

Riding On Waves and Filling the Cracks: Toward an Inclusive and Sustainable Sino-Thai Longan Supply Chain Management in Upper Thailand

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ABSTRACT

This paper examines the resilience of the upper Thailand longan supply chain's management in lens of nominee Sino-enterprises' impact over present and future disruption that caused the weaknesses and strengths of the supply chain. The nominee Sino-enterprises contributed the upper Thailand longan supply chain in terms of promoting the production efficiency and advanced technology utilizing, however, they could also be a disruption in the supply chain while dealing with the future competitions and changing future labor structure of Thailand. The nominee Sino-enterprises have brought both positive and negative impacts to the supply chain, utilize the strengths and avoid the weaknesses of the longan supply chain in upper Thailand would be a strategy of the supply chain riding the waves of nominee Sino-enterprises have brought and filling in the cracks of the future challenges of the supply chain. Therefore, the local, regional and subregional governments should take corresponding policies to achieve inclusive and sustainable development in upper Thailand.

Keywords: Nominee Sino-enterprises, Longan supply chain, Upper Thailand, Future Challenges, Policy recommendations

INTRODUCTION

Longan has cultural meaning to both Thailand and China. Longan is one of the most popular fruits in upper Thailand and be used to publicize the upper Thailand culture to other Thais or foreigners. For example, one of the classic northern popular songs with the title of “สาวเจียงฮาย” meaning “Chiang Rai Girls”. The lyric of the song describes the kindness and warm-heartedness of northern Thais. They would treat

the guests and friends with “Si-chompoo” longan (pink longan) which has its name because of the pink longan flesh (Charoenjit, 2016).

“ไปไปเตอะไปแ่อว ไปเตอะไปแ่อว จังหวัดเจียงฮาย ...ข้าเจ้าเป็นสาวเจียงฮาย...ข้าเจ้าเป็นสาวเหนือ เหนือสุดของประเทศไทย บ่าเดียวเจียงฮายนี้ มีลิ้นจี่ มีลำไย ถ้าหากพี่น้องไป เจ้าจะเลี้ยงลำไยลิ้นจี่ไปไปเตอะไปแ่อว ไปเตอะไปแ่อว...” (สุดยอด ที่สุด, 2013). Being translated into English is: “Let's go and have fun in Chiang Rai Let's go and have fun in Chiang Rai I'm a Chiang Rai girl...I'm a northern girl, from northernmost Thailand. Now Chiang Rai has lychee, and longan. I'll treat you with “Si Chombu” longan if you come here...”

Longan in Chinese, it is “龙眼” (Long Yan) meaning the dragon eye. Longan is also called “桂圆” (Gui Yuan) . “Gui” is the same pronunciation as “Gui” which means “precious”, “valuable” or “noble”. In China, people like to use Chinese dates, peanuts, dried longan and lotus seeds combing as a set to bless new couples that “wish you have precious child/children soon” in the marriage ceremony. Longan’s round shape and sweetness symbolized family's unity and happiness. Therefore, large demand during the time of preparation of the spring festival as Chinese family need to stock food (“Nian Huo”) to be used in Spring Festivals. Chinese believes that Longan is also an herb to Chinese as the function of helping to sleep, female health issue, digest system issue and so on (Angkasit et, al, 1999). Hence, increasing large demand for high quality longan is the trend of the Chinese market. Lamphun and Chiang Mai are the primary longan-producing provinces in Northern Thailand, and even the longan at Chonburi Province is introduced from the northern of Thailand (Angkasit et, al, 1999). China is the major market of longan export of Thailand. According to Hasachoo and Kalaya (2013), “Longan production completely depends on China because that country represents more than 80 percent of Thailand’s export market” (p.3). Even though China has Guangxi, Guangdong, Fujian and Chinese Taipei as major producing areas (Qiu, 2014), however, it does not satisfy the domestic consumption in China. Then, therefore, Chinese businessmen and enterprises choose to run the longan business at overseas and export to Chinese market.

In this paper, the researcher uses “upper Thailand” as the geographic scope due to the longan plantation characteristics and the climate characteristics. Longan trees grow in areas that have 10-25°C with the irrigation sources of the rivers in upper Thailand (Angkasit et, al, 1999). Moreover, “upper Thailand” is also used in the temperature changes and climate impact in winter days (Wangsri and McNeil, 2021) and in summer times (online reporters, 2022). In addition, Chokthaworn (2012) used “upper north area” in the longan research to study the way of the free trade policy impacting longan farmers between Thailand and China. Therefore, the researcher uses “upper Thailand” as the longan supply chain research area in this paper.

The connectivity and the network between Thailand and China have been increasingly interconnected due to regional and global cooperation. The researcher argues that Sino-enterprises take a leading role in the longan supply chain in terms of imparting longan plantation knowledge, enlarge the industrialization of longan supply chain and extending the export to the Chinese market. This paper uses Supply Chain Resilience as a concept to check with the weaknesses and strengths of the longan supply chain in upper Thailand. In the analysis part, the researcher uses

STEEP Analysis as the tool to analyze the way of nominee Sino-enterprises impact in the future supply chain development.

This paper includes five major parts, the first part is an introduction of the whole paper. The literature review part includes the scholars' articles on the negative impact of the Chinese influence, in addition, the author also explains the reason for using supply chain management and STEEP analysis. In the next part, the author will explain the research methodology of this paper. Then based on the conceptual framework, in the discussion part, strengths and weaknesses of the supply chain will be presented through analyzing the disruptions the supply chain has met and the way to deal with the disruptions. Then researcher further discussed impacts of the nominee Sino-enterprises have brought to and will bring to the supply chain in the future. The policy recommendations will be given in the conclusion part.

LITERATURE REVIEW

In this going global process, conflicts cannot be avoided to happen between the Chinese enterprise and the local's interest. Harding (1993) argued that people began to hold a fascination and considerable alarm attitude to "Greater China". On the hand, the dynamic common market provides growing opportunities for trade and investment. On the other hand, the raising concern on combination of economic and military resources available to a Greater China will pose a significant threat to the commercial vitality and the strategic stability of the rest of the world. Fold et al. (2011) argued that the rise of China is providing more threats than blessings to the ASEAN. More than that, Jarvis et. al. (2011) argued that rising China would restructure the value-chain of private sector actors, it would bring economic challenges to Southeast Asian countries. Laungaramsri (2015) argued that transnational Chinese had come to Southeast Asia with a discursive "Yellow Man's Burden". Lee (2018) argued that the local Thai entrepreneurs would have to meet the Chinese "join or die" strategy to force the local Thai business to concede in the high competition. The majority of the research would focus on the short-term interest conflicts that foreign powers brought, rather than their long-term influence. The longan industry in upper Thailand is mentioned in a small amount of English scholarly literature. The current situation of the longan supply chain will be discussed, as well as the function of the Sino-enterprises in the supply chain.

In order to look through the strengths and weaknesses of the longan supply chain, this research applies supply chain management as the concept to check the risk management of the supply chain. The way the supply chain has dealt or dealing with the risks or the disruptions reflects how fast the supply chain can recover from the disruptions. Lehtinen (2017) argued that risk management is one out of the five application aspects on sustainable supply chain management practices driving companies to adopt various practices to mitigate the risks. Gurtu and Johny (2021) argued that managing risks allows the decision-maker to understand and assess the impact of risk in a supply chain network. The disruptions determine the robustness of the supply chain management, therefore, to explore the disruption of the longan supply chain in upper Thailand is crucial to know better about the strengths and weaknesses of the supply chain.

STEEP analysis is also used in this paper to observe the five aspects of social, technological, economic, environmental and political. STEEP analysis is a variation of PEST analysis which includes four sources of changes, namely, political, economic, social and technological (Bonnici and Galea, 2015). In this paper, the researcher includes the perspective of the environment that the nominee Sino-enterprises have brought because the process of longan production brings both positive and negative impacts to the local environment. STEEP analysis well covers all aspects of the impacts that the nominee Sino-enterprises brought to longan industry of upper Thailand.

The researcher would observe and analysis the Chinese influence in the long run but not the short-term interest conflicts between nominee Sino-enterprises and the locals. Therefore, this paper tries to explore the role of nominee Sino-enterprises in the longan supply chain and the implications of Chinese influence in the long run. The researcher argues that Sino-enterprises take a leading role in the longan supply chain in terms of imparting longan plantation knowledge, enlarge the industrialization of longan supply chain and extending the export to the Chinese market. Nominee Sino-enterprise will take long term initiative influence in the future longan supply chain of upper Thailand. The policy maker of local and regional government or authorities should take active action on longan supply chain development to prevent the possible challenges that the related stakeholders might meet. Both Sino-enterprises and Thai longan farmers or other actors in the supply chain in Thai side as the upstream and middle stream of the supply chain should work together to resilience the supply chain as the entire entity.

METHODOLOGY

This study is conducted using a qualitative approach. The main research sites were Chiang Mai and Lamphun provinces, according to the researcher, Wechat, Line, and Zoom sessions were used to interview the participants online. In order to know better about the longan supply chain at the Thailand part, the researcher interviewed the longan farmers, longan orchard owner, nominee Sino-enterprise owners, and also upper Thailand longan related scholars as listed below. K.L and K.A are the owners of nominee Sino-enterprises in upper Thailand.

Respondents	Basic information
K.W	Prof at longan research center and published serval articles on longan research of MJU
K.P	Longan farmer (Lamphun)
K.C	Owner of a longan orchard (Chiangmai)
K.L	T.B Co. Ltd owner (Lamphun)
K.A	D.X Co. Ltd owner (Lamphun)

Nominee Sino-enterprises

Sino-enterprises are those Chinese transnational enterprises outside of China. In the case of this research, the researcher only focuses on the Sino businessperson

who runs and manages their companies in the way of being a nominee and cooperating with Thais. Their companies are legally Thai companies, however, those Chinese or Chinese based enterprises owners are the actual person who manages and controls the company. Lee (2018) argued that the Chinese businessperson would have their way to run their business in Thailand through agents cooperating with Thais. Those Thai nationals are their nominal pseudo-partners in business. In this paper, the researcher uses “nominee” with Sino-enterprises to illustrate that those Sino-enterprises are the nominees to the longan companies which are legally Thai enterprises. K.W as one of the respondents in this research, also mentioned that the nominee Sino-enterprises is one of three longan enterprise types in terms of Sino-Thai cooperation involving the upper Thailand longan supply chain. The focusing of this paper is the longan supply chain which connect upper Thailand as production and processing sector area, and mainland China as the distribution and marketing sector area, therefore, the researcher includes Taiwan area as one important part of the longan supply chain eco-system which share the similar Chinese culture with Fujian Province of China, and closer connection with longan production of Fujian and Guangxi Provinces. As Qiu (2014) also argued that China has Guangxi, Guangdong, Fujian and Chinese Taipei as major producing areas.

Conceptual framework- longan supply chain in upper Thailand

This research applies supply chain management and STEEP analysis as the concepts to observe the longan supply chain. The first step is using supply chain management to explain the recovery capacity of the longan supply chain from disruptions. The weaknesses and strengths of the supply chain. Then, the researcher uses STEEP analysis to illustrate the impacts that these nominee Sino-enterprises have brought to the society of Thailand. More than that, as the further step, the researcher will analyze the way that the nominee enterprises mitigate and aggravate the weaknesses, reinforce and diminish the strengths of the supply chain. The researcher wants to check with the supply chain resilience through the capacity of against the disruptions. Tukamuhabwa et.al. (2015) argued that “Resilience here is depicted as a process whereby a supply chain experiences a series of disruptive events and must make a series of responses and adaptations.” This research first looks at the weaknesses which are disruptions of the supply chain in present and in the future and strengths of the supply chain. Then the researcher analyzes the way that nominee Sino-enterprises impact the weaknesses and strengths of the supply chain after that.

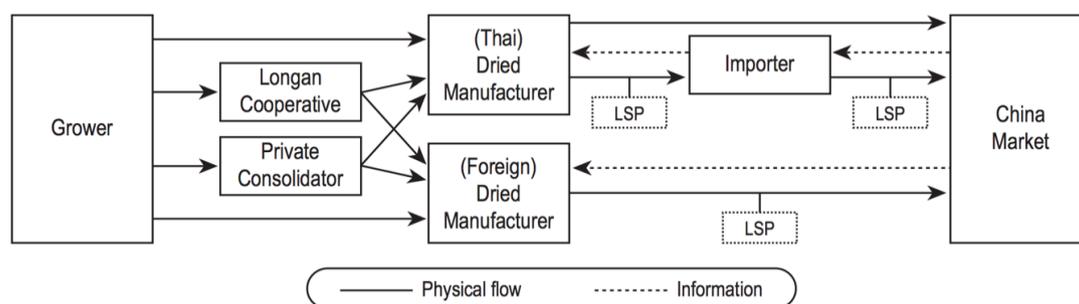


Figure 1. The supply chain for exporting dried longans in Chiang Rai.

Source: Hasachoo & Kalaya, 2013.

Hasachoo and Kalaya (2013) shows that the supply chain consisted of grower, longan cooperative and private consolidator, Thai and foreign dried longan manufacturer, exporters, and destination markets. With the development of the supply chain, the researcher argues that the new framework (Figure 2) includes not only the main actors in the supply chain related to longan industry, but also includes the related associations, and government agencies. They are not in the longan supply chain, but their role is important to the flow of longan imports and exports. Basically, the longan producing and processing are in Thailand, and the distribution and marketing are in China. In this framework, Thai longan farmers, Chinese factories and China customs are three important factors to impact the supply chain. Longan farmers and China customs are the instable factors and brought relatively negative influence on the supply chain, as the Chinese factories brought relatively positive influence on the supply chain.

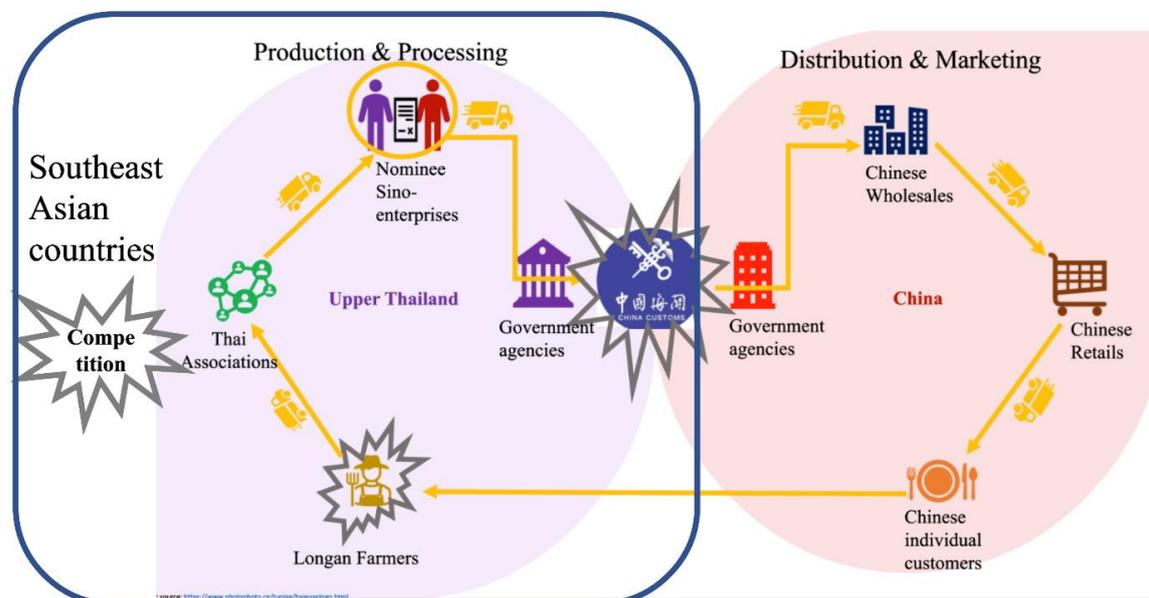


Figure 2. Longan supply chain in upper Thailand flows from Thailand to China.

Source: Compiled by the author.

DISCUSSION AND ANALYSIS

Part one: Weaknesses of the longan supply chain

The low production efficiency of longan farmers

Chaipiboon (2008) argued that low production efficiency has been the key issue of Thai agriculture sector due to lacking experience of longan farmers on agriculture production plantations, including selecting varieties, pruning and fertilizing based on the longan growing of Chiang Mai Province. Sudswang, et. al. (2018) also argued that the Thai farmers meet other issues, such as, farming labor in the agricultural sector, aging society entering, profession instability, high debt. Based on all of the factors above, the longan farmers are the vulnerable actor in the supply chain.

China customs' banning on longan of Thailand

Anupunt and Sukhvibul (2005) discussed that a total of 25% of longan fruits is directed to domestic market while more than 75% of the production is exported. In 2013, it was reached 80% (Hasachoo & Kalaya). China is more and more restrict on the food security both the domestic food qualification and exported from other countries. According to Decree of the General Administration of Customs of the People's Republic of China in 2021,

Article 37 Upon discovering that the import food fails to comply with laws, administrative regulations and national food safety standards, or there are evidences proving that the import food poses potential hazards to human health, food importers should, based on Article 63 and the third paragraph of Article 94 of the Food Safety Law, immediately suspend the import, sales and use, implement a recall, give a notice to relevant food producers, operators and consumers, record the processes of recall and notice, and file a report to the local Customs Administration about such recall, notice and response.

China has implemented an indefinite ban on longan imports from 66 Thai companies since 13th August 2021 over contamination with mealybugs (Zang, 2021). This event caused a protest by Thai farmers protesting low market prices for fruits by burning longans. The government agency had to negotiate with China to get the result of delaying the time of entering into China.

Future competition from neighboring countries of Southeast Asia

The future competition from neighboring countries is considered a huge challenge to the longan supply chain. The new Boten-Vientiane high-speed railway connects Laos and the neighboring countries with China through the border city of Boten. Indeed, it would benefit to Thailand's export. However, it also brings competition of agriculture products exporting to China from the neighboring countries, such as, Lao and Cambodia. The Cambodian longan farmer would export their longan to China directly instead of indirect exporting to China under the Thai longan brand to gain more benefit (Minea, 2021).

Part two: Strengths of the longan supply chain in upper Thailand

"Made in upper Thailand" longan

The uniqueness of upper Thailand longan as a highlighted characteristic is well-known by Chinese customers. The longan specie of upper Thailand is well known as "Edaw" longan which has thin shell, sweet and juice longan meat and small seed inside of the fruit. The Sino-enterprises owners like to use "Edaw" longan to process canned longan and dried longan. Those Sino-enterprise owners promoted their products as "Tai Bei Long Yan" (Upper Thailand longan) at China through online channel or physical shops (Mr.A & Mr. L, interview, 2022). It is different from the longan from China or from other areas all over the world. The wholesale and retail customers could also observe and get the longan plantation and production information from the Sino-enterprises.

"Field to table" longan supply strategy promoted by nominees Sino-enterprises

The Nominee Sino-enterprises have their networks and connections both in Thailand and in China on the longan production, processing, distribution and

marketing, therefore, they hold the most initiate position over the production quality control, processing efficiency, distributor selection and self-brand retail shops site selection.

The nominee Sino-enterprises directly influence the longan production by themselves or indirectly influence the longan farmers through the local Thai associations, including the fertilizer using, longan price negotiation and grading the longan fruits accordingly. In order to guarantee the good grade of the longan, the Sino-enterprises ask the longan farmer to use certain fertilizer to fasten the longan flower blooming and grow better quality of the longan fruit. In addition, the Sino-enterprises will hire enough part-time migrant Burmese workers and local Thai workers in order to washing, baking and packing the longan products (dried type). Furthermore, the Sino-enterprises select the partners or the wholesale distributors in China to get the long-term sustainable relation. Moreover, they even build their own team and started to run their own retail shops/office in China. As Mr.A mentioned that his companies intended to select Guang Zhou City (Guang Dong Province), Yi Wu City (Zhe Jiang Province) and Cui Er Zhuang City (He Bei Province) which located at Southern, Eastern and Northern China as his self-brand dried longan retail selling. He emphasized that to build a trustworthy brand is important, it takes effort to build (Interview, 2022).

Chinese advanced technology to be used in the longan industry to meet requirements of Chinese market

The longan baking skill is quite mature in China due to the long history of plantation and baking. The Sino-enterprise owners even brought in the fruits baking machine from China in order to ensure the dried longan quality and also to satisfy the criteria of passing the 27 random checking at China customs. For example, the humidity of dried longan should not excess 10% to avoid the moldy possibilities of longan to guarantee the food security of exported food in China. Mr. L also mentioned that in his future plan of longan business, he would consider bringing the extraction technology to be applied with longan waste, such as the longan shell and longan seed to sufficient use longan fruits while add more value to longan to sustainable develop the longan industry (Interview, 2022).

Part three: Nominee Sino-enterprises' impact on the longan supply chain of upper Thailand

Based on weaknesses and strengths of the longan supply chain of upper Thailand in the above session, the researcher analyzed the impact of nominee Sino-enterprises over these weaknesses and strengths through the STEEP analysis. Thinking through the social-cultural, technology, economy, ecological and political aspects, the research uses this lens to look at the way they mitigate and aggravate the weaknesses, and on the other hand, the way they reinforce and possibly diminish the strengths of the supply chain. This research looks at both present and future possible influence of the nominee Sino-enterprises over the supply chain in order to analyze the impact thoroughly and deeply as shown in Table 1 and Table 2. Therefore, the researcher summarizes four main aspects to analyze the impacts after the tables.

Table 1. STEEP analysis on the impact of nominee Sino enterprises over the weakness mitigation and aggravation of the longan supply chain in upper Thailand.

STEER analysis				
Social-cultural	Technology	Economy	Ecological	Political
Mitigation				
<p>Present: Brought the upper Thailand longan to China, "Made in Upper Thailand" longan</p> <p>Future: Smart farming working with few young farmers</p>	<p>Present: Taught the skills on growing longan,</p> <p>-Brought in the modern machine and technology to Thai,</p> <p>Future: -Chinese technology will be used in the longan plantation -extraction technology and biofuel technology will be practiced in longan industry. -technology would deal with the waste (seed, peel and old longan tree)</p>	<p>Present: Promote production efficiency,</p> <p>-Extend the Chinese market,</p> <p>-Flexibly passing the border ports</p> <p>-promote the local economy</p> <p>-employment rate rise</p> <p>Future: -multiple channels to sell the longan related products</p> <p>-Add more value to the longan products</p>	<p>Present: Environmentally friendly factory-water, air</p> <p>-help with the economic loss of longan farmers caused by extreme weather</p> <p>Future: technology would deal with the waste (seed, peel and old longan tree).</p>	<p>Present: Build the sustainable relation between Thai &China</p> <p>-Promote networks with local and regional associations</p>
Aggravation				
<p>Present: Unwillingness of young longan farmers</p> <p>Future: labor structure change</p> <p>-high-skilled tech workers from China</p> <p>-Hire more Burmese workers</p>	<p>Future: leading role in terms of technology utilize.</p>	<p>Present: -trade deficit</p> <p>- the fluctuation of the longan price</p>	<p>Present: disturbing the neighbors due to noise pollution</p> <p>-Land contamination due to fertilizer using</p> <p>Future: lose the local ecological diversity</p>	-

Source: author's own.

Table 2. STEEP analysis on the impact of nominee Sino enterprises over reinforcement and diminishment of strengths to the longan supply chain in upper Thailand. Source: author's own.

STEER analysis				
Social-cultural	Technology	Economy	Ecological	Political
Reinforcement				
Present: - "From Field to Table" longan strategy and bilateral network building - Help the local community during covid time	Future: -Chinese technology will be used in the longan plantation -extraction technology and biofuel technology will be practiced in longan industry. -technology would deal with the waste (seed, peel and old longan tree)	Future: -multiple channels to sell the longan related products -Add more value to the longan products	Present: Environmentally friendly factory-water, air -help with the economic loss of longan farmers caused by extreme weather Future: technology would deal with the waste (seed, peel and old longan tree).	Present: Build the sustainable relation between Thai &China society -Promote the supply chain through the regional and subregional cooperation.
Diminishment				
Future: labor structure change-high-skilled technicians from China	Present: Must satisfy the standard of China Future: leading role in terms of technology utilize.	Future: -unfair to the Thai domestic market due to good grade longan export to China	Present: disturbing the neighbors due to noise pollution -Land contamination due to fertilizer using Future: lose the local ecological diversity	Future: -possible vicious competition with other longan supply chains due to the regional facilitation's constructions

1. The "Made in Upper Thailand" longan has been well-known by Chinese market through the effort of nominee Sino-enterprises as they promoted the longan production efficiency and got through the whole supply chain.

The production efficiency of Thai longan farmers has been an issue in the development of longan industry (Auttarat et al. 2018). It can be counted as the first disruption to the supply chain. The nominee Sino-enterprises promoted the production efficiency, expend the Chinese market, and take the leading role on the technology utilize on the longan production, processing.

Mr.A, the owner of the D.X. brand fruit enterprise shared that the Northern longan industry was an "blank slate" around 30 years ago which means the northern longan industry was in the status of to be developed when his mother and uncle came here to start the business. His family business started with a small-scale firm with the longan honey and broom trade. His parent generation knew the way to grow longan and started to teach the locals to grow longan with the way from their hometown. Mr.A took over the family fruit business around 15 years ago. Their

company cooperated with local Thais when they first came here, then they set their own business, Mr.A even set his own family and got the Thai nationality. During 30 years of development, Mr.A's factory has had 600 employees now. His main business is fresh and processed fruits including longan and other northern fruits. Their fruits are mainly exported to China. They have rich experience in the Chinese market. In order to satisfy the increasing Chinese market day by day, they have to adjust themselves accordingly. In order to get better quality of longan, Mr.A requires the longan farmers to grow at a fair yield with fruits of bigger size, golden color and small seed.

Those requirements from the major market would hit the previous way of longan farming activity. However, changing means more opportunities. "Northern longan farmers would complain about the fastidious requirements and too harsh about the longan quality to catch up with", Mr.A smiled and continued, "but they gradually understood that they have to guarantee production efficiency so that they could get higher income." The low production efficiency also related to the culturally personality of Thai people, especially northern Thais. Their over relaxed attitude to life is the irresponsibility and indifference to their longan production in the eyes of Chinese businessperson. "They are too lazy, they know only enjoy their life and make money when they felt it necessary", Mr.A thinks that the longan farmers need to pay fair time and hardworking but not enjoy life alone. Mr.L, another Chinese businessman who is a nominee running his fruit processed factory with a Thai in Lamphun, also mentioned that they would teach the longan farmers on pruning, fertilizing, ripening agent to get better yield when he started his own business. He was a Chinese broker to collect and purchase the fresh longan for his previous company before he started his own.

The quality of longan each year was instable which means I could buy the very good quality longan if I was lucky, but next year, when I flew here, I could not guarantee the quality of longan would better than last year. That's why I am here to settle a company of my own in order to supervisor the quality of longan (Mr.L, 2022, online interview).

The supply chain seems to be moving faster than ever after the Sino hardworking businesspeople imparted their knowledge and inspiration on longan production. The nominee Sino-enterprises could even access the whole supply chain. "From field to table" northern longan industry gradually is taken initiative by Sino-enterprises. They know well about every single process of the supply chain. Mr.A even opens his own chain stores at different first-tire, second-tier cities and even county, such as, Guang Zhou city, Yi Wu city and Cui Er Zhuang County. He told the researcher that those areas are the places that he selects strictly. He also has the brand agents covers entire China which also need to pass the criteria setting by him. "I focus and emphasis on the quality of my products. A trustworthy brand to my customers is important." He explained. Even though Mr.A exports the longan to China with 700 containers each year, however, he is still on the way of making the products a better quality. One of the longan products in his company is dried longan with four types of grades and sizes which are B (20mm-22mm), A(22mm-25mm), AA(25mm-29mm), AAA(29mmup)..(mm:millimeter, it refers to the diameter of the

dried longan fruit). Apart from the major product, dried longan, he also cooperated with others to use the cold-chain logistic technology to export fresh longan.

2. High technology-based biofuel and chemical substance extracting from the longan waste by nominees Sino-enterprises reinforcing the strengths in order to add more value to longan industry to enhance the capacity to against the disruption of the supply chain.

The deeper involvement of the nominee Sino-enterprises, the better they know about the industry. The hard-working character drives them to look deeper into the longan industry. Apart from the extension of the longan supply chain, they also explore more about the wider utilize of the longan.

For the future plan, both Mr.A and Mr.L would like to add value to the longan products. Mr.L even brought all of the machines in his factory from China in order to satisfy the requirements of China, including the dried longan furnace which meets the criteria of air pollution regulations. And because of the imported high technology and machine, Mr.L and his partner's company even received a subsidy from the local government of 1.5 million baht. Mr.L even thinks about importing more high technology on making biological particles as biofuel through burning cut longan old trees. The households in Japan and Korea during winter days would be the best market who needed the biofuel as heating.

Moreover, the nominee Sino-enterprise are considering importing Flavone extraction related technology and technicians to Thailand which consider relatively mature of the technology in China. Flavone is found in longan peel and seeds and be used in the make-up or skin care industry. Mr.L shared that sufficient use of the longan will be the way to add value to the longan industry due to his observation of throwing tons of the seeds and peels away after the dried processing longan is finished. Simply relying on the fruits or dried fruits export is not the way to create more value for the industry since it could be limited by current and future production factors.

3. The trend of large demand of high skilled workers and the absent of younger generation farmers will change the future labor force structure while contamination of the land as another important production factor will bring huge challenge to the supply chain.

Lacking enthusiasm on longan farming of Thai young generations and Sino-enterprises' consistent presence in future technology might cause the further initiative on the longan supply chain by nominee Sino-enterprises. According to the evaluation of the white paper from EEC and National Bank of Thailand in 2021, farmers as low productivity and low demand occupation in the future would not be needed in the whole nation's labor structure. As the sharing of the respondents, longan plantation and processing use very limited modern technology in it which more rely on the traditional and local knowledge to cultivate the longan trees. It needs time and patience to grow and take care of the longan trees. Most of the younger generation are not willing to do farming but prefer other occupations that could work at offices. Mr. C even mocked himself as a "Pseudo farmers" which means that he is not the one who really do the farming activity even though he has a longan orchid. Neither he and his parents have this unwillingness to do longan farming in the near future, nor his next generation. He and his brother own the longan orchard while his parents live in the orchard and still grow longan. They live

in the city and far away from their longan orchard. The same thing happened to Mr.B's family. He owns one of the top 3 longan orchards in Lumphun Province. He enjoys growing longan, however, his only daughter has no interest in taking over the orchard but enjoys her current work more. He shared his future plan on the longan orchard.

I am the third generation to grow longan in my family. My daughter does not like doing longan farming...Maybe I will cut the longan trees and grow some fruits that are much easier to take care of, such as coconut. I think I can do longan farming for the next 10-15 years (Mr.B, 2022, phone call interview).

Few new generations would like to use technology to grow longan and do the customized service to the customers. Keeping the qualified fruits and cutting those unwanted ones to make sure the best quality of the fruits. In a word, higher quality, but less quantity of longan yield. It meets the requirements of Sino-businesspeople, however, the unknown thing is that if the young farmers need to use Chinese technology in order to export to Chinese market. In this sense, those limited young longan farmers might have to cooperate with Sino-businesspeople in the future. In the long run, Sino-enterprise will take further initiative over the northern longan supply chain.

Another type of the labor is the cutting and washing of the longan in the longan processing factories which are doing by the migrant Burmese workers or the Thai workers who came from Northeastern part of Thailand. Their involvement impacts the contemporary in the longan industry labor structure from July to September during seasonally harvest time. The cheaper seasonally labor cost for the nominee Sino-enterprises to prefer hiring migrant workers will hit the future local employment rate.

In the process of plantation, after around 6 years growing from the young longan trees to the mature ready to fruit trees waiting, the longan farmers choose to use the fertilizers to incentive the blooming of the trees. Sulphur is the main fertilizer to be used at the longan trees, and the "Bhun Kao" (white lime) is the fertilizer being used on the land to against the pests. However, the utilizing of the fertilizer would cause land contamination.

4. Due to the use of regional new transportation facilities, there may be fierce rivalry with neighboring countries while facing with the China Custom's banning and global pandemic as the external disruptions could cause the nominee Sino-enterprises diminish their strengths.

The Lao-China railway has been used since last year. The strategic significance is to benefit the small-scale farmers of Laotian farmers, and also the northeast part of Thailand. As Peter (2021) described in the VOA news,

The 414-kilometer ribbon of steel and concrete ties Laos' northern border with China's Yunnan province to its frontier with Thailand at Vientiane...With a top speed of 160 kilometers per hour...promising a new tide of trade and tourists from China for one of Southeast Asia's poorest countries.

The railway would greatly be beneficial to the Northeast farmers of Thailand. However, it threatens the benefit of longan farmers and exporters of northern Thailand. Northeast Thailand is the part which has least income level of entire Thailand. It would help to increase the income of northeastern farmers and drive

other related industries, such as tourism. The raise connection of northeast with China might cause the lower demand of northern goods to China. Mr. C shared that a lot of farmers started to grow longan at Ley province which is one of northeast provinces of Thailand.

Most of the respondents are hold the active and optimistic idea that Thai-China relations would remain the same or even better. "I hope the Sino-Thai relation would be improve so that our fruits can pass the border quickly", Mr.A said,

"The fresh longan could not be detained at the customs for too long, it will be rotten. I will cooperate with the logistic companies that I contact with. Once this border could not go, we will try another border custom."

Chinese CIQ (Customs Immigration and Quarantine) has been more and more restrict on import goods, especially on food sector due to the severe food security events happening. Not only the mealybugs issue with fresh longan (Zang, 2021), but also the longan moisture detection of dried longan. "Chinese customs will do the spot-check weather the longan satisfies the food humidity requirement." Mr.L explained that "if the moisture percentage is more than the custom standard, then dried longan would get moldy, then cannot pass the custom, but if it is drier than that, the taste would not be satisfied my customers." Those sino-enterprises at northern leave good impressions to Mr.B. He does not care who is the owner of the company, but only hope that his longan has remained the share of Chinese market would be enough to him. He has yearly income from longan more than 100,000 Baht, and 60% of his longan sending to China.

However, "Putting all your eggs in one basket" supply strategy of northern longan industry to the Chinese market lack of the mechanism or cooperation to prevent the urgent issue to make sure the resilience of the supply chain. Dr. W argued that Thailand's authority's way of "be wise after the event" could not really solve the problem that happening every year, they should prevent the problem. Almost 80-90% longan exported to China each year, the exporters are facing huge economic lost when there are unexpected things happening. The global pandemic Covid 19, and the "China Bans Thai Longan Imports" in 2021, are obvious example to show that the supply chain lacks resilience to reduce the risk that the supply chain would have to meet in the whole flow. The ministry of the commerce had to negotiate with China to ask the longan to pass the border checking in the fastest possible way otherwise the fresh longan would be gone bad if the longan clusters in the container stayed at the China custom for over 10 days (Zang, 2021). The longan price is another issue in northern Thailand. Thai farmers protested the low price of longan through burning or dumping the longan fruits in order to express their dissatisfaction in 2020. More issues such as drought and flooding also impact the longan farmers' yield then further impact the whole longan supply chain.

CONCLUSION

The researcher exams the resilience of the longan supply chain of upper Thailand through the weaknesses and strengths, and further taking the lens of looking at the nominee Sino-enterprises' role on the weakness and strengths over the supply chain. Upper Thailand longan supply chain is benefit from the raising

Chinese influence to export much more longan to China. Nominee Sino-enterprises have promoted the production efficiency of longan plantation and promote the longan supply chain development in the past 30 years, and advanced technology will be used in the longan industry. Apart from the low production efficiency, China customs banning and global pandemic are essential factors to impact the supply chain. Therefore, the researcher found that the current interest conflicts that happened between Sino enterprise and local firms or local farmers are not the focus to the entire supply chain.

Hence, upper Thailand longan supply chain should not only ride the Chinese waves as using the advantages and resources that they brought in, but also using the current resource to be filling the cracks as preventing the future disruptions might happen with the supply chain including the nominee network and the regional cooperation, such as RCEP and LMC-China cooperation. In the LMC-China Five Years Plan Cooperation (2018-2022) shows that the goal of LMC-China cooperation is focusing on extending cooperation over agriculture in technology aspect, such as experimental labs, technology center, agriculture information connection, and construct the agro-industrial park (Mekong-Lancang Cooperation, 2018).

Policy recommendations

The nominee Sino-enterprises as a Sino-Thai cooperation format takes the leading role in longan production efficiency, technology application and utilizing in the supply chain. However, nominee Sino-enterprises as the actor to solve the problems that the internal factors that caused the disruptions while they are also as future disruptions to the future development of the supply chain would impact and even take initiative power to northern longan supply chain. Therefore, in what way that local authority and local agriculture sector could do to reach a win-win situation and prevent the possible negative impact from Chinese influence in the long run is crucial. Hence, the researcher provides certain policy recommendations from subregional, regional and local governance levels based on the nominee Sino-enterprises have brought to the supply chain as below:

1. The Thai local government should promote the technology leading role of the nominees Sino-enterprises while encouraging them to incentive the national technological growth of young generations. It will benefit the future local labor force structure to ensure the source of technological labor and future employment rate.

2. The regional governments should cooperate with one another to share the data of tracing the source of agriculture products, including Thai and Chinese governments, to ensure the food security and data fairness and transparency to the whole longan supply chain. At the same time, the northern Thailand should balance the longan export to China. Increase the export share to other ASEAN or even western countries, at the same time, the domestic market should be also considered to avoid the dissatisfaction of demand unfairness to Thai people.

3. As the local governance, empower the local Thai and Chinese associations to work together in terms of the labor force balancing and pricing negotiation issue. The prevention mechanism and cooperation from the local Sino-enterprise should be provided by local authorities and local associations. Deliberative communication should be provided to the stakeholders over certain conflicts, such as the pricing

issue. The local government should organize workshops or meetings to involve all stakeholders working together to reduce the tension.

4. The subregional governments should balance the agriculture products trade to avoid vicus competitions. China and RCEP countries and Mekong-Lancang Cooperation or other subregional cooperation should look at the whole picture of development and balance the power in order to avoid the possible inner conflicts.

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