

Chapter 1

Impact of China's increasing demand for agro produce on agricultural production in the Mekong region

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Abstract

Fresh tropical fruit exports from Indochina to China increased rapidly in recent years. Drawing on various bodies of literature including those on (i) agricultural production diversification into horticulture from grains and (ii) buyer-producer relationship, we investigate how the rapid growth in China's fresh fruit imports exerts impacts on agricultural development in Indochina. In this introductory chapter, we spell out how individual case studies of this project link with the literature. One of major contributions of this project is to the literature of global value chain analysis on international trade of horticultural produce. We present the empirical evidence on the structure of the supply chain when the destination market is China, an emerging economy. We examine how the preference of Chinese market, which is apparently different from those of advanced countries, possibly affects the supply chain structure.

Keywords: Fresh tropical fruits, Diversification to horticulture, Global value chain analysis, China, Indochina

1. Introduction

Fresh tropical fruits exports¹ from Indochina to China exhibited a tremendous growth in the past decade. China's imports of fresh tropical fruits amounted to USD 2.468 billion in 2017, which surged from USD 1.378 billion in 2011. Its average annual growth rate of 10.2 percent by far exceeded the country's aggregate import annual growth rate of 3.6 percent.

¹ In this paper, tropical fruits include bananas, durian, longan, dragon fruit, coconuts, mangosteens, pineapple, watermelon and mangoes

Indochina countries, namely Lao People's Democratic Republic (Lao PDR hereafter), Myanmar, Thailand and Vietnam, are main suppliers of fresh tropical fruits in China. For these exporting countries, China is the main export market, too. In Vietnam, the value of fresh fruit exports has exceeded that of rice—the country's traditional agricultural export commodity—since 2015. Although the shares of Lao PDR and Myanmar in China's fresh fruit imports might not be high, the impacts of the trade on the former countries might be nontrivial considering the relative size of the Chinese economy.

There are multiple factors that could be associated with the rise in China's imports of fresh fruits from these countries. One is China's economic growth that raised the living standards of Chinese consumers. Since per capital income in terms of purchasing power parity has increased more than threefold², its consumers are considered to have diversified their food consumption more into fresh fruits and vegetables from grains.

Another development is the deepening economic integration between China and Indochina. In November 2002, ASEAN-China Free Trade Agreements were signed. In addition, under the initiative of the Asian Development Bank, the transport infrastructure in the Greater Mekong Subregion—Yunnan and Guanzhong Autonomous Region of China, Cambodia, Lao PDR, Myanmar, Vietnam and Thailand—has been improved in the past two decades, enhancing connectivity among the countries. These fostered intra-regional trade between China and Indochina, especially by cross-border trade.

Cross-border trade with China has a particular implication for some inland rural border areas of Lao PDR and Myanmar as their disadvantage of landlocked location has turned into an advantage of geographical proximity to the Chinese market. Cultivation of export-oriented nontraditional crops targeting the Chinese market can be a driver of rural transformation in these regions.

We aim to explore the rise in fresh fruit exports from Indochina to China. We examine the background of the rise in China's imports and analyze its impacts on the rural economies of exporting countries. We study the cases of fresh fruit exports to China from four countries, namely Lao PDR, Myanmar, Thailand and Vietnam. Specifically, we pick up the following crops: watermelons in Lao PDR, watermelons

² According to the World Development Indicator database of the World Bank, China's per capita income in terms of the constant 2011 international dollar increased from 3,980 in 2001 to 14,399 in 2016.

and melons in Myanmar, durian in Thailand, and dragon fruit and lychee in Vietnam. We complement these case studies of the exporting countries with an analysis of China's import statistics.

We expect some similarities and differences in experiences of four countries as to fresh fruit exports to China. The stage of economic development differs considerably between two groups of countries, Lao PDR and Myanmar on the one hand, and Thailand and Vietnam on the other hand. Such differences in economic conditions are one of factors that may alter the structure of fruit trade. Alternatively, the flow of business might be more affected by technical features of crops; it may be more different between single year crops and perennial crops in a country than between countries of different stages of economic development for the same crop. Comparative case studies would give us some insights into the determinants of the structure of fruit trade.

We take interdisciplinary approaches to analyze the multifaceted phenomenon of the rise in China's fresh fruit imports from Indochina. Individual case studies are tailored to focus on either the behavior of growers, the relationship between growers and buyers, or the macroeconomic conditions, depending on the subjects.

The remainder of this chapter is structured as follows. In Section 2, we briefly review trade and production statistics to obtain an overview of China's fresh fruit imports from Indochina. In Section 3, we present a review of the literature which are relevant to our analyses on fresh fruit trade. In Section 4, we spell out the research questions that we address in this project, and link the subsequent case studies to the bodies of literature to highlight their possible contribution.

2. Overview from trade and production statistics

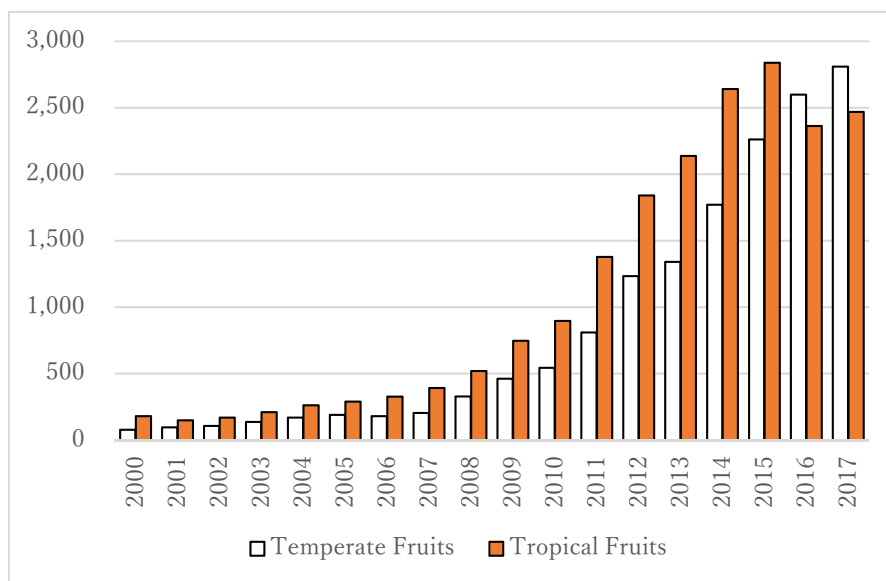
2.1 China's import statistics

China's imports of fresh fruits has been increasing rapidly. According to China Customs data, its imports of edible fruits and nuts (HS Code 08) amounted to USD 6.379 billion in 2017, accounting for 0.36 percent of the country's total imports. While its share is low, the growth rate of fruit imports exceeded that of the country's total imports in recent years.

Figure 1 illustrates the trend of China's fruit imports in 2000-2017. Fruits are categorized into temperate fruits and tropical ones. Major temperate fruits include cherries, grapes, oranges, kiwi fruit and apples, imported from the United States, Chile,

and New Zealand among others. The sharp rise in temperate imports in recent years is attributable to cherries; while there had been no recorded imports of cherries until 2011, the imports amounted to USD 771 million, accounting for 12.1 percent of the country's total imports of edible fruits and nuts in 2017.

Figure 1 China's fruit imports (US\$ mil.)



Source: Compiled by authors using the data of China Customs

Note: In this figure, watermelons are classified as a tropical fruits.

Imported tropical fruits include bananas, durians, longan, dragon fruit, coconuts, mangosteens, and pineapple. Table 1 lists major imported tropical fruits in the Chinese market and their source countries. Countries of the Association of Southeast Asian Nations (ASEAN) are main suppliers of fresh tropical fruits to China. Thailand takes the leading position in several crops including durians, longan, and mangosteens.

Table 1 China's imports of tropical fruits in 2017

Description	Import Value in 2017 (US\$, mil.)	Exporting Country (Share, %)
Bananas	580	Philippines (71%), Ecuador(14%), Vietnam(4%), Thailand(4%), Myanmar(3%)
Durians	552	Thailand(100%)
Longan	438	Thailand(57%), Vietnam(43%)
Dragon Fruit	390	Vietnam(100%)
Coconuts	166	Indonesia(48%), Thailand(37%), Vietnam(9%)
Mangosteens	147	Thailand(99%), Malaysia(1%)
Pineapple	146	Philippines(70%), Taiwan(26%), Costa Rica(3%)
Watermelons	32	Vietnam(99%), Myanmar(1%)
Mangoes	19	Taiwan(29%), Australia(26%), Thailand(20%), Peru(19%)

Source: Compiled by authors using the data of China Customs

China's import data may not be accurate particularly for imports from Lao PDR and Myanmar. As for watermelons, China's recorded imports from Myanmar in 2017 amounted to 7,665 MT, whereas the corresponding figure of Myanmar's exports to China was approximately 400,000 MT. If imports from Myanmar had been properly recorded, China's watermelon imports would have been twice as high as the recorded quantity.

2.2 Statistics on production and exports

From the viewpoint of Indochina, China is one of the top destinations of their fruit exports. As for Thailand, the exports of edible fruits and nuts amounted to USD 2.329 billion (0.99 percent of the country's total exports) in 2017³, of which China accounted for 36.1 percent. As for Vietnam, the corresponding figure was USD 4.611 billion (2.61 percent of the country's total exports) in 2016, of which 43.4 percent went to China. In Vietnam since 2015, fruit exports have exceeded rice exports—the country's main agricultural export commodity in the past. Fresh tropical fruits exports to China are a driving force of agricultural development in Indochina.

While fresh fruits production in Indochina have both the domestic and export markets, there are two notable patterns of fruit exports. First, some nontraditional cultivars targeting the Chinese market are produced in Indochina that are not commonly consumed in their domestic market. A good example of this is watermelons in Myanmar

³ This figure does not include exports of preserved (canned) pineapple (HS code 200820), which amounted to USD 571 million in 2017. Pineapple is the top export fruit in Thailand, followed by fresh fruits of longan, durian, mangosteens and mangoes. Dole, an agricultural multinational corporation, has pineapple processing operations in Thailand. Thailand is the top exporter of canned pineapple in the world.

and Lao PDR.⁴ The seeds of Chinese cultivars are brought into these countries, and the bulk of the harvests is exported to China. Single year crops including watermelons and bananas are easier to diffuse from China to exporting countries compared with perennial crops such as durian, longan, and mangosteens. Second, indigenous cultivars of fruits are produced and exported to China either by switching the sales from the domestic market to exports, expanding cultivation, or both. This pattern applies to most of perennial crops. Proportion of exports to the total production varies considerably among such crops. As for Thai durian, 63 percent of the total production was exported, mostly to China (Hnin Ei Win 2017).

China imports some fruits which are also cultivated in China, including longan and watermelons. Producers in Indochina take advantage of the difference in harvest seasons of such crops. For example, longan is commonly cultivated in Southern China and the total production in China amounted to 1,283 thousand MT in 2010 (Qiu 2014), which by far surpasses the imports from Thailand (137 thousand MT) and Vietnam (155 thousand MT). Similarly, China is the largest producer of watermelons in the world with the total production of 79,043 thousand MT in 2016, while the total production in and exports from Vietnam were 1,103 thousand MT and 180 thousand MT, respectively.⁵

3. Literature review

The rise in exports of fresh fruits from Indochina to China is multifaceted phenomena which can be examined from various analytical perspectives. We list four bodies of the literature that are relevant for our study.

3.1 Grain to horticulture literature

While fruit cultivation and exports have been common in Thailand and Vietnam, they are relatively a new phenomenon in Myanmar and Lao PDR. In the latter countries, the rise in export-oriented fruits production targeting the Chinese market can be discussed in relation with transformation of the agricultural sector from grain to horticultural production. Grain production refers to traditional extensive agriculture of relatively low

⁴ Vietnam also exports watermelons to China. The statistics of the Food and Agriculture Organization of the United Nations (FAO) indicate that the exports (198 thousand MT) amount to only 17 percent of the total production (1,163 thousand MT) in 2013.

⁵ FAO stat.

value staple crops including rice, wheat and beans. In contrast, horticulture refers to intensive cultivation of fruits and vegetables which obtain higher value in the market than grains. Drawing on Weinberger and Lumpkin (2007), we list several characteristics of horticulture in comparison with grain.

First, horticultural production generates higher income than grain production. Revenues from horticulture per unit of land can be several times higher than those of grain. Thus, transition from grain to horticultural production is compatible with poverty alleviation. Analyzing welfare implications on farmers of their participation in supermarket-driven export horticulture supply chains through cooperatives, Maertens et al. (2012) confirm positive welfare effects in the context of Sub-Saharan Africa.

Second, horticultural production requires labor and inputs more intensively than grain production. It generates demand for agricultural laborers which in turn raises their wages in the rural labor market, as documented in Maertens et al. (2012) in the context of Sub-Saharan Africa. At the same time, horticultural producers need to finance intensive production. Lack of financing resources would hamper transition from extensive grain cultivation to intensive horticultural cultivation. Key and Runsten (1999) analyze functions of contract farming including supply of credit, production input and knowledge, and they examine determinants of successful and unsuccessful contracting.

Third, fruits and vegetables are perishable. While grains can be stored for some time, fruits and vegetables have to be consumed or processed quickly since their shelf life is short. As a result, the prices of fruits and vegetables can be more volatile than those of storable grains. Contract farming with buyers or their marketing agents which sets the prices in advance can mitigate the price risk for farmers. However, in their case study of Nicaraguan horticultural farmers under contract farming, Michelson et al. (2012) illustrate that, although contracts lower the volatility of prices that contracting farmers receive, they are paid lower compared with outgrowers, implying that they face high insurance costs for price stability that the contracts offer.

In relation with the third characteristics of horticultural produce, the literature on transition from grain to horticultural production often focus on marketing. The markets of horticultural produce include both the exports and domestic market. One branch of the literature focuses on farmers' access to the domestic urban market. As the urban dwellers are the primary consumers of commercialized horticultural produce, the access to the urban areas, or more precisely the distance to major cities, can be an influential factor for farmers whether they can switch from grain to horticultural

production, which is the subject of analyses in existing studies (Wang et al. 2009).

The literature of transition from grain to horticultural production emphasize marketing, which makes a stark contrast with the literature of grain production (Reardon and Timmer 2007). The earlier studies of grain production concentrated on yield and production efficiency, and adoption of new technologies in relation with food sufficiency and security. Later on, the grain literature have shifted the focus to poverty alleviation and environmental sustainability. In the literature of horticultural production, productivity and efficiency are not the main scope of analysis. This is perhaps due to the fact that horticultural produce is more diversified in quality, and it has the characteristics of differentiated products, whereas grain produce is more homogenous and has the characteristics of commodity.

The analytical scopes of the grain to horticultural production literature include following research questions,

- (1) Which farmers' characteristics are correlated with their move from grain to horticultural production?
- (2) Is horticulture pro-poor, favorable for smallholders?

As for the first research question, horticultural produce is more differentiated products and buyers impose quality standards on suppliers. Furthermore, as pesticides are often applied intensively in horticulture, food safety is a serious concern. Growers are often required to fulfill traceability of their produce as to use of agrochemical when they sell produce to the quality food market in advanced countries. Food quality and safety standards can be a major constraint for smallholders, which could exclude them from the market.

The second research question is related to economies of scale. Horticultural production is more labor intensive compared with traditional grain production. Small scale family-based production also exist. Competitiveness of small scale production can be discussed in relation with economies of scale; if there is diseconomies of scale in horticultural production, small scale family-based production can function better than large scale plantation.

3.2 Global value chain analysis literature

Studies on horticultural produce from the viewpoint of the global value chain (GVC) analysis have been proliferating. The GVC analysis interprets development of industries from the viewpoint of interaction between suppliers and buyers. From this perspective,

the governance structure of the supply chain—the relationship between suppliers and buyers—differ from one industry to another. Depending on the technological characteristics of products that an industry produce, there emerge vertical coordination between the upstream and downstream firms and their mergers, or upstream and downstream firms remain independent with each other. Furthermore, industries are classified into supplier-driven and buyer-driven ones, and the direction of growth as well as constraints of growth of a particular industry is examined based on its governance structure.

The GVC approach applied to the horticultural supply chain often discusses the development of horticultural production in relation with rises in supermarkets as buyers. There have been rises in supermarkets in two ways. One is consolidation of the retail sector in advanced economies and their international procurement, and the other is proliferation of supermarkets in developing countries, which is often called the supermarket revolution.

First, as for consolidation of the retail sector in advanced economies, the market share of a small number of supermarket chains have increased, which has changed the governance structure of the food supply chains and has made the procurement policies of the supermarket chains on suppliers more influential. At the same time, the consolidated supermarket chains have expanded their procurement of horticultural produce in developing countries. Accordingly, the GVC literature argue that the food quality and safety standards by the supermarket chains in advanced countries have become more influential on horticultural producers in developing countries than ever before.

Second, as for the supermarket revolution in developing countries, the share of supermarkets in distribution of fresh fruits and vegetables has been rising continuously, taking over the position of the traditional wet market. Behind this trend is the rapid urbanization in these countries. The supermarket revolution in developing countries is considered to have important implications on their horticultural producers in terms of their access to the market.

In the GVC literature about international trade of horticultural produce, there is a controversy about impacts of food safety and quality standards on smallholders. Fresh fruits and vegetables are subject to the sanitary and phytosanitary (SPS) measures, and they are often considered as non-tariff barriers to trade (Unnevehr 2000). Moreover, since the retail sector has been consolidated in advanced countries and large supermarket chains have extended their procurement to developing countries, their

private quality standards have become also influential on farmers in developing countries.

One view is that buyers' quality standards marginalize smallholders from the lucrative markets in advanced countries (Humphrey 2006; Maertens and Swinnen 2009). Compliance to the standards may require initial large investment which is not compatible with smallholders. As for the buyers, it can be easier to deal with a smaller number of larger farmers to instruct their quality standards than with a larger number of smaller farmers. Shepherd (2005) documents that some supermarket chains have consolidated the number of vegetable suppliers in Malaysia and Thailand.

The other view is that buyers' quality standards quantifies the requirements explicitly that suppliers need to fulfill, which facilitates small farmers in developing countries to access the lucrative markets in advanced countries (Codron et al. 2014). Drawing on the case study of tomato farmers in Turkey, Codron et al. (2014) argues that adoption of integrated pest management and the good agricultural practices has made the European market more accessible for small farmers as well.

The analytical scopes of the GVC literature on horticultural produce include access of smallholders to the supermarkets in both advanced and developing countries. In addition to the implications of food safety and quality standards on farmers, existing studies examine the role of cooperatives if they facilitate smallholders' access to supermarket. Moustier et al. (2010) argue that cooperatives improve smallholders' access to the quality food market of supermarkets in Vietnam by consolidating supply of quality produce from individual farmers whose supply are otherwise variable. In contrast, Lemeilleur and Codron (2011) argue that the marketing function of cooperatives are not always superior to the traditional commission agents in Turkey, whereas cooperatives as a financing mechanism is effective in promoting upgrade of produce quality.

Another body of GVC literature addresses the structure of supply chain. Vagneron et al. (2009) examine the evolution of the supply chain structures of fresh pineapple sector in the global market. They discuss how technological changes are associated with the entry of multinational firms such as Dole and Del Monte in pineapple processing, which are now confronting consolidated retailers. Similarly, contract farming is one type of supply chain structures, which we discuss in some detail below as the separate literature.

3.3 Contract farming literature

Contract farming is highly compatible with horticultural production. Contract farming refers to agricultural production based on an agreement between a buyer and a producer regarding production methods, quality of produce, delivery schedule and/or prices. Large supermarket chains, specialized wholesalers and food processing companies offer contracts to farmers in developing countries to procure horticultural produce. Eaton and Shepherd (2001) present typology of contract farming and illustrate how contract configuration differs according to circumstances including technological requirements of crops.

As shown in the review of the grain to horticultural production literature, horticulture has several characteristics which may prevent small producers in developing countries from accessing the high-value market. First, horticultural production can be knowledge intensive, requiring skills in plant maintenance, integrated pest control and postharvest handling. Second, horticultural production is capital intensive, and financing can be a challenge for farmers. Third, horticultural produce is perishable, so that it necessitates the system to distribute harvested produce to the market quickly. Contract farming is coordination between farmers and buyers that can offer solutions to three challenges (Key and Runsten 1999).

Contract farming literature largely overlap with both the grain to horticultural produce literature and the GVC literature. In relation with the grain to horticultural production literature, export-oriented nontraditional horticultural production in developing countries often originates from contract farming between local farmers and foreign firms (Masakure and Henson 2005). In relation with the GVC literature, contract farming is regarded as buyer-farmer vertical coordination for high value agriculture (Gulai et al. 2007).

In the large literature of contract farming, empirical researches address following three questions (Bijman 2008);

- (1) What farmer characteristics are correlated with their participation in contract farming?
- (2) Is contract farming inclusive of smallholders?
- (3) Are farmers better off when they participate in contract farming, and in what conditions of contracts are they so?

Masakure and Henson (2005) find that knowledge acquisition is one of reasons for smallholders to participate in export-oriented vegetable production in Zimbabwe. As for inclusion of smallholders, Singh (2002) presents evidence that buyers tend to deal

with relatively large farmers for the case study of vegetable crops contract farming in India.

As for the welfare effect of contract farming on participating farmers, it is not straightforward to establish causality that contract farming improves welfare of participating farmers (Barrett et al. 2012). Although participating farmers have higher income compared with non-participating ones, it cannot be ascribed to contract farming. Farmers participating in contract farming might be better endowed with capability including the location of their farmland. Briones (2015) addresses this endogeneity issue in measuring welfare effects of contract farming. He finds that contract farming improved welfare of participating farmers for the case of tobacco farmers in the Philippines.

3.4 Literature of other approaches

The dynamics of international trade can be associated with changes in external factors rather than behaviors of individual farmers or their relationship with buyers. The political economy literature take an approach to account for sweeping trends of economic issues by linking them to underlying political economy backgrounds. In this line of researches, there is a growing body of literature that examine impacts of the improved transport infrastructure between China and Indochina on trade flows, including Stone and Strutt (2010) and Ishida (2013). Similarly, another characteristic of China's imports of fruits from Indochina includes informal cross-border trade (Kubo 2016).

Another branch of literature is the conventional trade analysis. The ASEAN-China Free Trade Agreements were signed in November 2002, and the early harvest program was launched which cut the import tariff rates of approximately 500 agricultural commodities to zero by January 2006 (Yang and Chen 2008). A number of studies including Tongzou (2005) and Park et al. (2009) examine the impacts of the free trade agreements on the trade flows with the computable general equilibrium model analysis. Fujimura and Edmonds (2006) analyze the impact of cross-border transport infrastructure on trade flows in the Greater Mekong Subregion using the gravity model of trade.

4. Contribution of this project to the literature

4.1 Research questions

With regard to the rise in fresh fruit exports to China, the case studies in this project address the following research questions;

- (1) What rural institutions fostered the rise in fresh fruit exports, especially for nontraditional export-oriented cultivars?
- (2) What buyer emerged and how did they underpin the shift from domestic sales to exports?
- (3) What farmer characteristics are associated with their participation in fresh fruit export supply chains?

We address all of these research questions with the combination of four approaches described in the previous section.

Question (1) is the issue similar to the grain to horticultural production, but we can discuss it by both the GVC and political economy approaches. This question is particularly relevant to watermelon cultivation in Lao PDR and Myanmar.

Question (2) can be well examined from the GVC and political economy approaches. This question is relevant to Thai durian exports and Vietnamese dragon fruit and lychee exports.

Question (3) is rooted in the grain to horticultural production literature. The case study of Lao watermelon exports employs farmer survey data to explore this question. Those of Myanmar watermelons and Vietnamese dragon fruits touch on this question, though in a casual way.

4.2 How this project contributes to the literature

This project contributes to the literature in several ways. First, one of the distinctive features is that the project examine the fresh fruit supply chain of which the destination is China, an emerging economy. In the GVC literature, there has been considerable accumulation of studies on international trade of fresh fruits and vegetables from developing countries to advanced countries where the large supermarket chains impose strict food safety and quality standards for their procurement from producers in developing countries. In contrast, food safety and quality standards are not the main issue for fresh fruit exports from Indochina countries to China. We examine how such preference of the Chinese market would affect the structure of the supply chain. This extends the frontier of the GVC literature on international trade of horticultural produce.

Second, in line with the grain to horticultural production literature, by

examining how nontraditional cultivars have been diffusing in Lao PDR and Myanmar, we contribute additional cases and evidence to the existing literature.

Third, with regard to the political economy literature of connectivity and economic integration in the Greater Mekong Subregion, by analyzing how Thai durian exports evolved along with changes in the logistic channels, we provide empirical evidence on the relationship between connectivity and trade flows.

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