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Chapter 4
The geography of the labor-intensive fruit export industry in Southeast Asia: A case study of Thai longan[1]

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Abstract

Comparing the fresh fruit export industry to a labor-intensive industry, we investigate the growth of fresh longan exports from Thailand to China. The export growth is attributable to the rising Chinese investment in the export fruit distribution system. We argue that possible determinants of the location of such Chinese investments include the abundance of cheap labor and concentrated landholding. Chanthaburi's endowment of these two factors, owing to its proximity to Cambodia, has attracted the Chinese investment in the fruit distribution system, which provided the impetus for fresh longan exports to China.
Keywords: fresh fruit export, longan, temporary migrant workers

1. Introduction

Longan (*dimocarpus longan*) is one of the major items of Thai fresh fruit exports to China, and the export value has increased from USD 110 million (2010) to USD 620 million (2017). For longan cultivation in Thailand, there are two primary cultivation regions, the northern provinces including Lamphun and Chiang Mai, and an eastern province, Chanthaburi. While the northern provinces are the traditional production region for longan, they exhibit a stagnant performance in terms of cultivation area and production volume. By contrast, Chanthaburi Province is an emerging longan cultivation region and has contributed to export growth in recent years.

We explore the contrasting performance of these two production regions by focusing on the behavior of the Chinese investment in the fruit marketing in Thailand, namely the investment in packing houses for grading and packing fruit in the production

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[1] This preliminary draft is not to be quoted. The fieldwork for this research was initiated by Aungkana Kamonpetch and Waranya Jitpong. The author is solely responsible for any remaining errors and omissions.

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areas for export. Investment in packing houses contributes to growth in longan production and export. We hypothesize that the Chinese investors have chosen the optimal location between the northern provinces or Chanthaburi for investment in packing houses to minimize the operating costs. We present evidence drawn from the field survey that Chanthaburi is endowed with the more suitable environment that has attracted the investment in packing houses, leading to growth in the production. We further discuss the implications of such behavior by the Chinese investment on the longan supply chain in Thailand.

The structure of this paper is as follows. Section 2 presents the framework of analysis in which we explicitly examine the behavior of investors in the longan marketing channel. Section 3 describes the trend of longan production and exports, and offers a brief summary of the two production regions. Section 4 contrasts the differences in the structure of the supply chains in the northern provinces and Chanthaburi. Section 5 presents the factors that affect the operating costs of the packing houses, which would account for a difference in the trend of Chinese investments between the northern provinces and Chanthaburi. Section 6 offers some concluding remarks.

2. Framework of the analysis

In fresh fruit export, how to maintain the freshness of the harvested fruit and deliver the product to the consumers is the key issue. The fruit distribution system is a mechanism that procures perishable fruit from producers and delivers the product to the consumers. The distribution system includes facilities that grade and pack the fruit (packing houses), transportation companies, exporters/distributors, and the retailers in consumption areas.

In this paper, we focus on the issues related to the packing houses; (1) boundaries of a firm, and (2) location of the packing houses.

First, the boundaries of a firm are the question of which firm in the supply chain can initiate vertical integration, such as an exporter producing fruit on its own account (Suzuki et al. 2011). In our case, we are interested in which firm manages the packing houses. In a less integrated supply chain, there are packing houses managed independently from the exporters or distributors. Such packing houses would procure fruit from producers and handle the grading and packing of the fruit according to their criteria, and conduct spot trading with the exporters or distributors. As coordination among firms in the supply chain progresses, the exporters or distributors instruct the product specification to the packing houses in advance. The packing houses purchase and grade the fruit based on the buyers' specification and then deliver to the buyers. As the integration progresses further, the exporters, distributors, or the retailers themselves may invest in packing houses in the production area and manage the procurement. In addition, such packing houses sometimes undertake contract farming with the producers and cultivate the fruit according to the desired quality and shipping schedule. Thus, the boundaries of a firm can take various forms; for packing houses, there can be various management forms, ranging from independent management to subsidiary of a downstream firm.

Second, in the literature covering agricultural supply chains (Key and Runsten 1999), not much attention has been paid to the location of the packing houses. Packing houses are regarded as being attached to the fruit production areas; they are not considered as selecting their preferred location. The location of the fruit grower determines where the packing houses are located. Fruit growers produce fruit by combining (1) farmland, (2) labor, (3) technology, and (4) capital. Here, capital refers to working capital to purchase inputs such as chemical fertilizer and pesticide. As a traditional production unit, family agriculture is assumed. Packing houses or downstream firms may provide funds and technology to the fruit growers through contract farming, which alleviates their constraints and contributes to the expansion of the scale of fruit production.

Unlike the viewpoint of the existing research as described above, we consider explicitly that the packing houses' decision-making regarding the selection of a location. Here, we assume that a packing house chooses the optimal location among several production areas to minimize the production cost. The products of the packing house are packed and graded fruit. A packing house takes into account not only the fruit's procurement but also the labor management required for harvesting, grading and packing the fruit, and the transaction costs, such as the cost for implementing contract farming. Our approach is in line with the analysis of industrial location, especially the location of the labor-intensive industry (Scott 2006).

Also, complementarity works between the packing houses and the fruit producers. A packing house is a facility for sending perishable fruit to the consumption area. Investment in packing houses improves the producers' access to the market. As access to the market improves, the producers can expand their production scale, which attracts further investment in packing houses. In addition, packing houses and their downstream firms often provide funds and technology to the fruit growers through contract farming, which alleviates any constraints by the growers and leads to an increase in production.

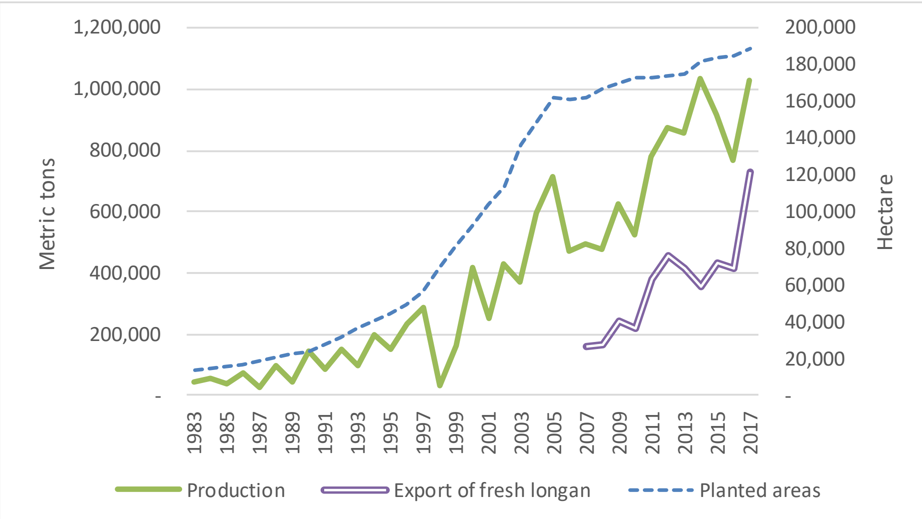
In the rest of this paper, we examine the issue of packing houses' location choice and the implications for the producers.

3. Overview of longan production and export

3.1 Statistics of production and export

First, we present an overview of longan production and export using various official statistics. Figure 1 summarizes the changes in cultivated area, yield and export volume of longan. The cultivation area has increased rapidly in the 1990s and the early 2000s, but the pace of increase has slowed since 2005. Regarding yield, the official statistics show sharp fluctuations. Regarding the export volume, the available statistics from 2007 indicate a rising trend from 160,000 tons in 2007, to 726,000 tons in 2017. The proportion of fresh longan exports to the total production volume reached 70% in 2007. Apart from fresh longan, a considerable amount of dried longan is exported to China, which implies that the proportion of domestic consumption to the total production volume is not high.

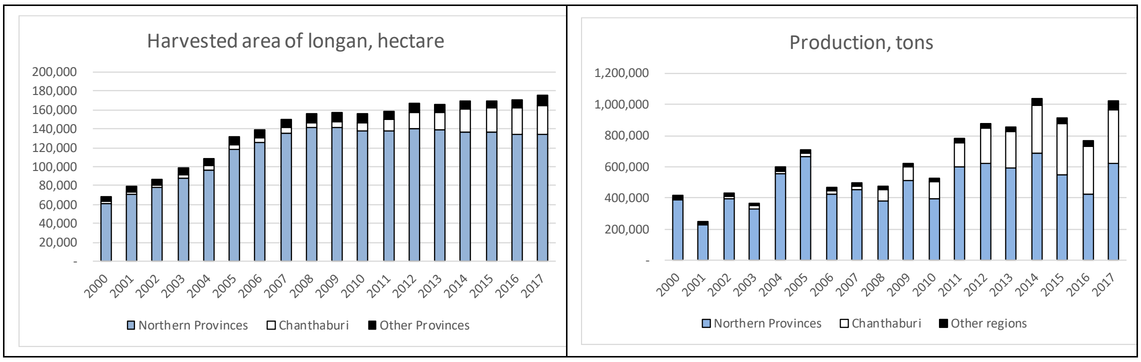
Figure 1: Longan planted area, production and fresh longan exports



Sources: Office of Agricultural Economics; Thai Customs

Longan's main production areas include the northern provinces (Chiang Rai, Phayao, Lampan, Lamphun, Chiang Mai, Mae Hong Son) and the emerging production area of Chanthaburi Province in eastern Thailand. Figure 2 shows the trend in the cultivation area and yield of longan, divided into the northern provinces, Chanthaburi Province, and the rest of the country. Looking at the cultivation area, the northern provinces occupy about 80%, but this has decreased gradually since 2005. By contrast, the cultivation area has been on the rise in Chanthaburi Province; in 2017 it occupied about 17% of the nationwide longan cultivation area.

Figure 2: Longan harvested area and production by region



Source: Office of Agricultural Economics

On the other hand, Chanthaburi Province accounts for 30% of the total nationwide production. The yield per unit area in Chanthaburi Province is more than twice as large as that in the northern provinces. Longan is a tree crop, and it yields the first harvest about five years after planting. Given the rise in the planted area in Chanthaburi Province in recent years, it is expected that its share in production will continue to increase in the near future. By contrast, fluctuation in the production volume in the northern provinces is intense.

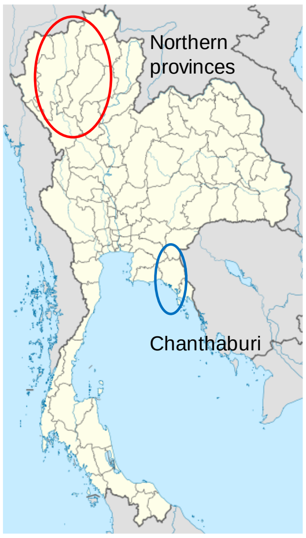
The harvest season of longan is from July to September. However, by adjusting the timing of fertilizer dosage, the temperate climate of Thailand enables off-season harvesting. Because China—the primary export destination of Thai longan—also produces in-season longan, production of the off-season longan harvested from October to April is common, especially in Chanthaburi Province.

3.2 Two production regions

There are two major technological changes in longan cultivation in Thailand. First, was the attempt to diffuse longan cultivation from the northern provinces to various other parts of the country in the 1980s. As part of this attempt, longan cultivation was started in Chanthaburi Province. Chanthaburi Province has been well-known for fruit cultivation, including durian and rambutan. Longan cultivation spread in the northern district of the province, which was relatively less developed at that time. Another is the diffusion of technology for off-season cultivation since around 2000. With this, it became possible to export longan during China's lean season.

We contrast the characteristics of these two production regions of longan, the northern provinces and Chanthaburi Province. Figure 3 illustrates the location of these two regions. The northern provinces are the traditional production area. Among the northern provinces, Lamphun and Chiang Mai collectively account for 84% of the total longan production. The average farm size is estimated to be about 1 hectare (6 rai), and family-run farmers grow on-season longan. Longan from the northern provinces is used for two purposes, fresh fruit and processed fruit (dried fruit). The destinations of the fresh fruit are exports to China and Indonesia as well as some consumption in the domestic market. The dried fruit is all exported to China.

Figure 3. Two production regions



Source: Wikipedia map is edited by the author.

Chanthaburi Province is the emerging production region. The average farm size is estimated to be about 3 hectares (20 rai). Many large orchards above 10 hectares exist in this region. As mentioned above, during the attempt to diffuse longan cultivation in the 1980s, cultivation was established in Soi Dao and Pong Nam Ron Districts in the northern part of Chanthaburi Province. At that time, these districts were less developed and remote areas where cassava and corn were cultivated by farmers whose land title registration status was ambiguous. Such land was enclosed by retired government officials, soldiers and investors who started longan cultivation. Therefore, unlike family-run longan cultivation in the northern provinces, the operation size is larger in Chanthaburi Province. In addition, the diffusion of techniques for off-season cultivation accelerated cultivation of longan aiming at the export market. The bulk of the production in Chanthaburi Province is exported to China as fresh longan.

4. Comparison of the supply chain structures in these two regions

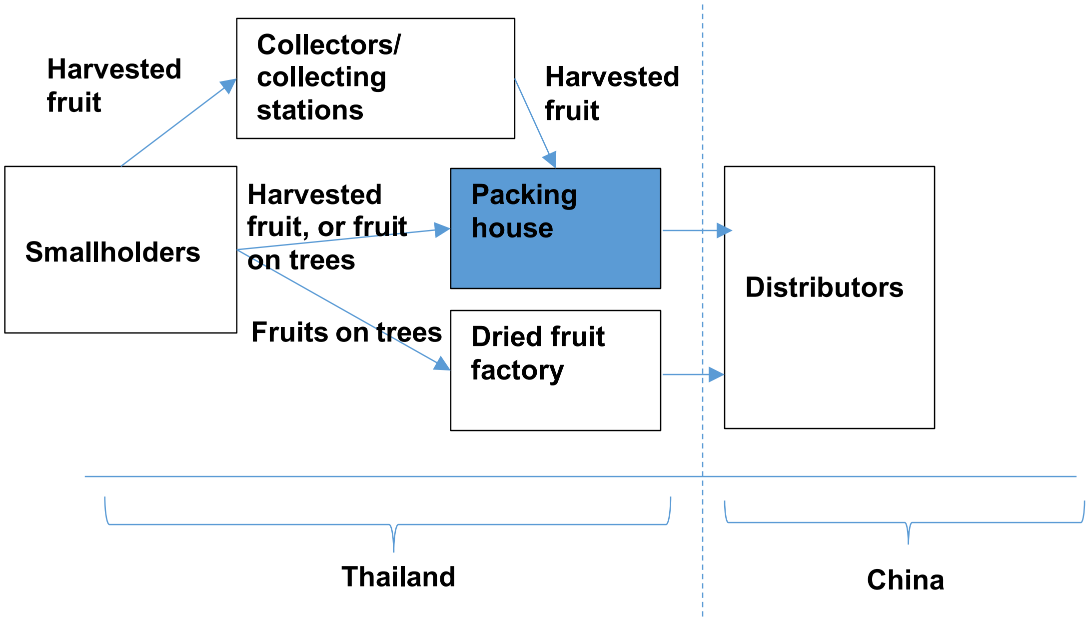
By comparing the longan export supply chain structure in these two regions, with a particular focus on the packing houses, we explore the background of the increase in fresh longan exports.

4.1 Supply chain in the northern provinces

The structure of the longan export supply chain in the northern provinces is summarized in Figure 4. The supply chain has the following features. Firstly, the producers are mostly small farmers. Large-scale farms over 10 hectares are few. Secondly, farmers and packing houses trade in spot transactions. Farmers often supply their harvest to either the collectors or packing houses. Sometimes, farmers sell the fruit on trees just before harvesting to the packing houses who bring their own workers to handle harvesting. Nonetheless, contract farming between packing houses and farmers is not common. By contrast, dried fruit processing factories purchase the fruit on trees. Before harvesting, these factories buy the fruit and dispatch their workers to handle the grading at the time of the harvest and bring the harvest to their factories.

For the trading of fruit on trees, there are two patterns of pricing. One is that the fruit in the field is priced by total amount. The other case is that the buyer (packing house or dried longan processing factory) sets the price according to the fruit's quality and pays the total amount according to the actual harvest. While the latter case appears to offer more transparent pricing, there can be a dispute between the grower and the buyer; as the buyer arranges the harvest labor, its workers can cherry-pick and not pick any small-sized fruit to reduce the total amount purchased.

Figure 4: Structure of the longan export supply chain in the northern provinces



Source: Author

Some packing houses in the northern provinces present daily purchase prices for farmers delivering harvested fruit. The fruit priced by size, and larger fruit achieves a higher price. Among the packing houses, at least two patterns of pricing are assumed. In one case, an independently managed packing house sets the price to buy fruit from the farmer by judging the market condition themselves, and it deals with the downstream buyers by taking the risk of price fluctuations. In the other case, the packing house has a contract with the downstream buyer to procure fruit at the price set by the buyers. In the latter case, the packing house is paid a commission fee according to the volume of packed and graded fruit. We cannot differentiate between these two patterns of pricing easily. In any case, the buying prices are not so much different, since the farmers can collect the price information and select to whom to sell.

An example of a packing house in Lamphun Province is as follows. It is a medium-sized packing house owned by a Thai businessman. It posts the fruit buying price in the office to accommodate farmers bringing the harvested fruit as a spot transaction. The workers in this packing house are mostly Burmese migrants. Because the amount of fruit arrival varies from day to day, the packing house adjusts the operational capacity with overtime work by its employees. The packing house operates only during the in-season—July to September.

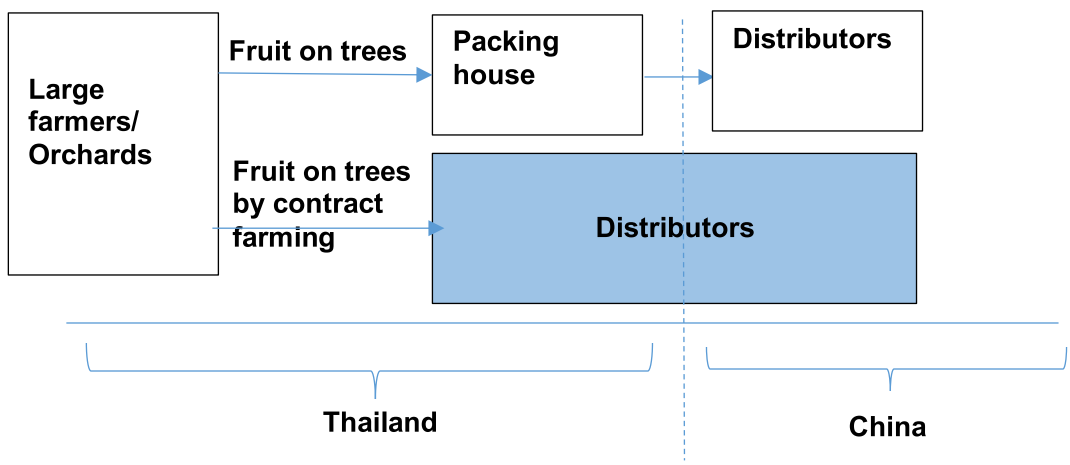
Another packing house in Lamphun Province also only operates during the in-season only. It is managed by a Thai businessman. However, the staff of a Chinese distribution company stays in the packing house and directs the purchase during the in-season longan harvest time. The Chinese staff set the prices of the harvested fruit. The packing house receives a commission fee according to the volume of the fruit packed and graded by the facility.

Finally, dried fruit processing factories compete with packing houses for procurement of inn-season longan. They are mostly managed by Chinese entrepreneurs. They have cold storage to stock semi-processed dried fruit for further processing at the time of sale.

4.2 Supply chain in Chanthaburi

The longan export supply chain in Chanthaburi Province is summarized as shown in Figure 5. First, producers have relatively large orchards. Many large orchards are over 10 hectares. Second, farmers and the packing houses negotiate contracts in advance which allows the packing houses to manage the timing of the fruit's arrival. Third, the packing houses do not accept spot deals with the producers. The harvesting work is carried out by workers dispatched by the packing houses to the orchards. The workers do the grading of the fruit at the time of the harvest, and bring the graded fruit to the packing houses.

Figure 5: Structure of the longan export supply chain in Chanthaburi Province



Source: Author

There are two reasons why the packing houses in Chanthaburi Province engage in contracts with the farmers beforehand about the cultivation and shipping schedule. First, in Chanthaburi, farmers grow off-season longan whose harvest period runs from October to April. To level the arrival of fruit, the packing houses need to make prior arrangements. Second, the competition among packing houses is fierce. The packing houses prefer to secure fruit purchases by presenting the purchase price in advance and by making partial advance payments to the farmers.

An example of a packing house in Chanthaburi Province is the investment by a Chinese distributor whose headquarters is in Chongqing. The packing house's parent company is one of the leading fresh fruit distributors in China, with sales bases in the major cities in southern China. In 2007, the company established its own packing house in Chiang Mai, and another in Chanthaburi in 2009. According to its website, the company is ranked first for China's imports of Thai longan, and its packing house in Chanthaburi is the largest in Thailand. A rough estimate of the company's export of Thai longan to China consists of 60,000 tons from Chanthaburi and 20,000 tons from Chiang Mai, totaling about 10 percent of the total Thai exports to China. The company sells about 70% of the imported fruit from its branch offices to supermarkets and retailers, while the rest is sold in various wholesale markets throughout China.

The packing house procures fresh fruit by contract farming with the farmers. Contracts are negotiated for about four to six months before harvesting. The prices, set by the size of the fruit, are determined at the time of the contract. In October 2018, the purchase price of the top and second grade fruit was 32 baht per kilo and 30 baht (approximately 1 US dollar), respectively. The fourth grade is purchased at 3 baht per kilo. If the proportion of lower grade fruit in the harvest exceeds a certain portion, the packing house imposes a massive price discount. The harvesting work is handled by the packing house, but in the case of small farmers whose farm size is below a particular scale, and not sufficient to fill the daily work volume of the harvesting worker team, the packing house cuts the purchase price. The average production cost of longan in Chanthaburi Province is estimated to be 17 to 20 baht per kilo.

The managing director of the packing house is dispatched from China, and purchasing managers in charge of negotiations with farmers are also Chinese who have acquired Thai language skills. The purchasing managers monitor the farmers even after signing a contract so that suitable quality fruit is produced on schedule.

5. Location choice of a packing house

As more than 90% of exports of fresh longan are to China[3], the investment in packing houses is dominated by firms connected to Chinese buyers. Investments from China takes various forms, including a joint-venture with Thai capital and firms using Thai people as nominees. On the other hand, packing houses with Thai capital coexist.

When Chinese firms invest in packing houses, how do they select the location between the northern provinces and Chanthaburi? Here, we assume the firm chooses the location where they can minimize the production costs while maintaining the quality of the product. As factors affecting the production costs of the packing houses, we focus on (1) labor supply and (2) distribution of the farmers' size.

Firstly, since operations of packing houses—harvesting, grading and packing—are labor-intensive tasks, labor supply is the primary consideration for the location of a packing house. Moreover, unlike industrial products, labor demand for exporting fruit exhibits a strong seasonality; the labor required to maintain the fruit trees is limited, but harvesting requires much labor. Also, even for the off-season cultivation, there is little harvest work from May to August. Such nature of longan production and export makes labor management a challenging issue. In the northern provinces, the farmers themselves harvest the fruit; in some cases, the farmers in rural villages organize self-help groups to provide harvest labor services reciprocally among the members, which partially alleviates the labor demand fluctuation of the packing houses. However, when the packing houses purchase the fruit on the trees, they have to arrange the harvesting workers in addition to packing.

In Chanthaburi Province, temporary migrant workers from Cambodia enable packing houses' flexible workforce management. Chanthaburi Province has an agreement with the neighboring Cambodian Province of Battambang to accept temporary migrant workers. By a simple procedure, Cambodian migrant workers are issued a short-term work permit which is valid only for a designated employer in Chanthaburi Province. For the packing houses, temporary migrant workers from Cambodia are the source of an abundant cheap workforce. The Ban Laem border gate is located in Phong Nam Ron

[3] For the export of longan to China, the proportion of fruit sent to China via Vietnam has increased. As the Vietnamese longan exported to China by cross-border trade is subject to China's preferential tax scheme, Thai longan is disguised as Vietnamese and re-exported to China by cross-border trade. Furthermore, in the bilateral agreement with Thailand, the Chinese authorities require that the Thai fresh longan exported to China goes through fumigation at the packing houses certified by Thai authorities' Good Manufacturing Practice (GMP). It is inferred that those fruits packed at uncertified facilities are disguised as Vietnamese to circumvent the regulations.

District of Chanthaburi Province, which is the gateway for temporary migrant workers from Cambodia.

The longan export supply chain in the northern provinces also depends on migrant workers from Myanmar. The migrant workers are engaged in unskilled labor, such as fruit harvesting, grading, and packing. However, the longan production area is not close to the border gates, and there is no system to accept temporary migrant workers as in Chanthaburi Province.

Secondly, it is considered that the relatively large scale of farmers growing longan in Chanthaburi Province works more advantageously for a packing house's location. Assuming that the contractual procedure and monitoring costs for the farmers are constant regardless of the contract farmer's size, contracting with a large-scale farmer rather than a small-scale farmer is more efficient for a packing house to reduce the per unit procurement cost (i.e. transaction cost per kilogram of fruit). In the northern provinces, farmland ownership has been sub-divided, as longan cultivation has a longer history. By contrast, in Phong Nam Ron and Soi Dao districts of Chanthaburi Province, due to underdevelopment, the frontier of ambiguous land title registration development has remained until recently, which enabled large-scale farmland enclosures.

We argue that the two elements of abundant temporary migrant workers and large scale farms as above led the Chinese investment to prefer Chanthaburi to the northern provinces as the location of a packing house, which gave impetus to the growth of longan production and export from the latter region. Table 1 summarizes the number of longan packing houses and dried longan processing plants. Although the cultivation area and harvest of longan are still higher in the northern provinces, the number of packing houses in Chanthaburi is catching up with that in the northern provinces. While accurate time series data on the number of houses is not available, it has increased from around forty packing houses in 2012 to seventy-one in 2018 in the northern provinces. On the other hand, in Chanthaburi Province, the number has nearly tripled to fifty-eight in 2018 from below twenty in 2009.

Table 1: Number of packing houses and dried fruit processing plants by region in 2018

Province	Fresh longan packing house	Dried longan processing plant
Chiang Mai and Lamphun	71	83
Chanthaburi	58	0

Total	129	83

Source: Office of Agricultural Economics

However, the location advantage of Chanthaburi for a packing house is also a potential threat. The packing houses in Chanthaburi Province benefit from the abundant temporary migrant workers from Cambodia and the large-scale longan orchards. If packing houses pursue further cost reduction, they may move the location to the Cambodian side of the border. Cambodia has an abundant cheap labor force and frontier land. In fact, some Thai entrepreneurs have longan orchards on the Cambodian side of the border, and unofficially have brought longan to Chanthaburi Province to disguise it as Thai produce for export to China.

6. Concluding remarks

In this article, we shed light on the growth of the Thai fresh longan export business to China, focusing on Chinese investment in fruit distribution (packing houses). Two major production areas—the northern provinces (Chiang Mai and Lamphun) and the eastern province (Chanthaburi)—exhibit different performance. Chanthaburi Province has two advantages compared with the northern provinces, which attract Chinese investment in packing houses and contribute to longan production and exports. One is the availability of temporary migrant workers from Cambodia, which facilitates flexible labor management by the packing houses. The other is the large-scale orchards which emerged through the enclosure of the farmland due to ambiguous land title registration.

The above two benefits enhance the superiority of Chanthaburi Province to the northern provinces when Chinese investors choose the location for the packing houses. However, if the investors seek to reduce the production cost further, it is conceivable that the packing houses may move from the Thai side to the Cambodia side of the border region in the future. Since Thai longan exports are heavily dependent on cheap migrant labor from Cambodia, leakage of Chinese packing houses to Cambodia is a potential threat.

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