performance of agricultural operations, thereby affecting productivity levels and the growth of the sector. Additionally, labor constraints could affect the crop systems, and this could completely or gradually change the crop types, crop choice decisions, and land allocation, especially in the Southern region that had generated the largest income for the country's agricultural sector.

Moreover, a climate suitable for planting many important perennial cash crops would demand intensive labor, which had been affected by the increasing literacy rate that had resulted in the non-agricultural sector absorbing a new generation of educated and skilled workers. Thus, this led to more difficulty for the farming sector to find successors.

In addition, in Southern Thailand, the agricultural sector was dominated by family farms, farmer groups, and cooperatives that worked interdependently and assisted each other; hence, if individual households encountered problems and were consequently weakened, the community's function for resilience would be weakened as well. Furthermore, to consider effective guidelines or strategies to help build or improve the community's resilience in agriculture, especially for smallholder farmers, who would be among the most vulnerable groups in connection with these problems, it would be important to understand the farmers' labor requirements, crop diversification patterns, and crop choice behavior. This understanding would also need to take into consideration the decisions farmers would make regarding farming succession and farming size.

To understand the resilience and sustainability in South Thailand, the following issues would need to be confirmed. First, the crop production technologies, especially with regard to labor requirements, would need to be identified. Second, the situation of crop diversification

and the motivation of farmers, or more broadly, crop choice behavior would need to be examined. Third, decisions regarding farming succession and farming size strategies would need to be analyzed in order to consider the possibility of sustainable farm sizes for the future. Finally, the connection of social ties with regard to these aspects would have to be discussed in order to construct an efficient strategy for making society resilient.

This study, therefore, sought to understand the effect of these constraints and investigate farmers' decisions as well as investigate the resilience and measurements important to sustain farms. The main purposes of this study were as follows:

- 1) To contribute to the understanding of crop structural transformation regarding farmers' decisions with respect to land allocation and crop choice under labor constraints in order to devise an efficient strategy for ensuring resilience in Southern Thailand.

- 2) To contribute to the understanding of the features of farmers' decisions regarding farmland succession and the effect of these decisions on the size of farmlands, especially for future generations.

Chapter 2 described the agricultural sector in the study area, the Southern region of Thailand. In 2017, the agricultural sector played a major role in generating income in this region of the country with a 21.1% share of the Growth Regional Product (GRP). The Southern region also provided the largest agriculture GRP compared to other regions. Most of the farming income was generated from perennial crops, including rubber, palm oil, coffee, durian, coconut, and other varieties of tropical fruits. Likewise, livestock and fisheries farming provided economic potential in the Southern region along the coastline.

The top five provinces consisted of Surat Thani, Nakhon Si Thammarat, Songkhla, Chumphon and Krabi, which provided a perfect combination of the factor of endowment in terms of abundant agricultural land use and income generation. These five provinces represented almost 60% of the agricultural land in the South, and 59% of the total agricultural Gross Provincial Product (GPP), while Nakhon Si Thammarat province had the largest number of farms/households (19%) of the accumulated farmland in the Southern region. The composition of production value was also high among these five provinces. Rubber plantations predominated in the production value in Songkhla province, while the palm oil production value was largely found in Nakhon Si Thammarat followed by Krabi, respectively. In Surat Thani province, rubber and palm oil had the predominated value. However, unlike other provinces, Chumphon province had various predominated values in rubber, palm oil, durian, and also coconut and coffee that were still equally important.

In Chapter 3, the structural transformation in the crop composition in Chumphon province in Southern Thailand at the macro (province) and micro (farm household/plot) levels was examined. Based on the public data, the decomposition analysis of the crop production value growth of the province of the effects of price, productivity, area reallocation between crops, and enlargement of the total area was examined. The analysis found that the price effect of durian had turned to be positive since the mid-2000s, the productivity effect for coffee was negative before the mid-2000s, palm oil showed a positive productivity effect for almost the full estimation period, and durian's positive effect in land reallocation effect before the beginning of the 2000s was significant. These findings raised the question of how farmers could obtain the crop price or technical information for crop choice decisions. In the author's original survey, farm or plot-level crop diversification was studied in a region where coffee production was historically active. The analysis on the survey found that the capacity for diversification differed according to the farm scale, and information use regarding the crop price or farming practices was highly dependent on informal social networks. Furthermore, the role of social relationships in the information sharing on price and farming practices of a specific crop was important even for farmers who did not produce that crop. This suggested that social relationships were the most effective channel for the promotion of crop diversification and sustainable farming practices.

Chapter 4 examined the farmers' crop choice decisions to investigate the motivation of the recent coffee production decrease in Chumphon. Through a choice experiment based on a random parameter logit model, which took into account the farmers' heterogeneous preferences for commodities, the estimation results found that the constraint on hiring labor induced farmers to refrain from replanting new coffee trees. In addition, the aging problem of the coffee trees induced the removal of old coffee trees but did not significantly affect the replanting of new coffee trees when the hiring labor constraint was not imposed in the experiment.

Chapter 5 shed light on the problems of the succession decision and farm size. Two studies were also conducted in this chapter. The first study analyzed the farmer's land size history after the succession of the farming and land inheritance strategy based on the original survey in four Southern provinces. The analysis showed that the farmers tended to inherit land with a reduced size from their parents due to the equal sharing of the inherited land among the children. However, this study showed the farmers enlarged their farmland by conducting transactions between their relatives and others during their farming career. Furthermore, the farmers revealed their strategy that the transferred land size to the next generation was almost indifferent to their inherited land size from the parents. In this context, the second study

aimed to investigate the difference in farm size per child between households with and without successors in another original survey in Nakhon Si Thammarat province. Moreover, since the succession decision was not randomly deployed; thus, this study applied Propensity Score Matching (PSM) to address and correct the problem of self-selection. The findings indicated that either the farm size per child or the land productivity was not significantly different between the households, whether or not a successor existed. In considering the situation that land was mainly transacted through kinship, sibling, and relative relationships in the surveyed area, this result could be interpreted as the land investment effort or information on the land quality were likely to be shared in the local society.

Chapter 6 summarized the studies in the dissertation and discusses the policy implementation for the resilience and sustainability in the future. The suggestions were discussed on the following aspects. (1) Technical/practical support for crop diversification to help enhance resilience. (2) Dissemination of the agricultural standards to farmers involving more small-scale farmers. (3) Data dissemination to farmers. (4) Development of labor-saving technology. (5) A program for supporting and enhancing capacity-building for small-scale farmers in the future. (6) Enhancing and supporting farmer networks, especially for small-scale farmers. These discussions were constructed in mobilizing the advantage of social ties and networks.