SUPPLY CHAIN REDESIGN STRATEGIES FOR AGRO-INDUSTRY IN CHIANG RAI SPECIAL ECONOMIC ZONE

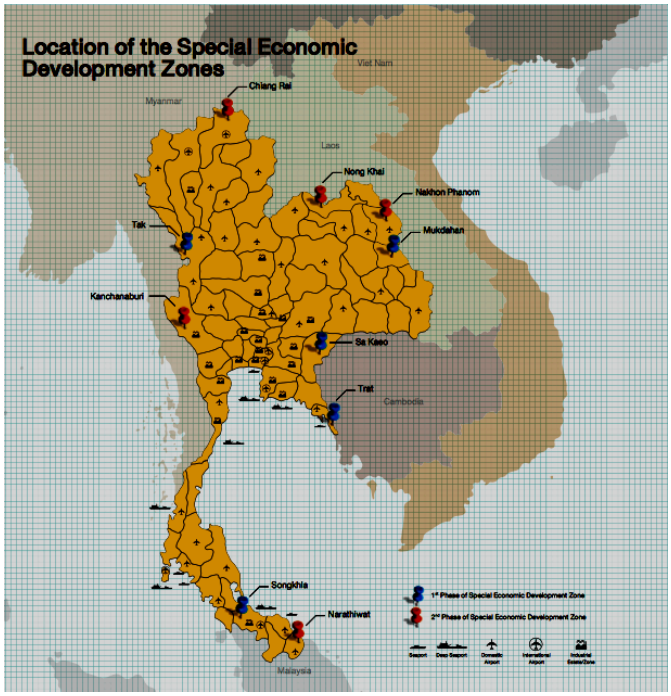
S.Ramingwong*, A.Sopadang, K.Y.Tippayawong
Excellence Center in Logistics and Supply Chain Management, Chiang Mai University, THAILAND
*For correspondence; Tel. + (66) 897009083, E-mail: sakgasem@gmail.com

ABSTRACT: *Policy of Special Economic Zone by Thai government was introduced in 2015 where business can yield more benefit than normal. Agro-industry in Chiang Rai Special Economic Zone is selected as the case study where supply chain redesign can address the changing business environment. The study develops supply chain redesign strategies based on literature, survey, interview and consultancy with stakeholders in the area. The strategies are developed based on purchasing, operation, distribution and supply chain integration elements. Then the strategies were selected to implement by 5 cases study factories in Chiang Rai. The result shows the benefit of the implementation.*

Keywords: Thai Special Economic Zone, Chiang Rai, Supply Chain Redesign Strategy

1. INTRODUCTION

In 2015, Thailand government has introduced a new policy, "Special Economic Zone" or SEZ, to develop 10 border areas which connect to ASEAN countries (see Figure(1)), aiming to attract investor by offering special infrastructure, tax and non-tax incentives, One Stop Service Center and other facilitating measures.



Fig(1) Thailand Special Economic Zones Source: [1]

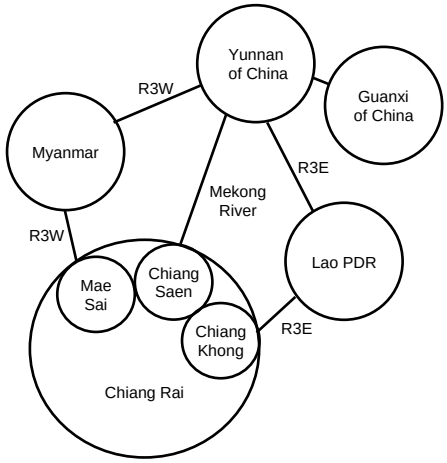
The SEZ incentives are, for example;

- Exemption of corporate income tax for a period of 8 years (not exceeding 100% of investment value excluding cost of land and working capital) and 50% reduction of corporate income tax for a period of 5 years
- Double deduction from the costs of transportation, electricity and water supply A 25% deduction of the project infrastructure installation/ construction costs from the project capital (in addition to the deduction in depreciation expenses) Exemption of import duties on machinery
- Exemption of import duties on raw or essential materials used in manufacturing of export products
- Permission to employ foreign unskilled labor
- Land ownership and bringing in foreign skilled labor or experts

Together with the ASEAN Community Initiatives, trades and industries can get benefit from investing in SEZ or ASEAN countries in order to access resource, labor and to distribute goods more easily. [1]

Agro-Industry in Chaing Rai Special Economic Zone

Chiang Rai is the northernmost province of Thailand. It is considered Thailand's north gateway connecting to Southeastern Asia. Chaing Rai has a population of 1.2 million and an area of 11,678 sq.km. Chiang Rai has a GPP of 3.2 billion USD.



Fig(2) Chiang Rai in Connection with Myanmar, Lao PDR and China Source: author

Chiang Rai Special Economic Zone (CRSEZ) is among 10 pilot SEZ to be developed. CRSEZ comprises of 3 border districts of Chiang Rai, accounting more than 1,500 sq.km. of SEZ. CRSEZ is neighboring with Myanmar at Mae Sai and Chiang Saen districts and Lao PDR and Chiang Khong and Chiang Saen districts. Moreover, CRSEZ can be a gateway connecting to China via Greater Mekong Subregion's (GMS) North-South Economic Corridor (NSEC). [2-3] Figure (2) illustrates these connectivity.

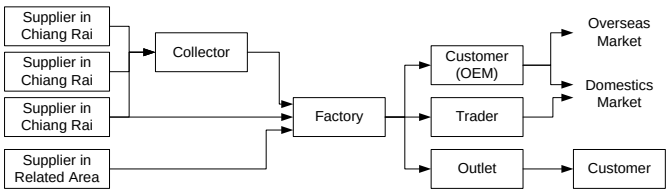
Agro-industry is Thailand's and Chiang Rai's key economic sectors. The industry accounts for more than 65% of total factories. The industry is labor intensive, resource-based and has been a significant industry for Thai economic and society for more than 100 years. Nearly 38% of Chiang Rai GPP is accounted for the agriculture and agro-industry. Moreover, than 86% of total import and 50% of total export involve agriculture and agro-industry products. [4]

Supply Chain Redesign Initiatives for Agro-Industry in CRSEZ

Agro-industry is on the interest of the Logistics Bureau, Ministry of Industry of Thailand government, who is a key driver in logistics and supply chain improvement in Thailand. With more than 20 logistics and supply chain improvement and related projects funded yearly, more than 200 factories can improve their logistics and supply chain performance [5]. In 2015, the case of agro-industry in CRSEZ is also of interest. The bureau urges the industry to understand the context of today's change and take advantage of the opportunities by advising and provide the on-field consultancy. The industry can therefore compete on these new eco-systems. The project period is 8 month, with supply chain study, supply chain redesign strategy development and implementation on 5 case-study factories.

SUPPLY CHAIN OF AGRO-INDUSTRY IN CHIANG RAI

As the supply chain of any products can be varied in detail due to its nature, the common supply chain can be generally drawn as shown in Figure (3).



Fig(3) Supply Chain of Agro-Industry in Chiang Rai
Source: author

It can be seen that the supply are mostly from the agricultural strengths of the area. Where Chiang Rai is resourceful, the 44% of the area is used for plantation. Key products are tea, coffee, rice, longan, corn.

If not taken to the central Thailand to process, the products can be processed in Chiang Rai. There are more than 2,000 factories, directly employing more than 14,000 personnel in Chiang Rai and related area. [6]

Most of Chiang Rai factories are small and medium sizes. Local businesses still enjoy the benefits of the resource and geographical advantages. However, with ASEAN agreement of a single market and production base among 10 ASEAN countries, it presents threat and opportunities at the same time. Whilst more resource is available, competitor and market competitive are unavoidable. [7-9] Therefore, it is the task for the businesses, to adapt to survive these forcing factors from regionalization and, eventually, the globalization. Of interest, the supply chain redesign is most likely to such case.

2. SUPPLY CHAIN REDESIGN

Supply chain redesign is normal due to change of either supply, demand, production conditions or else. The aim of supply chain redesign is simple as it must at least sustain efficiency and effectiveness and therefore competitiveness in the market. [10-13] Forced by globalization and regionalization, the competitive level is high, especially for the agro-industry where it is, as well, a common economic sector for Lao PDR, Myanmar and China.

Here, supply chain redesign is focused based on 4 elements, i.e., purchasing, operations, distribution and supply chain collaboration. [14]

3. SUPPLY CHAIN REDESIGN STRATEGIES FOR AGRO-INDUSTRY IN CRSEZ

The study is based on more than 30 man-days of interview to stakeholders in the area and 5 case-study-factory in-depth-consultancy. The case study factories vary from small to large in size. The factories were selected based on the potential benefit from CRSEZ as well as commitment to involve in the project. Systematic problem diagnosis was conducted. Then the series of consultancies with expert in supply chain were conducted. Matching up the current supply chain with the supply chain redesign possibilities, the strategies for supply chain redesign for agro-industry in CRSEZ is suggested. Examples of the strategies are as follows:

Purchasing Elements

- Sourcing production resource (material, labor, machinery and equipment) from the neighbor countries
- Quality control Platform development for supplier
- Clustering for purchasing power
- Procurement system development
- Supplier selection system development
- Supply forecasting

Operations Elements

- Improving inventory and warehouse management
- Productivity and internal logistics improvement
- Capacity building for workforces
- Demand forecasting
- Factory relocation feasibility study
- Product change
- Process innovation
- Product research and development
- Customer-focus product development

Distribution Elements

- Neighbor and overseas market research
- Capacity building for salesforces
- E-commerce with multi-language
- Package design for Neighbor and overseas markets (for attraction, function and information)
- Information technology for customer relationship management
- Traceability platform development
- Rules and regulation research for neighbor countries

Supply Chain Integration Elements

- Collaborative planning, forecasting, and replenishment platform development
- Customer relationship management platform development
- Supplier relationship management platform development
- Electronic data interchange platform development
- Partnership with neighbor company

4. RESULTS

The result is here due to strategy implementation or simulation, depending on the requirement and the complication of the strategies.

Case Study Factory 1: Tea Maker

The case study factory is a famous tea maker in Chiang Rai. 50% is OBM and 50% is OEM. Annual sales are more than 180 million THB with more than 1,500 tons of dried tea produced yearly.

Tea leaves come from 1,400-rai company own and contracting farms in Chiang Rai and close cities.

The study mostly focuses on the OBM and the customer accessibility channels. The first strategy is to improve the customer communication channel via website and social media. Current website is limited to Thai language and therefore limited to Thai customers. Where potential customers are from China and overseas, therefore, new designed website is made in Thai, English and Chinese. This can give access to new customers. Social media marketing is also used to promote the website and products.

The second strategy is a new package design. Aiming at reducing a size of a package to response customer preference and giving more information in multi-language, sales are expected to increase.

The third strategy implemented is the re-layout of the outlet shop in Chiang Rai downtown. Consulted by the specialized designer and marketing, new shop layout is designed. The new layout maximizes accessibility and comfortability of the customers, while minimizing confusion of the product and information.

With these 3 strategies, it is expected that customer accessibility is increased, customer communication is more effective and OBM sales can increase up to 20%.

Other suggested strategies are, for example, (i) to source from neighbor countries, (ii) to develop a tea supply forecasting system (due to weather and land condition), (iii) to develop a collaborative planning, forecasting, and replenishment system with OEM customers.

Case Study Factory 2: Preserved Vegetable

The case study factory is medium-sized vegetable preserve factory. Main products are preserved eggplant and ginger. Source is 100% local. Products are 95% OEM to overseas partners. Currently, the production capacity is 11,700 tons per year, accounting more than 2,000 million THB of sales per year. However, with emerging competitors, order has been reduced.

Therefore, the factory is suggested to introduce new products using existed production resource. In this case, mango is chosen as supply and demand are accessible. The factory is suggested to lease a warehouse in the SEZ area to gain tax and non-tax benefits. The strategy yields a 5% increase of return on supply chain fixed assets.

Other suggested strategies are, for example, (i) to source from neighbor countries, (ii) to study the feasibility of moving factory in neighboring countries or partner-up with overseas company to access to overseas labor and resource.

Case Study Factory 3: Rice Producer and Trader

The case study factory is an organic rice producer and trader in Chiang Rai. More than 60 tons of quality controlled rice is sold yearly. Rice is planted within own (550 rais) and contracting paddy.

The first strategy is focused on internal operations. The stock card and inventory control system is developed to improve the inventory transparency, reduce inventory control expense and yield FIFO.

The second strategy is the package design. Aiming at giving value-added information such as Phytochemistry, the product can be upgraded to meet customer preference, especially the health and aging society trends of Thai customers.

These strategies are expected to reduce inventory cost, improve customer respond lead time and improve sales. Upon the estimation, the profits can be improved by 5%.

Suggested strategies are, for example, (i) to research market and demand from neighbor countries, (ii) to build capacity of the sales force for neighbor market, (iii) to develop e-commerce for overseas market, (iv) to design packaging for neighbor market.

Case Study Factory 4: Gai Chilli Paste Producer

The case study factory is a small Gai chilli paste factory. Gai (scientific name: Cladophora) is a local freshwater algae which can be found only in Mekong river in Chiang Khong district of Chiang Rai (see Figure (4)). The chilli paste production is the way to preserve and add value, using fruitful know-how of the community.

Fig(4) Gai Harvesting in Mekong River
Source: www.unseentourthailand.com

The strategy implemented in this factory is to improve inventory control. The production and stock cards are developed as well as the inventory information system. Thus, the factory can respond to the customer demand and order accordingly to the supply on-hand. This can reduce logistics communication between customer and factory as well as departments within the factory by 75%.

Other strong suggested strategies for the factory are, for example, (i) to source Gai from neighbor countries where the plant condition is similar, (ii) to set up contract for supplier in

the area to ensure the quality and delivery of raw material, (iii) to study the feasibility of market in neighbor countries where lifestyle is quite similar, (iv) to design package for oversea market.

Case Study Factory 5: Dao Inka Oil

Fig(5) Dao Inka Seed.
Source: daoinka.com

The case study factory is Dao Inka Oil Extract Factory. Dao Inka (see Figure(5))(scientific name: Plukenetia volubilis) oil is rich in protein, omega 3, 6, and 9, alpha tocopherol vitamin E, carotenoids (vitamin A), and fiber. Dao Inka can grow well in Chiang Rai and closeby area.

The factory source Dao Inka bean from contracting farms and local farmers. The process is common to other plant oil extraction. Then it is packed and sold to domestic market.

The strategy implemented in the factory is packaging improvement. As currently, glass bottle is used and the carton box is not well supported. Bottles are broken up to 5% during handling and delivery. Therefore, it is not feasible to deliver to the customer in neighbor countries as there must be a load-unload process at the border checkpoint. Here, new carton box is designed for 100% protect the bottle, even with drop test.

Other suggested strategies are, for example, (i) to set up a contract for supplier in the area to ensure the quality and delivery of raw material, (ii) to study the feasibility of market in neighboring countries, (iii) to develop e-commerce for overseas market.

5. CONCLUSION

The supply chain redesign strategies are developed based on the emerging competitive situation, should the agro-industry in Chiang Rai Special Economic Zone adapt to survive. Focusing on purchasing, operation, distribution and supply chain integration elements, common strategies are suggested. Then 5 cases study factories pilot these supply chain redesign strategies. Many strategies can be implemented and the result is immediate. However, some strategies can be long-term and the result can be in the long run. Here, examples of benefit are sales opportunity, customer responsiveness and accessibility, internal process and logistics improvement.

ACKNOWLEDGMENT

The project is conducted under Excellence Center in Logistics and Supply Chain Management, Chiang Mai University, Thailand. The author would like to thank Logistics Bureau, Ministry of Industry of Thailand government, as the funding agency.

REFERENCES

[1] Office of the Board of Investment, "A Guide to Investment in the Special Economic Development Zones" (2015)

[2] M. Ishida, "Special economic zones and economic corridors" *ERIA Discussion Paper Series* (2009)

[3] R. Banomyong. "Logistics Development in the Greater Mekong Subregion" *Journal of the Greater Mekong Subregion* (2008)

[4] Office of the National Economic and Social Development Board, "Gross Provincial Products", Retrieved from http://www.nesdb.go.th (2016)

[5] Sakgasem Ramingwong, Apichat Sopadang, Korrakot Yaibuathet Tippayawong, "Factory Logistics Improvement Projects: Case Northern Thailand", in Proceedings of Industrial Engineering, Management Science and Application 2015, *Lecture Notes in Electrical Engineering* **349**, 357-362 (2015)

[6] Department of Industrial Works, "Industry Database", Retrieved from http://www.diw.go.th (2016)

[7] ASEAN Secretariat. "ASEAN Economic Co-operation: Transition & Transformation". (1997)

[8] ASEAN Secretariat, "ASEAN Economic Community Blueprint" (2008)

[9] Petri, Peter A., Michael G. Plummer, and Fan Zhai. "ASEAN Economic Community: A General Equilibrium Analysis" *Asian Economic Journal* **26**(2), 93-118 (2012)

[10] F. Hewitt, "Supply Chain Redesign" *The International Journal of Logistics Management* **5**(2), 1 – 10 (1994)

[11] J.G.A.J. van der Vorst, A.J.M. Beulens, "Identifying Sources of Uncertainty to Generate Supply Chain Redesign Strategies", *International Journal of Physical Distribution & Logistics Management* **32**(6), 409 – 430 (2002)

[12] R.B. Handfield, E. L. Nichols, "Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems", Prentice Hall PTR (2002)

[13] Sakgasem Ramingwong and Apichat Sopadang, "Simulating Benefits over Supply Chain Redesign Strategies", *Journal of Applied Science Research* Special **11**(20), 7-10 (2015)

[14] Wisner, J.D., Keong Leong, G., Tan, K.C., "Principles of Supply Chain Management: A Balanced Approach", Thomson South-Western (2005)