CAPACITY DEVELOPMENT OF RICE NOODLES PRODUCTION THROUGH CLUSTERING : A CASE STUDY OF NAKHON PATHOM PROVINCE

Nuttapong Petlaor

A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
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ABSTRACT

Title of Dissertation	CAPACITY DEVELOPMENT OF RICE NOODLES PRODUCTION THROUGH CLUSTERING : A CASE STUDY OF NAKHON PATHOM PROVINCE
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This basic research has 2 objectives: 1) To study the model of Khanom Chin (Thai rice noodle) business cluster in Nakhon Pathom Province, and 2) To study the important components and the guidelines for capacity development related to driving Khanom Chin business cluster in Nakhon Pathom Province. Population and Samples 1) Thai farmers in the cluster of Nakhon Pathom Province 2) Thai entrepreneurs from midstream and downstream groups (processing and marketing) in the cluster of Nakhon Pathom Province 3) people from Thai network support groups (external networks, government agencies, and educational institutions) related to the cluster of Nakhon Pathom Province. This study was based on qualitative research through observations, focus groups, and in-depth interviews.

The results showed that The Khanom Chin business clusters have operations in 4 Models including 'Nakhon Pathom Model', Agricultural Marketing Co-operative Model, 'Khao Yoi Model' And 'Bualomchang Model'. There are 5 important components for capacity development consist of external support, leadership and management, the process within a cluster group, production development, and product development to support the marketing need. From the operation of that 4 clusters, there are recommendations for improving the capacity of the clusters as follow: 1) development of production plans and infrastructure, 2) government support in terms of budget and tax deduction measures, and knowledge support from educational institutions 3) product development for marketing demand included packaged and innovative development in order to expand the market share.

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The study has indeed helped me to explore more knowledgeable avenues related to my topic and I am sure it will use in the future

Nuttapong Petlaor

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CHAPTER 1

INTRODUCTION

1.1 Background and Significance of the Problem

Rice is important for Thai people's way of life in two ways. First, it has been an economic crop for a long time. Thailand has been cultivating rice for more than 5,500 years. Second, rice is a belief pattern that is bound to Thai people's way of life in the conduct of rituals based on beliefs and merit-making traditions. The knowledge of rice cultivation is also accumulated as the local wisdom.

In terms of being an economic crop, in 2016, the rice planting areas in Thailand were approximately 56.5 million rai, and the production of rice was approximately 23.61 million tons (Rice Department, 2016). The volume of exported rice was around 9.88 million ton, which ranked fifth in rice exporters worldwide (Thai Rice Exporters Association, 2017). The rest was for consumption and processed into other food products in the country. Although rice sales generate income for the country for several hundred billion baht per year, almost 17 million Thai farmers still experience poverty because there is no marketing plan. Also, the production cost calculation of the products produced to stimulate sales results in no bargaining power. Using the policy of rice pledging or rice price insurance to solve the problem is not a sustainable solution because it does not solve the problem at the root cause in the production, processing and marketing cycle comprehensively. For sustainable development of rice farmers, a chain of rice production, rice processing and the marketing of rice that is supported by various groups involved, including farmers, academics, merchants, industrial processing factories and mills must be created. Each group is required to promote and develop rice fields in each aspect together to enhance and create innovations for processing products from rice to increase the value of rice products.

There are many important processing rice products at present as follows. 1) Instant rice products: these include instant porridge or frozen rice in various forms such as canned rice which can be opened and eaten immediately and its quality can be maintained for up to 2 years. 2) They are snacks and breakfast products. 3) Products from the fermentation process of rice, such as fermented sweet rice, Khanom chin (Thai rice noodle) and liquor products: Khanom chin is only the product from the fermentation of rice that is produced in an industrial process. Mostly, they are small factories located in communities in all regions of the country. For the rice fermentation process for using as a beer production component, there are some quality limitations compared with the use of barley in the production. 4) Noodles and rice vermicelli products: in addition to domestic consumption, there are also demands for these products from outside the country. They have been exported to major countries such as Malaysia and Japan. 5) They are sweets and Thai desserts. 6) They include Rice bran oil products. 7) Cosmetic products include skin care cream and rice germ extract cream (Bureau of Industrial Management Development, 2012).

On the other hand, rice is in the Thai way of life as well as people in Asia. The food culture that has been processed from rice has a long history in Asia because Asian people in Thailand, China, Korea, Japan and India eat rice as the major staple food. There are many types of rice processing, but they are called with different names such as noodles, rice vermicelli, ramen and noodles. It is also believed to be an auspicious food. The length of noodles is like a blessing for long life. It is suitable for use as a gift, making the recipient feel impressed and show the good wishes of the giver (Rathphr Khahom, 2011). One of the important noodles is “Khanom chin”.

Rice processing into Khanom chin is considered as a valuable wisdom of Thai people and people in ASEAN countries. In Thailand, Khanom chin is called differently in each region. In the central region, it is commonly known as “Khanom chin” which is served with different types of curry. In the northern region, it is called “Khanom Sen”, popularly eaten with Nham Ngiao (spicy pork sauce) and pork rind. In the northeastern region, it is called “Khao Poon”, usually eaten with fermented fish curry. It is also mixed with papaya salad, called “Tum Sua”. Fermented rice is popularly used as a raw material for making Khanom chin. In the southern region, it is called “Nhom chin, which is eaten for breakfast in the south-west provinces, such as

Ranong Province, Phang Nga Province and Phuket Province. It is usually eaten with various kinds of vegetables or steamed fish with curry paste, deep-fried dough sticks, hot tea and hot coffee. It is served with Thai southern style curry and Kang Tai Pla (fish organs sour soup). In other countries in ASEAN, the food that is similar to Khanom chin is also found. For example, in Vietnam, it is called “Bun”, popularly eaten with soup and meat. In Laos, it is called “Khao Poon” like in the northeast region of Thailand. In Cambodia, it is called “Nom Pan Jok” which is usually eaten with fermented fish. In Myanmar, it is called “Mohinga”, generally eaten with fish sauce. In Singapore, there is a food look like Khanom chin, prepared in a national menu called “Laksa”. In Indonesia, it is called “Laksa Bogor”, usually eaten with steamed rice, bean sprouts, basil, chicken and boiled eggs. In Malaysia, it is called “Asam Laksa”. In the Philippines, it is called “Pancit Lug Lug” which is eaten as a noodle. In Brunei, it is flatter, rounder, longer and bigger than Khanom chin , called “Mee Soup” (Maeban, 2015).

Therefore, forming a group of Khanom chin processing to upgrade production and promote marketing is an important factor for rice farmers to gain higher income. Forming a group of Khanom chin processing is another way to help raise the value of rice because Khanom chin is rapidly grow in popularity. Currently, Khanom chin factories are almost in every region of Thailand. Upgrading Khanom chin production process is one way to free farmers from poverty as farmers can change themselves from the agricultural producers to the modern Khanom chin entrepreneurs. Therefore, good management is needed in order to have low production cost. If this can be implemented, farmers will be able to increase the value of agricultural products from the processing of Khanom chin. The quality of life for farmers with stable income can be improved by connecting Khanom chin production of farmer groups to the consumer market, establishing a fund to enhance capacity and creating Khanom chin entrepreneurs in the area as well as raising productivity standards, creating innovations for Khanom chin, increasing food production quality, improving Khanom chin production process that does not damage the environment along with the developing production traceability systems for Khanom chin production and promoting the integration of the Khanom chin business cluster and related production groups (Korawik Pornnimit, 2016)

The hidden thing in the popularity of Khanom chin in Thailand and ASEAN countries is the production process that is quite difficult and complicated. The manufacturing process also causes environmental problems. In the past, Khanom chin production in Thailand was only for eating in the merit-making traditions because every step in the production process took 5-7 days and required a lot of labor. Therefore, kindness, love and generosity of people in the community were required for producing Khanom chin together. This is different from the present that Khanom chin can be quickly produced by modern production technology. Khanom chin is produced in small and medium industries inherited in the family. The experience of Khanom chin production has been transferred from generation to generation. Khanom chin manufacturing industry classification can be divided according to production size. The large Khanom chin industry uses modern tools such as dough kneading machines and dough sprinkling machines, resulting in good quality production and large quantities of Khanom chin production. Khanom chin is an industry that generates income for the rural areas and well strengthen the economic system of the community (Lawan Kraidet, 2002).

Although machines are used in the production of Khanom chin, making it able to produce a lot Khanom chin at the industrial level, in the production process of Khanom chin is quite complicated. For this reason, there are important problems in the production of Khanom chin, namely shortage of quality rice which is a raw material and lack of storage space for rice specially used for producing Khanom chin. There is also the problem of polluted water causing bad smell to the surrounding communities although some operators use EM to reduce the odors that occur. But, if the entrepreneurs use the process of fermentation and soaking of rice, it will still cause bad smell problems, rather than using finished flour. In addition, rice husk is also used as fuel, so it causes smoke and dust disturbing the surrounding areas. Moreover, large numbers of flies live in the production area. All these effects of Khanom chin production cause negative impacts on the environment so that the operators need to pay attention to and related government agencies should take care of this environmental impacts. Although some Khanom chin factory operators use finished flour in the production of Khanom Chin, which causes a less severe impact on the environment (Sini sangswang, 2013), the environmental problems caused by

Khanom chin production are still the issues that need attention and require knowledge to share among the clusters that may have environmental expertise in order to seriously reduce the impacts.

Forming Khanom chin cluster is a useful action in increasing the ability to develop Khanom chin business group to achieve the important goal of raising the value of Thai rice. The cluster will help strengthen the business group processing rice to Khanom chin. It will also promote the production of quality rice for Khanom chin production, the development of rice storage areas for Khanom chin production and the development of economical logistic and leads to the exchange of knowledge among relevant parties. In addition, it can be developed to respond to the popularity of consumers in many ways. It also focuses on the development that leads to Khanom chin's overseas consumers. In this regard, rice processing into Khanom chin will lead to the increase in the value of agricultural products by developing Khanom chin to be tasty and easily eaten that consumers can eat it fast and conveniently with low price. Moreover, nutrition for good health can be added from various ingredients, such as Khanom chin served with coconut milk curry mixed with Krachai or Khanom chin served with peanut curry sauce and Khanom chin served with southern style curry mixed with turmeric. At the same time, Khanom chin is usually eaten with fresh vegetables and blanched vegetables which are all herbs high in vitamins. Therefore, the goal of developing Khanom chin as a healthy food is not difficult. In addition, it can be developed into an agricultural innovation product. That is to say, Khanom chin can add value by developing its look with beauty and creativity. The product can be adjusted to have a variety of colors and flavors. Producing semi-processed Khanom chin is also recommended as it can be stored for a long time and convenient for exporting.

It is not easy to successfully develop Khanom chin to have many features in the same product and operate it by just one person or one group because each group has different expertise and there is the inability to specialize in all areas. So, if the group is not formed, it will not be able to create the product that meet many needs. Clustering can respond to complete development at the same time. Savings groups for production and cooperatives cannot respond to the diverse needs. The integration of cooperatives is a group of members with an emphasis on equality. The operational

guideline is to manage financial capital. The group members do not need to be in the community. The raw materials of the products do not need to be produced in the community. For the village fund integration, it focuses mainly on people and raw materials that are in the community. It emphasizes sufficiency. It does not focus on competition. The integration of savings groups for production emphasizes on sufficient development. The members are people in the community, but raw materials for production are not necessary to be in the community. Therefore, it is necessary to adopt the cluster approach to lead to self-reliance and develop income for farmers by producing the products that are consistent with the Thai way of life and wisdom that will lead to product upgrades and support each other in the same cluster.

Based on the reasons mentioned above, it has led to the interesting research questions. What is the form of a group for cooperation in the production of Khanom chin that leads to mutual support? What are the development approaches that lead to upgrading, increasing the capability in the production, processing, and market competition of Khanom chin production groups of farmers and private entrepreneurs involved in the Khanom chin business, as well as various sectors in the cluster? The purpose of this research was to understand the integration of Khanom chin production group with the goal of increasing competitiveness in production and rice cultivation suitable for Khanom chin production, processing from rice to Khanom chin and marketing of Khanom chin distributing to consumers by considering the whole process completely which is tied to the basis of self-reliance and internal strength.

In Nakhon Pathom province, there are large plots of rice fields. In addition, Khanom chin is a traditional food that is made from important rice, which reflects the wisdom of the villagers in the local community. Khanom chin factories are located in almost every district. They are medium and small industries as well as the household industry. There are more than 20 Khanom chin factories with a production capacity of more than 500 kilograms per day (Lawan Kraidet, 2002). The government also established the policy of Khanom chin cluster in Nakhon Pathom Province (Nakhon Pathom Model), which is a cluster with the aim to promote the production and the marketing of rice comprehensively (Large Land Plot of Khanom chin) in 2017. This phenomenon led to the interest in the study of Khanom chin cluster in this study.

1.2 Research Objectives

1) To study the style of Khanom chin business cluster in Nakhon Pathom Province

2) To study the important components and the guidelines for capacity development related to driving Khanom chin business cluster in Nakhon Pathom Province

1.3 Scope of the Study

This research was a qualitative research, consisting of scope of content, scope of setting, scope of target group, and scope of time as follows.

1.3.1 Scope of Content

The scope of content was divided into 2 main issues.

1) The style of Khanom chin business cluster in Nakhon Pathom Province in terms of business formation, setting up a cluster, process within a cluster as well as the external environment driving the Khanom chin cluster

2) The key elements and guidelines for capacity development related to strengthening the cluster which can be divided into 6 areas: (1) external support, consisting of government policy support, technology support related to product manufacturing, financial support; (2) leadership and management, consisting of leadership and good management; (3) processes within the cluster, consisting of trust, member engagement, collaboration among cluster members, training for providing knowledge and understanding, monitoring and evaluation and traceability system, (4) skilled manufacturing workers; (5) product development, consisting of research and study, production planning, easy access to factors of production and having the necessary infrastructure and (6) product development based on market demand, consisting of product development based on consumer demand and product standardization

1.3.2 Scope of The Study Area

This study was conducted in the areas of Nakhon Pathom Province related to the integration of Khanom chin production groups in Nakhon Pathom Province, focusing on the areas where rice is produced for Khanom chin production and processed for Khanom chin market.

1.3.3 Scope of Target Group

The target group in this study was Thai farmers participating in Large Agricultural Land Plot Project in Nakhon Pathom Province which is upstream group, midstream group and downstream group, Thai entrepreneurs (processing and marketing) in the Khanom chin production group in Nakhon Pathom Province as well as support groups, external network, government agencies and educational institutions related to Khanom chin production group in Nakhon Pathom Province

1.3.4 Scope of Time

The research was conducted from September 2018 to December 2019.

1.4 Expected Benefits

1) The information on background, development and challenges of Khanom chin Business Cluster is gained.

2) The roles of various groups supporting and pushing for success, namely farmer groups, small business groups/companies, academic support groups, development coordination groups, and related groups that help promote and push the cluster to continuously improve work efficiency are recognized.

3) The style, the components and the guidelines of clustering enhancing the group's competitiveness by considering the complete cluster components according to the economic activities of the supply chain, namely upstream entrepreneurs which are the groups of rice farmers, the midstream operators, which are the main business groups of the network, consisting of rice mills, Khanom chin production factories and downstream operators, such as wholesale and retail distributors in the domestic market and exporting to foreign countries are obtained.

4) Policy recommendations to support the development of Khanom chin production cluster and its application for development of other clusters are obtained.

CHAPTER 2

LITERATURE REVIEW

In the study entitled “Capaciy Development of business groups through clustering: a case study of Khanom chin production groups in Nakhon Pathom Province”, the documents about concepts, theories and related research were studied as follows.

2.1 Guidelines for Competitiveness Development

2.2 Forms, Characteristics and Development of Promotion of Group Integration

2.3 Theoretical Concepts Related to Clusters

2.4 Concepts and Development of Khanom Chin

2.5 Core Concept

2.1 Guidelines for Competitiveness Development

Nowadays, the whole world is focusing on the competitiveness development on 5 areas which are 1) technology and innovation development, 2) human resource development, 3) infrastructure system development, 4) cluster development and 5) amendments to rules and regulations that obstruct the development (Jareeporn Jarukornsakul, 2020). For the competitiveness development of the cluster in this study, the capability development in the production, processing, and marketing together with the concepts, theories and network management related to the development of the capability of Khanom chin business group were studied as follows.

2.1.1 Definitions of Competitiveness Development

In terms of the cluster development for competitiveness development, the upstream, which is the sources of raw materials used as the production factors, the midstream, which is the processing process, and the downstream, which is the

marketing, should be developed. The competitiveness development of the cluster refers to the following issues.

2.1.1.1 Capacity Development in Production and Processing

1) Production: Based on the study of the competitiveness development of the beef cattle cooperatives group, Kasetsart University, Kamphaeng Saen Campus, using the cluster-based approach in Nakhon Pathom Province and Suphan Buri Province, it was found that there were changes caused by the implementation of the cluster-based approach as follows. (1) Changes in farmers: Farmers raised more quality fattening cattle, accepted the beef traceability system according to specified criteria and introduced a new management system that can change itself to survive in the crisis. For example, farmers switched from growing corn for cattle to other grass during the crisis of drought. (2) Changes at the cluster level: It consisted of group marketing planning as well as linking production networks for small-scale farmers which had regular meetings, sharing and learning together, guidelines for effective beef traceability innovation, breeding and recording the information in a systematic way (Boonanan Phinaitrup, 2012)

2) Processing: Lanyanat Phatanan (2008) studied the potential of some Thai-style noodle (Ka-Nom-chin) producers to comply with established good manufacturing practices (GMP) and found that Khanom chin processing was contaminated with microbes, and the consumers did not cook before consumption, causing them to have a high chance of food poisoning. From random inspection, it was found that 87% of contamination was found. Therefore, competitiveness development is necessary to upgrade the processing standards to meet the GMP export standards. In addition, Khanom chin processing has the production process that includes production components such as rice, water, fuel for boiling, electric power for the dough kneading machine and light in processing. Therefore, the processing has released waste to water sources, such as flour from the rice fermentation process or washing Khanom chin, causing the oxygen in the water source to decrease rapidly and the putrid odor affecting the surrounding communities. Improving the process to reduce flour loss is considered a reduction in environmental problems and also the cost of production of Khanom chin (Pollution prevention technology division office

of water technology and factory pollution management department of industrial works, 2016)

2.1.1.2 Capacity Development in Marketing

1) Competing in international markets: Khanom chin has a long history with many ethnic backgrounds. In addition, in Asia, people in almost every country like to eat noodles. Therefore, there is an opportunity to promote Kanom chin produced in Thailand to export to foreign countries (Winner, 2016; Yuphin Somkhumpee, 2011)

2) Values and cultural values of Khanom chin: In the past, Khanom chin was eaten in auspicious ceremonies such as traditions and wedding ceremonies, because it was convenient food. It can be served for a large number of people. Therefore, developing Khanom chin's competitiveness can be a good choice that is in line with the way of Thai society. It also hides the belief about the auspicious food. Person believe that eating Khanom chin can make them have a long life like Khanom chin (Trueplookpanya, 2010).

3) Nutrition of Khanom chin: Khanom chin is an alternative of healthy diet. In developed countries in Asia, the amount of rice consumption has decreased because of concerns about obesity. Therefore, the eating behavior has changed. People eat less rice and switch to consume low-carbohydrate diets instead. Khanom chin is healthy alternative food that has enough nutrients to sustain life while the energy is not high and it is eaten together with large amounts of vegetables. Khanom chin can be pushed into a healthy alternative diet in the trend that consumers value clean food. Moreover, nutrition of Khanom chin has been developed by adding useful nutrients such as Gaba to help enhance the memory. Creating an alternative for rice consumers to change to eat Khanom chin has already been in the way of consumption (Folk Doctor, 2004; Kasetsart Thai Agri Business, 2016; Today Health, 2017).

4) Ease of eating and long-lasting preservation of Khanom chin: Kasetsart University created instant Khanom chin which can be stored for up to 1year. It can be cooked by pouring boiling water on it, covering the container and leaving it for 3 minutes. Therefore, it is an opportunity to push Khanom chin to

compete in the instant food market just like instant noodles, meeting the needs of the consumers in foreign countries and those with fast-food eating habit.

2.1.2 Elements of Competitiveness Development

From the review of the concepts and research related to clustering both in Thailand and other countries, it can be classified into 6 main areas which are (1) external support, (2) leadership and management, (3) process within the cluster, (4) production labor, (5) production development and (6) product development according to the market needs. The research conducted in Thai mainly focuses on the development of process within the cluster to enhance the group's capability, followed leadership and management and product development according to the market needs. This is consistent with the research conducted in foreign countries that priority is given to the development of the group's capability in the process within the cluster, followed by production development. But, leadership and management is not focused as in the study in Thai research. Empowering cluster integration in terms of the process within the cluster includes cooperation, collaborative learning, trust, commitment, training, communication, knowledge provision, monitoring and evaluation and creating product traceability systems. Both Thai and international research studies emphasize on cooperation of members to develop the group's capability as shown in Table 2.1: research studies related to capability development guidelines of clustering in Thailand and Table 2.2: international research studies related to clustering.

2.2 Forms, Characteristics and Development of Promotion of Group Integration

The forms of grouping certified by government regulations are small and micro community enterprises, small and medium enterprises, cooperative groups for production, savings groups for production and village and urban community funds. Each form of grouping has different characteristics. The development of group integration will be presented in the next topic.

2.2.1 Development of Support for Group Integration for Production, Processing and Marketing

The development of the integration of farmer groups in Thailand is being pushed by the government sector as shown in almost all national economic and social development plans. For example, the First National Economic and Social Development Plan, Article 5 (10) required the promotion of integration of farmers and cooperatives. It was considered an important mechanism leading to the goal of farmer development. The principles of the establishment of cooperatives must be based on voluntariness (National Economic and Social Development Council, 1963). The government continuously promoted integration in the economic development plan. The Second National Economic and Social Development Plan had the guidelines for farmers to join production groups and promoted the farmer assistance projects and increase of productivity. The government sector established water distribution systems, water allocation and drainage and provided knowledge on the approaches to nourish the soil for farmers (National Economic and Social Development Board, 1967). The Third National Economic and Social Development Plan highlighted the role of group integration for local production and the integration of the same career, which was useful for presenting facts, obstacles and problems of the groups as well as ideas for solving problems for the government sector in the form of associations, business groups and agricultural institutes. In addition, the government set the guidelines for promoting groups to have the market system at the farm level, the coordination between production groups, the establishment of trading group integration and the integration of groups to increase the competitiveness of the private sector in exports and negotiation with foreign buyers. The government continued to support these issues in the Fourth National Economic and Social Development Plan and the Five National Economic and Social Development Plan, which had the essence of driving cooperative integration and reducing the role of middlemen by defining the structure of cooperative grouping in the form of Cooperative Act and having the guidelines for providing loans to farmers through cooperative grouping. Besides, the government also supported the grouping of merchants to export their products to foreign countries for the products that cannot be stored for a long period of time (National Economic and Social Development Board, 1977, 1982).

Table 2.1 Research Studies Related to Capability Development Guidelines of Clustering in Thailand

No	Factor of Integration	Tiyanont (2008)	Kriwanit (2004)	Khodphue (2008)	Suranartyuth (2010)	Suttiprapa (2012)	Maturos (2012)	Phinaitrup (2012)	Pitaksarn (2013)	Chieochankitkan (2013)	Nathongkham (2014)	Chai-amporn (2017)	Phochathan (2016)	Suwaenadchariya (2004)	Wattanapunkitti (2016)	Chamnanpon (2016)	Chamnanpon et al. (2016)	Total (16)	(%)
External Support		-	-	-	1	1	-	1	-		-	1	1	1	1	1	-	8	50
1	Funding Support				1	1										1		3	19
2	Public Policy Support					1		1				1	1	1	1			6	38
Leadership and Management		1	-	1	1	-	1	1	1		-	-	1	-	1	1	1	10	63
3	Leadership	1		1	1		1	1	1				1		1			8	50
4	Good Management				1											1	1	3	19
Process within the Cluster		1	1	-	1	1	-	1	1		1	-	1	1	-	1	-	10	63
5	Cooperation		1		1	1							1	1		1		6	38
6	Learning Together	1	1					1						1				4	25

No	Factor of Integration	Tiyanont (2008)	Kriwanit (2004)	Khodphue (2008)	Suranartyuth (2010)	Suttiprapa (2012)	Maturos (2012)	Phinaitrup (2012)	Pitaksarn (2013)	Chieochankitkan (2013)	Nathongkham (2014)	Chai-amporn (2017)	Phochathan (2016)	Suwanadchariya (2004)	Wattanapunkitti (2016)	Chamnanpon (2016)	Chamnanpon et al. (2016)	Total (16)	(%)
7	Trust				1			1		1					1			4	25
8	Attachment						1		1									2	13
9	Training, Communicate, Knowledge, Understanding	1			1	1					1			1		1		6	38
10	Monitoring and Evaluation								1									1	6
11	System Product Traceability							1										1	6
Production labor		-	-	**1**		**1**	-	-	-		-	-	-	-	**1**	-	**1**	**4**	**25**
12	Productive Skills			1		1									1		1	4	25
Production Development		-	-	-		-	-	**1**	-		-	-	**1**	**1**	-	**1**	**1**	**5**	**31**
13	Research Study															1		1	6
14	Manufacturing							1										1	6

No	Factor of Integration	Tiyanont (2008)	Kriwanit (2004)	Khodphue (2008)	Suranartyuth (2010)	Suttiprapa (2012)	Maturos (2012)	Phinaitrup (2012)	Pitaksarn (2013)	Chieochankitkan (2013)	Nathongkham (2014)	Chai-amporn (2017)	Phochathan (2016)	Suwaenadchariya (2004)	Wattanapunkitti (2016)	Chamnanpon (2016)	Chamnanpon et al. (2016)	Total (16)	(%)
	Planning																		
15	Easy Access to Factors of Production												1					1	6
16	Necessary Infrastructure												1	1			1	3	19
Product Development According to the Market Needs		**-**	**-**	**1**	**1**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**10**	**63**
17	Develop Products to Meet the Needs of Consumers.	-	-	1	1	1	-	1	-	1	-	-	1	1	1	1	1	10	63
18	Standard Product	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	6
								Total										**16**	**100**

Table 2.2 International Research Studies Related to Clustering

No	Factor of integration	Michael (2525)	Shantanu (2534)	Sonobe T, Hu D, and Otsuka k (2543)	Michael E. Porter and Scott Stern (2544)	Wasim Arif Babur (2545)	Margarida Fontes (2548)	VuHoang Nam, (2553)	Chrysoula(2554)	Yung-Lung Lai, (2557)	Mercedes(2557)	Domin(2561)	Total (11)	(%)
External Support		-								1	1			9
1	Funding Support												0	0
2	Public Policy Support									1			1	9
Leadership and Management											1		1	9
3	Leadership												0	0
4	Good Management									1			1	9
Process within the Cluster			1			1	1	1	1	1	1		7	64
5	Cooperation		1			1	1	1	1	1	1		7	64
6	Learning Together							1	1	1			3	27
7	Trust												0	0
8	Attachment												0	0
9	Training, Communicate, Knowledge, Understanding												0	0
10	Monitoring and Evaluation												0	0

No	Factor of Integration	Michael (2525)	Shantanu (2534)	Sonobe T, Hu D, and Otsuka k (2543)	Michael E. Porter and Scott Stern (2544)	Wasim Arif Babur (2545)	Margarida Fontes (2548)	VuHoang Nam, (2553)	Chrysoula(2554)	Yung-Lung Lai, (2557)	Mercedes (2557)	Domin (2561)	Total (11)	(%)
11	System Product Traceability												0	0
Production Labor								1					1	9
12	Productive Skills							1					1	9
Production Development		**1**	1	1	1			1			1		7	64
13	Research Study			1	1						1		3	27
14	Manufacturing Planning			1								1	2	18
15	Easy Access to Factors of Production	1											1	9
16	With the Necessary Infrastructure	1	1					1				1	4	36
Product Development According to the Market Needs								1	1				2	18
17	Develop Products to Meet the Needs of Consumers							1	1				2	18
18	Standard Product												0	0
				Total									**11**	**100**

In the Sixth National Economic and Social Development Plan, the government sector focused on supporting group integration to improve production and marketing according to the willingness of farmers. It focused on increasing productivity, improvement of production quality and product quality control so that quality products needed by the markets were obtained. Moreover, the networks of connections between manufacturers and customers were created, resulting in the exchange of information about product specifications. This made farmers be able to adjust the production methods to get the products meeting the market needs. It was comprehensive development, starting from the production process, processing and distributing to consumers. The government also provided loans to SMEs in this national economic and social development plan. The explanation of the group integration guidelines, including the production process, processing and distributing to consumers was provided. This is in line with the cluster concept by Porter (1990), focusing on the development of competitiveness by integrating business groups and related institutions to completely proceed the process. The groups are connected and supported each other (National Economic and Social Development Board, 1987; Ratima Gajanandana, 2015)

Later, the group promotion was introduced again in the Ninth National Economic and Social Development Plan and the Tenth National Economic and Social Development Plan. The government focused on the ways to strengthen the small and medium-sized businesses in order to make them able to compete and rely on one another. Clustering processes and linking the chain of product manufacturing and services from upstream to downstream based on appropriate knowledge and innovation were employed in reducing production and product costs as well as raising the standards of products and services (National Economic and Social Development Board, 2007). On September 22, 2015, the Minister led by General Prayut Chan-ocha approved the cluster development guidelines for the development of Special Economic Zones. The Board of Investment of Thailand, the Office of the National Economics and Social Development Council and the Ministry of Industry were assigned to formulate the cluster development policy to strengthen the production and marketing chain, leading to the creation of the industries of the future, which also included agro-processing clusters. It focused on the basic development of agricultural

cluster in the business of promoting knowledge bases and logistics, pushing for investment and upgrading the cluster with science, technology and innovation, resulting in higher competitiveness. The government also had the policy to support the exemption of tax, tax deduction and other rights related to the right to land ownership of foreigners for operating the promoted business or providing permanent residence for international experts (Ratima Gajanandana, 2015).

This was in line with the Twelfth National Economic and Social Plan that the government supported the group integration in the development of enterprise networks and creation of the network of cooperation and linkages with other manufacturing enterprises or other businesses with related agencies. The government sector also focused on promoting research and development on production and product processing (National Economic and Social Development Board, 2017). as shown in Table 2.3: promotion of group integration for production, processing and marketing,

2.2.2 The Principles of Group Integration

The principles of group integration in each form are different as follows.

2.2.2.1 Small and Micro Community Enterprise (SMCE): According to the definition of the Community Enterprise Promotion Act, Section 3, community enterprise means the community's business relating to product manufacturing, service rendering or other businesses undertaken by a group of persons having a relationship with each other who share common ways of life and join together to conduct such business for income generation and self-reliance in the family, in the community and across the communities whether it is a juristic person in any form or a non-juristic person (Government Gazette, 2002). In summary, Small and Micro Community Enterprise is the operation for community capital management for self-reliance. The community capital is not just only money, but also resources, knowledge, wisdom, cultural capital and social capital. The important principle is that the community must operate and mainly use raw materials, resources, labor capital in the community by focusing on the basis of sufficient economy to support the economy of the community. It has been found that some of the small and micro community enterprises are not ready to enter the competition.

Table 2.3 Promotion of Group Integration for Production, Processing and Marketing

No.	Promotion of Group Integration for Production, Processing and Marketing	Plan No. 1	Plan No. 2	Plan No. 3	Plan No. 4	Plan No. 5	Plan No. 6	Plan No. 7	Plan No. 8	Plan No. 9	Plan No. 10	Plan No. 11	Plan No. 12
1	Promoting the Integration of Farmers and Cooperatives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Promoting Acceleration in Production of Farmer Groups	✓	✓	✓	✓	✓							
3	Promoting Effective and Efficient Production				✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Promoting the Integration of Various Professional Groups in the Form of Associations and Business Groups in Proposing Development Concepts			✓	✓	✓	✓	✓		✓	✓	✓	
5	Promoting the integration of Groups into Various Local Areas			✓	✓	✓		✓	✓	✓	✓	✓	✓
6	Promoting the Integration of Buyer-Seller Groups			✓	✓								
7	Promoting Export and Negotiation with Foreign Countries			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

No.	Promotion of Group Integration for Production, Processing and Marketing	Plan No. 1	Plan No. 2	Plan No. 3	Plan No. 4	Plan No. 5	Plan No. 6	Plan No. 7	Plan No. 8	Plan No. 9	Plan No. 10	Plan No. 11	Plan No. 12
8	Supporting the Integration of Farmer Groups and Organizing Agricultural Products Market					✓							✓
9	Supporting for Loans to Farmers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
10	Supporting for Loans to SMEs						✓	✓		✓	✓	✓	
11	Promoting Production and Marketing Improvement, Controlling Products and Connecting Manufacturers and Consumers						✓	✓	✓	✓	✓	✓	✓
12	Integrating SME Groups Based on The Concept of Integrated Cluster									✓	✓	✓	✓

Therefore, they must be enhanced to promote knowledge, local knowledge and build community innovation in order to be able to be self-reliant (Secretariat Office of Community Enterprise Promotion Board, 2008)

2.2.2.2 Small and Medium Enterprises (SMEs): It is the group integration for production, trade and services, with the flexibility to adapt to the general situation, spending less money on operations than large enterprises. It is the place to support agricultural labor during the end of the planting season who migrate to work in Bangkok and metropolitan areas (Institute for Small and Medium Enterprises Development, 2018). The integration of small and medium enterprises can be categorized according to Small and Medium Enterprise Promotion Act, B.E. 2000 based on the number of employment (persons) and the fixed asset (million baht) as follows. Small-sized enterprises include the following criteria. (1) The manufacturing business employs no more than 50 people and the fixed asset does not exceed 50 million baht. (2) The wholesale business employs no more than 25 people and the fixed asset does not exceed 50 million baht. (3) The retail business employs no more than 15 people and the fixed asset does not exceed 30 million baht. (4) The service business employs no more than 50 people and the fixed asset does not exceed 50 million baht. The criteria of medium-sized enterprises are as follows. (1) The manufacturing business employs 51-200 people and the fixed asset is 51-200 million baht. (2) The wholesale business employs 26-50 people and the fixed asset does not exceed 51-100 million baht. (3) The retail business employs 16-30 people and the fixed asset is 31- 60 million baht. (4) The service business employs 51-200 people and the fixed asset is 51-200 million baht.

2.2.2.3 Cooperatives for Production: According to the Cooperatives Act, it means a group of persons who jointly conduct affair for economic- social interests on the basis of mutual assistance and self-help in accordance with the principles of cooperatives. There are 7 principles of cooperatives. 1) It must be open to general members who want to use the services of the cooperatives without discrimination in race, religion and political parties. Each member has equal status. 2) The members of the cooperatives have voting rights in accordance with democratic principles, which is one person per one vote. The priority is given to individuals over

the number of shares they hold, which is different from the capitalism which gives more importance to the percentage of shares than voting. 3) The dividends paid to the members are from the purchase or doing business with the cooperatives in order to stimulate love and loyalty to the cooperatives. This is different from the capitalism that the returns are based on the shareholding proportion, or the socialism in which the returns are given to society. 4) The interest rate is set at not more than 5 percent per year to prevent the pursuit of profit from cooperative capitalists by not doing business with cooperatives. 5) Political and religious neutrality must be remained to prevent conflicts due to differences in ideas. 6) Trade in cash is recommended. Products should not be sold with credit because it will cause business deterioration due to outstanding debt problems. The stores will not have revolving funds to buy new products. Also, extravagant spending should be reduced and saving should be promoted. 7) It is the promotion of education in order to make the cooperatives stable and grow. It is necessary to promote better understanding in cooperatives by providing knowledge to cooperative members (Office of the Basic Education Commission, 2013). There are 7 types of cooperatives in Thailand. 1) Agricultural cooperative: It is established among those having occupations in agriculture. The group is registered as a juristic person to the cooperative registrar so that the group members can work together to help each other in their careers and improve their living conditions. 2) Fisheries Cooperative: It is established among fishermen in order to solve the problems and obstacles in the occupation, provide academic knowledge regarding the procurement of suitable materials and equipment, quality in culture and storage of processed fish for members and help other fishing professions. 3) Estate Cooperative: It is a form of land allocation for members together with provision of loans in order to be production factors, agricultural processing and public utilities for the members. 4) Cooperative Shop: It is established to sell products to the members and general people in order to solve the problem of purchasing consumer goods. The members also want to sell their products. It also aims to raise awareness of saving to the members and encourage them to help each other to achieve cooperation in the cooperative group. 5) Savings Cooperative: It is a financial institution. The members working in the same profession or community know about savings. When it is needed, the members of the savings cooperative do not have to borrow informal loans that

have high interest rates. For this reason, the family institution has more financial security. 6) Service Cooperative: It is the integration of professional group to promote self-help and mutual assistance among the members. The members will benefit from the cooperative that acts as a center for development of professional skills, resulting in standardized services meeting the market demand, such as Aranyik Knife Cooperative Ltd. and Taxi Cooperatives. 7) Credit Union Cooperative: It is a cooperative established among people in the same relationship, such as working in the same place, studying in the same school or engaging in the same profession. It is operated by regularly accumulating the members' money into funds as specified by the cooperative. The funds will be used to help the members of the cooperative who have financial problems in the form of loans (Cooperative Promotion Department, 2017).

2.2.2.4 The Integration of Savings Group for Production: It is the gathering of the members who regularly accumulate money, which is called Sajja savings, in order to be used as the fund for the members in need of loans to invest in their occupations or for their own welfares. The funds of the savings group for production are obtained from various sources, which are divided into 3 types: (1) Sajja savings accumulated by the members with equal amount every month according to the ability of savings of the members and the dividends are given to the members, (2) Special Sajja savings received from the deposits of the members and the returns are the interest or the dividends in accordance with the regulations of the group, (3) Other revenues obtained from membership fees, fines, interests, and profits from investments and (4) Government subsidies through local government agencies or other organizations. The savings group for production uses the funds to lead people development, making people have morality. People are integrated to save money. The group is managed by the group members with the sense of ownership and responsibility for sharing and group's operations. The group members must adhere to 5 moral principles: honesty, sacrifice, responsibility, sympathy and trust. There is a self-control system for the group members in spending on the savings funds. The group is open to people of all ages in sub-districts or villages who are able to save money. The group focuses on promoting the habit of saving, honest, and patience. The members' savings are accumulated in the form of group to reduce dependence on external funds. All members must take care of the movement and check each other.

The members know how to spend money appropriately based on the principles of the sufficiency economy philosophy (Department of Community Development, 2012).

2.2.2.5 The Integration of Village and Urban Community Fund: It is a source of funds for the promotion and development of villages. There is a system for managing revolving funds in villages and urban communities to increase the capability of development and strengthen the self-reliance process of villages and urban communities. The principles of village and urban community fund are as follows. 1) A source of working capital for investment in professional development is job creation, income generation or reduction of expenses and expenses for emergency relief and urgent needs. 2) It is a source of funds for the development of villages and urban communities to have the ability to manage capital. 3) The fund helps strengthen the self-reliance process of villages and urban communities so that people can learn and develop creativity, contributing to promoting the sufficiency economy. 4) The fund helps stimulate the economy at the foundation level and strengthen the capacity of the people in the villages and urban communities in terms of both economic and social aspects.

The integration of the 5 main groups mentioned above can be distinguished by the prominent features as follows. 1) In terms of the integration of manufacturers of goods and services, community enterprise and village and urban community fund, the community leaders are the leaders in the production of goods and services. For the integration of small and medium enterprises, cooperative group and savings group for production, the group members determine the production of products and services. 2) In terms of profit management, the profits are given back to the group members. In the case of community enterprise integration and village and urban community fund, the returns are not only given to the members but also for the development of the community. 3) For the capital management of the group, all groups emphasize the importance of capital management. Only community enterprise group focuses on other capital management, including knowledge capital, wisdom capital, cultural capital and social capital in the production of products and services. 4) The investment size can be classified as small, medium and large scales of investment. The largest scale of investment is the integration of cooperative group, followed by the investment in small and medium enterprises, and small investment can be found and

distributed in all groups of production. 5) For the integration of group members, small and medium enterprise group and cooperative group do not mainly focus on community members, which is different from community enterprise group, savings group for production and village and urban community fund that focus mainly on community members. 6) In terms of production resources, community enterprise group and village and urban community fund emphasize the use of local resources as the basis for the development of products and services. Other forms of integration do not give importance to the use of resources and raw materials in the community for development of products. 7) Regarding group development, community enterprise group, savings group for production and village and urban community fund focus on sufficiency in community development and promotion. This is different from cooperative group for production that focuses on equality. As for the integration of small and medium enterprise group, it is a group focusing on competition. 8) For group management, community enterprise group, cooperative group and village and urban community fund focus on educating members about the production of goods and services as well as linking cooperation in the production chain. Regarding the integration of small and medium enterprise group, the clear guidelines on the integration for production have not been defined. It is open to manufacturers to set up an operation system that is suitable for the products they produce. This is different from the approach of the cooperative group, which clearly specifies the operational principles, namely knowledge enhancement for members, equality in admission to membership, democratic principles, political and religious neutrality, cash trading, returns in the form of dividends to members if engaged in business and charging interest at a limited rate. 9) Regarding tax privileges, the integration of production groups with clear tax privileges is the integration of small and medium enterprise group and cooperative group as presented in Table 2.4: The details of the integration of groups to promote production, services, processing and marketing.

Although the integration of various forms of groups for production, processing and marketing has different principles of integration and management, each type of grouping requires the use of cluster concepts that help in grouping for efficient production, processing, and marketing, leading to competitiveness enhancement. Competitiveness enhancement is, therefore, very important.

Table 2.4 The Details of the Integration of Groups to Promote Production, Services, Processing and Marketing

No.	Details of the integration		Small and Micro Community Enterprise (SMCE)	Small and Medium Enterprises (SMEs)	Cooperatives for Production	The Integration of Savings Group for Production	The Integration of Village and Urban Community Fund
1	Suppliers of Goods and Services	Community	✓				✓
		Group Members		✓	✓	✓	
2	Generating Revenue	Community	✓				✓
		Group Members	✓	✓	✓	✓	✓
3	The Operator to Manage Funds	Finance	✓	✓	✓	✓	✓
		Knowledge Capital	✓				
		Wisdom	✓				
		Cultural Capital	✓				
		Social Capital					
4	Investment Size	Small	✓	✓	✓	✓	✓
		Medium		✓	✓		
		Major			✓		

No.	Details of the Integration		Small and Micro Community Enterprise (SMCE)	Small and Medium Enterprises (SMEs)	Cooperatives for Production	The Integration of Savings Group for Production	The Integration of Village and Urban Community Fund
5	Members	Community	✓			✓	✓
		Do not Focus on Community		✓	✓		
6	Production resources	The Main Raw Material Used in the Community	✓				✓
		Do not Focus on Raw Materials in the Community		✓	✓	✓	
7	Development Principles	Focus on Self-Sufficiency	✓			✓	✓
		Emphasizes Equality			✓		
		Focus on Competition		✓			
8	The Operation	Systematically Integrated	✓				
		Knowledge Builder Members	✓		✓		✓
		Equality Admission as a Member			✓		

No.	Details of the Integration		Small and Micro Community Enterprise (SMCE)	Small and Medium Enterprises (SMEs)	Cooperatives for Production	The Integration of Savings Group for Production	The Integration of Village and Urban Community Fund
		Democratic Principles			✓		
		Political and Religious Neutrality			✓		
		Cash Trading			✓		
		Return for Payment If the Members Involved in the Business			✓		
		Limited to Interest Rates			✓		
		Savings			✓	✓	
		Not Specified		✓			
9	Privileges	Eligible		✓	✓		
		Unclear	✓			✓	✓

2.3 Theoretical Concepts Related to Clusters

The group integration according to the cluster concept for production, processing and marketing is a way to create mutual support within the group or among related networks. The words about the group integration of production have many meanings. The dictionary of So Sethaputra defines “cluster” as a group, a mass or being together or in groups. United Nations Industrial Development Organization (UNIDO) defines “cluster” as the integration of group and interconnected networks in neighboring areas supporting one another. For example, business associations play a role in technical assistance, focusing on innovations that make use of dynamic business integration support systems (The United Nations Industrial Development Organization (UNIDO), 2017)

Clustering based on the concept of Michael Eugene Porter focuses on the factors affecting productivity development and innovation of integration of various business organizations related within the geographical boundary. The foundation is based on the fact that no business organization can survive by itself. There must be a connection with many other organizations, including upstream, midstream and downstream groups and support groups, such as professional training institutions, trade associations, product inspection organizations and universities (Porter, 1998; Somsak Samukkhethum, 2018)

The concept of clustering has gained attention since the economic downturn in 1997. The concept was first used in industrial development in Thailand as the tool for the country’s economic development. The development guidelines were specified in the tenth National Economic and Social Development Plan and the twelfth National Economic and Social Development Plan. The cluster concept of Michael Eugene Porter has created a tool for analyzing the competitiveness of cluster in a diamond model with the following characteristics: 1) Inputs or production factors such as skills, labor, human resources, infrastructure needed for production, including transportation systems, communication systems, public health system, housing and workplaces as well as natural resources, technical knowledge about production of products and services, market research data, funding for the production of goods and services; 2) Competition context and strategy formulation referring to rules,

regulations, norms, and strategies that affect competition, which give the group an advantage in the competition such as differentiation strategies that lead to product innovation; 3) Conditions of demand and market demand and the services that will be the pressure causing changes to the improvement of the production to meet the needs of consumers and 4) Supporting factors in related industries because related industries will support the production of goods and services, resulting in the development of product, production, processing and marketing or services (Porter, 1998; Somsak Samukkhethum, 2018).

To sum up, the benefits of clustering in accordance with Michael Eugene Porter's concept, which are the result of cluster collaboration, will accelerate cooperation in efficient product and service management and the invention of technology and new innovations. Group integration in accordance with the cluster approach by connecting in small to large units increases the group's competitiveness capacity because the group members exchange information regularly and understand the operational guidelines together. In addition, clustering helps reduce production costs in terms of raw materials, and create innovations, which are additional factors, leading to new business expansion (Jakkaporn Aunjit & Aditad Vasinonta, 2009; Ratima Gajanandana, 2015).

2.3.1 Theories of Organization and Network Management

There are many forms of clustering. In the 1980s, many executives of organizations in the government and private sectors responded to the increasing competition at both national level and local levels by using a centralized coordination structure and the command lines at many levels, leading to the management using a flexible structure. This is similar to the network model of the organization or special units using coordination based on market forces instead of command lines. Network management is the collaborative operation using informal social systems both within the organization and the relationships between organizations to jointly produce complex products and services that occur in the highly uncertain and highly competitive environment (Miles & Snow, 1992).

2.3.1.1 Definition of Network Organization: Network is defined as a group of actors who are involved in the relationship, which can be person, team,

organization, concept or others, depending on the context of the network in relation to linking two or more actors in a relationship. The network has three dimensions: 1) relationship, which could be both a one-directional relationship, such as giving advice to individuals and a two-way relationship such as having discussions, 2) The existence of the relationship, which is to consider whether the two organizations are in relationship or not and 3) the value of the relationship or the strength or the weakness of the relationship, such as a deep, strong, long-term, or superficial relationship. Alter and Hage (1992) called it an inter-organizational network, which is a group of organizations with formal or informal covenants. There is a non-hierarchical relationship of independent organizational units. Larson (1992) called it a network organization model. The ongoing exchange creates an interdependence that depends on the responsibility. Expectations are mutually beneficial in the organization. Powell (1990) called it a network of organizations, which is a pattern of the plane relationship of an exchange. There is an independent flow of resources. There is a common communication path between organizations.

2.3.1.2 Essential Conditions for Administration in Business Network Groups: Jones, Hesterly, and Borgatti (1997) stated that there are four essential conditions for enabling network management to happen and grow in a business organization. 1) The uncertainty of product demand and supply stability: Uncertainty can be caused by raw material suppliers, customers, competitors and financial markets. Under the uncertainty, the organization tends to break into independent units based on subcontracting hires. The uncertainty contributes to the network management. 2) The exchange of highly specific goods or services: This will lead to an exchange that creates interdependence between organizations. This form of exchange requires the organization to expand cooperation, intimacy and greater frequency of exchange. 3) The complexity of the work under the pressure of time: The presence of many different inputs and the complexity of the work cause the need to coordinate in doing activities under the pressure of time. The coordinated activities of the team are fast adapted, communicated and shared information, reducing the time of doing the complex work. 4) The frequency of exchange among the parties involved within the network: The frequency is reciprocity. The frequency helps people develop

skills and knowledge through a process of deepening knowledge through continuous interaction. The frequency also contributes to trust and reciprocal relationship.

2.3.1.3 Organizational Effectiveness: The assessment of organizational effectiveness is related to the criteria assessed by the assessor with 8 groups of values: 1) flexibility, which is the ability to adapt to changing conditions, 2) resource acquisition and accumulation, which is the ability to increase external support and internal expansion, 3) planning for clear and understandable objectives, 4) high efficiency, high productivity and high ratio of output to input, 5) organizing information systems as a means of communication that allows people to know what will affect work, 6) stability, which is the value of order, continuity and smooth performance, 7) unity of operators, mutual trust of workers, respect and honor and working together well and 8) the skills of the workers who have been trained with the skills and competencies to work properly. These 8 aspects are framed to create 4 unique models for evaluating organizational effectiveness: 1) the human relationship model, which defines that the organizational effectiveness consists of unity and operators' skills, 2) the open system model, which defines the effectiveness as flexibility and the ability to acquire and accumulate resources, 3) the rational-goal model which refers to having a plan, a goal, and a high performance and 4) the internal process model which defines the effectiveness in the form of organizing the information system both in the acquired and distributed parts and stability and obedience to orders.

2.3.1.4 Environment Affecting the Ability of the Organization to Achieve Its Objectives

1) General Environment: It refers to the environment that has an indirect impact on daily operations, consisting of the state, society, culture, economic conditions, technology, financial resources and the international situations. (1) The state affects almost all social organizations. The state has a broad meaning prescribed in the constitution, laws, policies, measures and regulations of the government. (2) The society and culture that the organization should pay attention to in the analysis consists of population structure, migration, education, religion, values, beliefs, environmental conservation and consumer protection movements. (3) Economy has a great impact on the organization, especially the business organization

that has three main economic issues: economic growth, interest rate changes and currency exchange. (4) Technology changes affect both advantages and disadvantages between organizations in production, information management system, management within the organization and reaching the target groups. Organization with modern technology will result in positive impact on the organization. Michael E. Porter (1982) conducted a study entitled “Location, Competition, and Economic Development: Local Clusters in a Global Economy” to study economic geography in an era of global competition. Trade competition affected by technological changes, dramatically reduced the role of geographic advantage. (5) Financial resources are important to the organization’s operations. Usually banks and financial institutions are important financial resources for business organizations. Or, the organization may have to raise funds in the capital market. (6) International situations or the actions of any country or group of countries inevitably affect other countries, both positively and negatively, such as the situation on trade tax agreements, the decision to raise or lower oil prices by oil producers and terrorist situation.

2) Specific environment: It is an environment in which the organization has direct interactions with and it has a direct impact on the ability of the organization to achieve its objectives. Specific environment includes the following aspects. (1) Conducting research regularly and connecting knowledge, skills and data together: Delgado, Porter, and Stern (2014) stated in the study on the assessment of the performance of industrial clusters within the same industry that research should be conducted regularly. Connecting knowledge, skills and information together will result in a stronger group. (2) Raw materials: It means procurement of raw materials for the organization, raw material quantity analysis, quality of raw materials and the group procuring raw materials for the organization. (3) Human resources and trade unions in the group are needed. (4) Groups of customers or service recipients: Attitudes, preferences behaviors, expectations and needs must be analyzed. (5) Organizations and regulations and laws directly affecting the practice: Each type of organization interacts with organizations and regulations and laws differently.

2.3.2 Elements Involved in the Development of a Strong Cluster

After studying related documents and research, the elements involved in the integration of the cluster can be summarized into 6 aspects.

2.3.2.1 External support: Creating a cluster requires support from various sectors such as government, private sector, financial institutions or educational institutions to reach the goal of producing quality and standard products (Ariyaporn Suranartyuth, 2010; Pattratida Wattanapunkitti, 2016; Theerawut Suttiprapa, 2012), which can be supported in several ways, as follows.

1) Policy support from the government is an important component for integrating clusters related to the study of Kanom chin cluster since Kanom chin cluster is a food and agricultural product related group. This can be seen from the study of Suthanan Phochathan (2016) studying capability development of SMEs through cluster-based approach: healthy food industrial cluster in Nakhon Ratchasima Province. It was found that the government support is needed for enhancing the safety of processed, ready-to-cook and packaged foods. The relevant government organizations have to issue regulations or measures, including setting specific policies for areas used in the development (Suthanan Phochathan, 2016). The study on the factors affecting implementation of community enterprises in San Pa Tong District, Chiang Mai Province revealed that in term of the government support, it was supported by the District Agricultural Office and SAO in organizing trainings, promoting knowledge transfer and developing the clusters' skills (Supunnee Khodphue, 2008). The government officers also gave advice, coordinated with small and medium enterprises, created a manual for operators, prepared up-to-date information and used IT for business administration (Supannee Chaiamporn, 2017).

2) The import of raw materials from abroad should be supported to provide clusters with opportunities to produce low-cost products and be able to compete in the market because Thailand may not have raw materials to produce products in the country. However, this element is unlikely to be related to the integration for Khanom chin production since Khanom chin production uses only domestic ingredients and the technology in producing Khanom chin is effective enough (Theerawut Suttiprapa, 2012). Therefore, the researcher did not select this

element as the subject of the study. However, if it is found that the target group needs to import raw materials from abroad, this topic may be considered later.

3) Technology support related to the production of the cluster's products as well as a new management approach allows the cluster to develop agricultural products in accordance with the world standards and safety production (Boonanan Phinaitrup, 2012). The introduction of information technology will enable the implementation of product diversity (Pattratida Wattanapunkitti, 2016).

4) Financial and resource support is essential to the production of the cluster's products, as can be seen from the study of (Ariyaporn Suranartyuth, 2010) which studied factors contributing to the success of industrial cluster implementation in Thailand. The variables that led to success in clustering were identified, namely financial support and resource support. The above variables are applicable to the organizations aiming for integrating industrial clusters. Khanom chin cluster is related to the integration of small industry groups. Therefore, there is the need for financial support and resource management. Managing financial liquidity in the context of competition and increasing competitive business strategies are needed (Theerawut Suttiprapa, 2012). The researcher, therefore, studied financial support and resource support.

3.2.2.2 Leadership and management: In terms of leadership, from the study of factors affecting the successful implementation of the community enterprise promotion policy: a case study of Mueang Krabi District, Krabi Province, it was found that leadership had an effect on the policy implementation at a high level and affected the strength of the cluster (Sasipa Pitaksarn, 2013). The leaders leading the cluster to success must have the following characteristics.

1) Leaders must be knowledgeable, competent, recognized and trusted by their members and have production expertise (Supunnee Khodphue, 2008). In addition, the study of the opinion of service motorcycle drivers on operative establishment: a case study of Ban Pong District, Ratchaburi Province also revealed that

2) leaders must be honest and do not take advantage of customers. Safety and responsibility for the services must be taken into account (Somjate Tiyanont, 2008). This is in line with the study of factors contributing to

success of community enterprises in Lampang Province which indicated that entrepreneurs must be honest and leaders must have discipline in their work.

3) Leaders must encourage members to participate equally in the management of the cluster (Pattratida Wattanapunkitti, 2016). From the study of factors contributing to the success of industrial cluster implementation in Thailand (Ariyaporn Suranartyuth, 2010),

4) leaders must be clear on policies, objectives, goals and measures that can help practitioners to work effectively. The study entitled "Transformational Leadership, Effectiveness of Sustainable Cluster Development and Commitment of Silk Product Cluster Members in Ubon Ratchathani Province" (Laaiad Maturos, 2012) suggested that

5) leaders must be the mentors to the members to encourage the members to have a systematic way of working to achieve their goals and plan and act together in production and marketing, resulting in increased income for the members. The research of development of western region organic vegetable in Nakhon Pathom cluster (Boonanan Phinaitrup, 2012) revealed that

6) leaders must be strong and selfless, resulting in a strong group. The study of the integration of Khanom chin cluster was interested in studying the leadership of Khanom chin cluster and the characteristics of leaders affecting the operation of Khanom chin Cluster in order to consider and study in details of the relevant elements. Administration needs good management. Financial and resource management is the key of clustering as presented in the study of factors contributing to the success of industrial cluster implementation in Thailand (Ariyaporn Suranartyuth, 2010). Knowledge management is also extremely important as shown in research study on the effect of knowledge management on the effectiveness of innovation in industrial clusters. Knowledge management is a factor in increasing competitiveness. Good management is important for the management of Khanom chin cluster. Financial management, resource management, knowledge management and other management that may be discovered during the study must be considered in order to be the information for Kanom chin cluster management so that the cluster that is appropriate to the context of the study area can be formed.

3.2.2.3 Process within the cluster: (Santner, 2018) studied the relationship among SMEs companies and their marketing links from cluster formation of agricultural engineering industries in Germany that was being recovered and started the new cycle sustainably with the concept of clustering. Cluster Life Cycle (CLC) was reviewed. New internal processes that are driven within the integration will create efficient processes. From the literature review, the concepts of process within the cluster involved in this study consist of 7 aspects.

1) The participation of the cluster's members results in the innovation efficiency of the group and dependence on resource management as well as increasing the competitive advantage, leading to the sustainable development of the cluster. This is shown in the results of the study on the effects of industry cluster knowledge management on innovation performance (Hsu, Lai, & Lin, 2014). In addition, the participation of members provides constant and consistent feedback on the operation of the cluster, affecting the strength of the cluster (Ariyaporn Suranartyuth, 2010).

2) The learning of cluster members affects the integration in the following ways. The learning of the members leads to the linking of information to each other. This is in line with the results of the study entitled "Capability Development of SMEs through Cluster-based Approach: Healthy Food Industrial Cluster in Nakhon Ratchasima Province" which found that the learning of members affected the connection in the purchase of raw materials in the cluster network, which increased the development of the potential of related businesses continuously (Suthanan Phochathan, 2016). It is also consistent with the concept of connection in the tourism development in Songkhla Province which indicates that to develop tourism, it is necessary to connect, work, exchange, learn and share information together in providing tourist services as presented in the study entitled "Procedures and Ways to Specify Tourism Clusters in Songkhla Province" (Chinsakk Suwaenadchariya & Piyapong Chanpaso, 2016) and "The Cluster Development Process: A case Study of Northern Handicraft Manufacturer and Exporters Association (Piyachat Kriwanit, 2004). The learning of members affects the network management in the tourism operator cluster to support the ASEAN Community market (Kosin Chamnanpon, Wanawee Boonkoum, & Narin Sungrugsa, 2016). The

learning of members also affects the knowledge management of the cluster group and suggests new techniques affecting the building of competitiveness of the cluster (Hsu et al., 2014). In addition, the exchange of knowledge leads to the accumulation of knowledge and building the strength of the group (Lamprinopoulou & Tregear, 2011). The learning of members impacts the building of understanding and integrates knowledge of the cluster analysis method (Chinsakk Suwaenadchariya & Piyapong Chanpaso, 2016). This corresponds to the traffic problem solving by organizing training to create shared learning in solving traffic problems found in the study entitled "The Opinion of Service Motorcycle Drivers on Operative Establishment: A Case Study of Ban Pong District, Ratchaburi Province". The service motorcycle drivers were trained so that they understood the professional practice of honesty, not taking advantage of passengers and considering safety and being responsible for passengers (Somjate Tiyanont, 2008). Also, the learning of members leads to the new management change in the production suitable for clusters such as the use of chemicals in breeding and pest protection that is suitable for production in each area (Boonanan Phinaitrup, 2012).

3) The collaboration among cluster members affects the operation of the cluster, i.e. sharing resources, resulting in the strength of the cluster. It creates efficiency in production, enhances the competitiveness of small and medium businesses of India as demonstrated in a study on the collaboration among small and medium enterprises in India (Corsa, 2014). The cooperation of human capital and social capital from the network of relatives to integrate the clothing cluster in Northern Vietnam caused strength in group development, collaboration of clothing clusters in Northern Vietnam and the relative networks of foreign countries involved in exports (Nam, Sonobe, & Otsuka, 2010). Group collaboration results in increased employment and patent registration. The strength of a cooperative cluster results in regular research conduction and data linkages in the cluster (Delgado et al., 2014). Collaboration is a key factor in ensuring the cluster's survival and enhancing the cluster's ability by adhering to common goals and building a good relationship with each other. This will result in a reduction in the cost of production of the entire system. According to the study of the structure and relationship of the networks among SME business groups (Lamprinopoulou & Tregear, 2011) and the integration

of the networks that contact customers to exchange information from the study of cluster and sustainable competitiveness enhancement: a case study of Chanthaburi Gem and Jewelry Industry Cluster (Theerawut Suttiprapa, 2012), collaboration also creates joint innovation in research and development in developing new challenging products and services in the market (Hsu et al., 2014). The cooperation to create links for tax privileges is the reduction of production costs of the cluster that requires relationships among the entrepreneurs as presented in the study of establishment of industrial enterprises: a case study in Pakistan (Arif & Sonobe, 2012).

4) Training is to communicate and educate the members. The information is presented to the cluster members (Ariyaporn Suranartyuth, 2010; Kosin Chamnanpon et al., 2016; Somjate Tiyanont, 2008) through the meeting the group members, adding marketing strategies and overall goal as presented in the study entitled "The Operating Development Model of Community Enterprises in Rongkham District, Kalasin Province (Poonsawad Nathongkham, 2014). In addition, training is to develop personnel to be able to produce or serve customers (Chinsakk Suwaenadchariya & Piyapong Chanpaso, 2016; Piyachat Kriwanit, 2004). Therefore, the researcher was interested in studying the training organized for communicating and providing knowledge in the cluster in order to study the phenomena in the cluster area to determine the strength of the integration of Kanom chin cluster. (5) Monitoring, evaluation and organization of a traceability system have an effect on the effectiveness of the operation of the cluster (Sasipa Pitaksarn, 2013). Moreover, a traceability system of the products in order to make the farmers' products be accepted and trusted leads to good marketing results. From the study on the competitive development of Kasetsart University Kamphaeng Saen Campus Beef Cattle Cooperative, the data were systematically recorded and traceable, resulting in good quality products and consistent breeding (Boonanan Phinaitrup, 2012). The researcher took monitoring, evaluation and a traceability into account in considering the phenomenon occurring with Kanom chin cluster to see whether there is such a phenomenon in Kanom chin cluster or not.

6) Trust among cluster members results in an exchange of knowledge with one another, leading to the acceptance of terms, rules and agreements (Boonanan Phinaitrup, 2012). Trust can lead clusters to success by establishing the

standards of the products to make the customers trust in the products (Ariyaporn Suranartyuth, 2010). This is consistent with the study on developing service quality for spa establishments in the active beach tourism cluster, Thailand, which pointed out the needs of the customers in receiving tourism services. The tourism clusters must respond to the needs of the services that exceed the expected demand of the customers. The perception of providing quality service and the response to the needs of the customers that reach the highest confidence leads to reliability (Anan Chieochankitkan, 2013). Therefore, trust in the cluster was also considered in the study of the integration of Kanom chin cluster.

7) Member engagement also improves the effectiveness of sustainable cluster development as pointed out in the research entitled "Transformational Leadership, Effectiveness of Sustainable Cluster Development and Commitment of Silk Product Cluster Members in Ubon Ratchathani Province" (Laaiad Maturos, 2012). This is in line with research on factors affecting the successful implementation of the community enterprise promotion policy: a case study of Mueang Krabi District, Krabi Province, which found that member engagement had the greatest impact on the success of the policy implementation in the cluster (Sasipa Pitaksarn, 2013). The engagement of cluster members is a necessary component of the study of Kanom chin cluster.

3.2.2.4 Production labor: It is also known as human capital which includes the physical strength, the will, the knowledge, the wisdom and the thoughts that human beings devote to the production of goods or services. Labor is an important factor of production that results in the strength of the cluster. Workers must have proficiency in production and are able to produce products to meet the needs of customers. The study of factors affecting implementation of community enterprises in San Pa Tong District, Chiang Mai Province (Supunnee Khodphue, 2008) is consistent with the study of an inquiry into the development process of village industries: the case of a knitwear cluster in Northern Vietnam, which found that skilled labor (human capital) had an important effect on the rapid development of the production of the cluster's products (Nam et al., 2010). The study of cluster and sustainable competitiveness enhancement: a case study of Chanthaburi Gem and Jewelry Industry Cluster (Theerawut Suttiprapa, 2012) also indicated that the artisans who were

respected and inherited the techniques of burning and cutting of gemstones were limited only in their families and relatives. In the gemstone cutting cluster, the focus was on the production labor. Therefore, in the study of Kanom chin cluster integration, labor skills were considered because it is relevant to the human capital that has been accumulated from the past to the present in Kanom chin production, which is different in each area.

3.2.2.5 Product development: It consisted of the following aspects.

1) Promotion of research affecting product development as shown in the research study for the development of tourism services (Kosin Chamnanpon et al., 2016). It is aligned with the research on developing high-value product quality that is in demand by a larger market (Nam et al., 2010) and the innovative research, leading to success in development and a competitive advantage group integration leads to regular research conduction in the development of groups (Delgado et al., 2014).

2) Production planning: Entrepreneurs buying local raw materials and selling local products have to plan with farmers to set up a good production system and plan the use of production areas and export throughout the year (Arif & Sonobe, 2012; Boonanan Phinaitrup, 2012). Production planning requires effective representatives to work regularly, especially external factors relevant to the political decisions of the country (Santner, 2018).

3) Logistics management: It make it easy to access inputs because geographic factors influence the competitive advantage in the convenient transmission of local production inputs (Porter, 1982; Suthanan Phochathan, 2016).

4) Infrastructure and resources needed for production of goods: This creates the competitive advantage in trade (Porter, 1982). It is in line with the concept of local infrastructure development in the areas that affect the potential of product development (Corsa, 2014). The production of goods requires a complete utility system (Nam et al., 2010). This is consistent with the studies of (Suthanan Phochathan, 2016) and (Chinsakk Suwaenadchariya & Piyapong Chanpaso, 2016) which stated that necessary structures are needed for facilitating production and sufficient utilities to support tourists, such as transportation routes, electricity and water supply are also needed (Khem Lengwiriyakul & Sakchai Jarernsiripornkul,

2017). Also, access to modern, cutting-edge technology for management and development affects the development of product development capabilities (Santner, 2018).

3.2.2.6 Production development according to the market needs: The integration for production requires product development to meet the market demand (Supunnee Khodphue, 2008) and create new product innovations (Nam et al., 2010). Products must make customers satisfied (Ariyaporn Suranartyuth, 2010). The study on the market demand and the improvement of the efficiency of the products in accordance with the market must be conducted in order to build the stability of the supply chain (Lamprinopoulou & Tregear, 2011). The development of product quality in accordance with the export standards of GAP system and GMP system is also required. Systematic note taking in animal husbandry is also recommended (Boonanan Phinaitrup, 2012; Suthanan Phochathan, 2016). Moreover, the quality of service that is beyond the expectations of customers in the spa business and tourism business must be developed (Anan Chieochankitkan, 2013). There must be the development of tourism service facilities to meet the standards (Khem Lengwiriyakul & Sakchai Jarernsiripornkul, 2017). Creating tourism activities that are unique in the area, such as cultural identity, agro-tourism, bullfighting and new activities at newly built areas such as cable car, floating market or cultural center is also recommended (Chinsakk Suwaenadchariya & Piyapong Chanpaso, 2016). Community products must be prepared to support tourism (Kosin Chamnanpon et al., 2016).

2.3.3 Guidelines for Cluster Development

Based on the relevant research studies, 6 factors for cluster development can be summarized as follows.

2.3.3.1 Development of the process within the cluster consist of

1) Member participation: Lamprinopoulou and Tregear (2011), proposed for the management of member cooperation, linkage of the business sector and small and medium-sized enterprises and external related groups to improve marketing efficiency. The integration of small and medium-sized enterprises has resulted in a strong relationship in the supply chain. Gathering knowledge from outside market contacts is also recommended.

2) Building learning among cluster members: Somjate Tiyanont (2008) conducted a study on the opinion of service motorcycle drivers on operative establishment: a case study of Ban Pong District, Ratchaburi Province and pointed out that the guidelines for the integration of motorcycle taxi cooperative group were required. For example, the coordination of the motorcycle taxi group with Savings Cooperatives of Thailand Limited is recommended for creating knowledge and understanding of members about the benefits of setting up a cooperative.

3) Training and knowledge provision: The knowledge and understanding in the operation of community enterprises must be provided for the group members. The knowledge on the working capital, which is still a limitation in the development operations of the entrepreneurs in the area must also be provided for the group members (Supunnee Khodphue, 2008). Providing knowledge about the creation of innovations, using IT systems in business administration that results in the coordination of both people and the budget of the network as well as preparing a balanced plan is also needed (Supannee Chaiamporn, 2017). In addition, (Somjate Tiyanont, 2008) suggested the Provincial Office to organize trainings and provide knowledge about the operation and create cooperation in solving traffic problems.

4) Building trust: It consists of building trust with customers to maintain brand value and building trust in enhancing the exchange of knowledge among members with morality and financial transparency.

5) Building member engagement: It affects the success of the policy implementation. From the study of related research, it was found that Thailand has placed more importance on this issue than the research conducted in foreign countries. The study of factors affecting the successful implementation of the community enterprise promotion policy: a case study of Mueang Krabi District, Krabi Province revealed that member engagement had the greatest impact on the cluster on the success of the policy implementation (Sasipa Pitaksarn, 2013). This was consistent with the study entitled “Transformational Leadership, Effectiveness of Sustainable Cluster Development and Commitment of Silk Product Cluster Members in Ubon Ratchathani Province” which found that the commitment of silk product cluster members in Ubon Ratchathani Province resulted in sustainable cluster development (Laaiad Maturos, 2012).

2.3.3.2 Product development according to the market needs

1) Producing products that meet the market demand: The production that cares about product quality meeting various customer needs must be made. This will help the cluster to enhance its competitiveness and widen the customer base, leading to the sustainability of the cluster. The study on the cluster development process: a case study of Northern Handicraft Manufacturer and Exporters Association found that the handicraft entrepreneurs in Chiang Mai Province had been continuously forming groups, benefiting from joining the members of the Northern Handicraft Manufacturers and Exporters Association in marketing. Information and experiences were exchanged and shared with other members. They also organized exhibitions together (Piyachat Kriwanit, 2004). The study of factors affecting implementation of community enterprises in San Pa Tong District, Chiang Mai Province revealed that the development of products met the needs of the customers and the market (Supunnee Khodphue, 2008).

2) Establishing product standards for entrepreneurs: Diversity in product quality must be created by using information technology as a development (Pattratida Wattanapunkitti, 2016). From the study of capability development of SMEs through cluster-based approach: healthy food industrial cluster in Nakhon Ratchasima Province, there was a consumer demand condition recognizing the GMP certification and the food safety standards (Suthanan Phochathan, 2016).

2.3.3.3 Production development: It requires adequate infrastructure. Research must be conducted and innovative products must be produced for having competitive advantages. This can be seen in the research conducted by (Nam et al., 2010) on process of cluster formation in China: a case study of a garment town. It was found that in China industrial clusters consist of small and medium enterprises that have been successfully developed. The results revealed that the local marketplace, where enterprise managers can easily purchase materials from and sell products to local traders, plays a critical role in stimulating the entry of new enterprises in the early stage of cluster development. As a cluster develops, entrepreneurial ability in producing high-quality products is needed. (Delgado et al., 2014) studied the innovations that are the defining requirements for global competition. For example, Sweden and Finland have developed wireless innovations.

2.3.3.4 External Support

1) Government policies are established to promote business development for the strength of the group (Pattratida Wattanapunkitti, 2016). The role of the government is to focus on supporting entrepreneurs of small and medium enterprises for exchanging experiences and transferring knowledge to enhance management potential, building understanding of the network which leads to the building of the connection within the network and contributes to enhancing the competitiveness of the cluster (Theerawut Suttiprapa, 2012). The government sector has to support the cluster, with an emphasis on efficiency in planning and controlling the performance of the responsible organizations, which will lead to policy management with a clear set of missions, objectives, strategies and operational goals, all of which are critical to the success of the policy implementation (Woradech Jantarasorn, 1984). In addition, the government sector should have potential personnel to give advice and coordinate with small and medium-sized enterprises along with preparing a manual and up-to-date information for the operators, using IT in business administration, making a strategic plan in business, and organizing a balanced plan for the integration of personnel and network's budget (Supannee Chaiamporn, 2017).

2) Support of funds and resources will help achieve the goals of cluster integration. Usually banks and financial institutions are important financial resources for business organizations.

2.3.3.5 Leadership and management: Leadership promotion results in the strengthening of community enterprises. Leaders must support the learning of their members and promotion of networking and monitor and evaluate the activities of the community enterprises, which will result in efficient operations (Sasipa Pitaksarn, 2013). The study on the factors affecting implementation of community enterprises in San Pa Tong District, Chiang Mai Province revealed that that the leadership could build trust. Leaders must be knowledgeable, talented and reliable (Supunnee Khodphue, 2008).

2.3.3.6 Production labor: Promoting skilled manufacturing labor will have an important effect on the rapid development of product manufacturing. The production skills may come from the transmission of traditional wisdom. The influence on the success of the operation of community enterprise integration in

Lampang was studied from 144 community enterprise groups, and it was found that selecting people with the ability in producing products, the president of the group highly respected by workers and responsible for various functions were the key success factors of the group's development (Pattratida Wattanapunkitti, 2016).

2.4 Concepts and Development of Khanom Chin

In this study, the background and culture Kanom chin, the context in Thai society with consumer trends affecting health values and the needs for convenient and fast consumption in daily life as well as each type of Khanom chin production process, the effects of Khanom chin production and the approaches for developing sustainable Khanom chin production were studied.

2.4.1 Background and Culture Kanom Chin

"Khanom chin" is a distorted term from "Khanom Jin, which is Mon language. The word Chin means being cooked (Academic Service Center, 2009). Khanom chin is a savory food. It is considered an international food because it is not eaten only in Thailand. Khanom chin is eaten in Southeast Asia. Different countries call it with different names. In Thailand, it is clearly evidenced in Khun Chang Khun Phaen Sepa as follows: "Arriving at the Palace, the cookers served us with sticky rice and chili paste and Khanom chin with fish curry source immediately." In addition, in the Rattanakosin period, King Rama I established Khanom chin production factory. In the past Khanom chin was produced only for merit making, traditions or auspicious events due to its meticulous, complicated and labor-intensive process. The unity of the people in the community to join together in the production of Khanom chin is also required (Winner, 2016; Yuphin Somkhumpee, 2011). Thus, Khanom chin is generally served in merit making, traditions, and auspicious events of Thai people. Khanom chin is served to monks as it is believed that rice cultivation will be abundant in the future. Another role of Khanom chin is that it is usually served at the party. It is an easy-to-eat food that can accommodate a large number of attendees. Khanom chin is a single dish meal, eaten easily with curry sauce and vegetables. There are many kinds of Khanom chin different from region to region. It is also believed that Khanom

chin is an auspicious food. Those who eat it will lead have a long and prosperous marriage life like Khanom chin strands. In contrast, it is forbidden in the funeral ceremony because it is believed to cause death to others, or that the dead will not be able to reborn (Trueplookpanya, 2010).

Nowadays, the popular rice used for making Khanom chin is paddy, originally called “Khao Khong Jao”. It is an indica variety. The grain is long and elongated and the stem is also long. It was first discovered in India. But, it is now cultivated in Thailand, China and Vietnam (Agricultural Research Development Agency, 2017). Rice has been cultivated in Thailand for more than 5,500 years. The evidence is the pottery found in Ban Chiang, Udon Thani Province. A mixture of rice husk obtained from paddy was used in making pottery. The paintings on the walls of the cave that look like rice plots and the buffalo paintings were also found at Pha Mon Noi. Khong Chiam District, Ubon Ratchathani Province, which is about 6,000 years old. This is to confirm that rice has been cultivated in Thailand for a long time (Agricultural Research Development Agency, 2017). Rice is a symbol of food security. It is the security of Thai society and the world society because Thai rice is accepted and needed by the world market. Thai people have a lifestyle that is associated with rice cultivation. Furthermore, rituals, beliefs, merit making and traditions are related to rice cultivation. For example, at the beginning of the rice cultivation, there is a ritual of feeding “Pee Ta Haak”, a ghost guarding the rice in the field. Farmers believe that this ritual helps flourish the rice production. There is also a barn opening ritual in the third month. Rice will be brought into the barn at the barn opening ceremony to enhance the prosperity of rice cultivation. Krayasart ritual is held on the 10^{th} month of every year, which is a merit-making ceremony for relatives who have passed away. Khao Thip merit festival is held during the Buddhist Lent Festival (Anan Sonpanoa, Sattra Loaunca, & Boonchuey Panitkul, 2017). Thai rice is recognized in the world market, generating hundreds of thousands of millions of baht per year. But, nearly 17 million farmers remain trapped in poverty due to high cost of rice production. They have to rent land for cultivating rice. They have smaller paddy fields due to inheritance allocation. Some farmers lack knowledge of how to plant rice properly in the changing environment. Excessive use of chemicals causes soil deterioration. In addition, there is no production and marketing planning, resulting in the urgent selling

of paddy yields without bargaining power. Farmers have to face problems of the downturn in rice prices. The governments in all eras have tended to focus on solving problems in pledging measures or insurance for the rice prices, but the problems at the root cause have not been solved because farmers have not been strengthened sustainably (Chutima Bunyapraphasara, 2017).

In terms of rice consumers, nowadays, there is a tendency to consume less rice. The average rice consumption of Thai people is about 100 kg per year, compared to average consumption of rice in ASEAN which is 200 kg per year. This is because Thai people are more aware of obesity and understand that eating rice causes obesity. Therefore, they reduce the amount of rice consumption by eating something else as a staple food instead of rice, which is consistent with the developed countries in Asia such as Japan and Korea. Another reason for the decline in rice consumption is due to the change in lifestyle of Thai people that have more rushed lifestyle, so fast and convenient food is more consumed. It can be seen that people in the city eat less rice than those in the countryside ("When Thai people eat the least “rice” in the world ???", 2013). Thai farmers have been trying to find new trade channels to solve the problem of the decline in rice prices by forming groups to build bargaining power, setting up a community rice mill, producing packaged rice, having online marketing channels and establishing a distribution center in sub-districts and villages to reduce dependence on middlemen and rice mills ("Rice: food security and Thai society", 2016; Chutima Bunyapraphasara, 2017). Due to the decline in rice prices, processing rice into various products is essential to create added value of rice. Processing rice into Khanom chin is, therefore, the added value of rice. The current role of Khanom chin has become increasingly important in a changing social context that demands ease of eating and a healthy diet. In the past, processing rice into Khanom chin needed a lot of labor. But, now Khanom chin can be produced quickly by using advanced equipment and machines, consistent with the popularity of consumers as they can choose to eat Khanom chin in their daily life with a fast, simple and healthy lifestyle. In addition, Khanom chin flour fermentation produces high GABA, which helps the brain to relax and make people sleep well throughout the night. It also helps reduce stress or anxiety, promote body growth and recover muscles. Eating Khanom chin also provides enough energy for daily use as it is made from rice and has good fiber

as it is eaten with a lot of vegetables. An example of a popular vegetable eaten with Khanom chin is cabbage, which helps to reduce obesity, build immune system, maintain bones and teeth, reduce the risk of colon cancer, treat stomach ulcers and improve digestion and detoxification. Yard long bean contains calcium, phosphorus and vitamin C that help the body absorb iron well. It also helps in digestion, and nourishes kidneys and spleen. It can treat aphthous ulcer and reduce cholesterol. Sprouts help nourish the brain, nervous system and slow down aging. Gotu kola is a power tonic, relieving fatigue, headache and sore throat. It also helps urinate and reduce the pressure and bruises. Hairy basil helps to expel air in the intestines, relieve nasal congestion, nourish eyesight, increase breast milk and strengthen bones. People with heart disease and pressure should eat Khanom chin with curry sauce without coconut milk to reduce high cholesterol problems (Folk Doctor, 2004; Today Health, 2017).

2.4.2 Types and Production Process of Khanom Chin

Khanom chin are divided into two types: fresh flour Khanom chin and fermented flour Khanom chin. Fresh flour Khanom chin is made from rice. Rice is soaked in water and milling without fermentation process. This type of Khanom chin is popularly consumed in the South of Thailand. But, it does not last very long. For fermented flour Khanom chin, rice is fermented before milling. Khanom chin is soft and has strong smell of fermentation, which is popularly eaten in almost every region of Thailand. The rice used for making Khanom chin should be stored more than 6 months but not more than 1 year. If the rice is stored more than 1 year when producing Khanom chin, it will be stiff, not shiny. The production process of fresh flour Khanom chin consists of 8 main steps (Lanyanat Phatanan, 2008).

1) Rice is cleaned to remove impurities so that rice is efficiently milled and clean flour is obtained.

2) Rice is soaked with clean water and the water should not contain a lot of chlorine because it may cause Khanom chin to have chlorine smell. In the traditional case, rice is soaked for about 12 hours, but in the industry, it will be soaked for only 2-3 hours, making the rice easier to mill.

3) It is the process of milling and removing water from fresh rice flour. A hand-powered granite mill may be used to remove the water. Or, in a local setting, the dough will be packed in a calico bag and heavy objects are placed on it overnight to remove the water. The humidity should be about 30-40%.

4) The dough is partially cooked. The dough that has been boiled to be partially cooked looks like a ball with 20-25 cm in diameter.

5) The uncooked dough and the cooked dough is kneaded together. While kneading, the water will be added, which will result in a 40-50% increase in humidity.

6) Filtration eliminates flour that cannot be kneaded. Some industries use a thin white cloth as a filter, or a pressure filter can be used in large industries.

7) The dough is extruded from a sieve with a plunger device into a large pan with boiling water. It is boiled in the water temperature of 90-95 degrees Celsius. It is needed to wait until the steamed strands come up, then scoop them out of the pan and do not let them cook too long.

8) Khanom chin strands are placed in a pan to cool down and it must be rinsed with water and placed in an open container. The temperature of Khanom chin strands should be maintained for not being too high by frequently rinsing it.

The production process of fermented flour Khanom chin is similar to that of fresh flour Khanom chin. But, rice must be fermented. It takes several days for fermentation process in order to make the rice puffier and easier to mill into flour. There are 8 main steps of making fermented flour Khanom chin (Lanyanat Phatanan, 2008).

1) Rice is cleaned and fermented. Rice needs to be rinsed. It will be placed it in a plastic bucket and soaked for 10-15 minutes. After that, the washed rice is poured into the bamboo track lined with a nylon net and cover it by a sack for fermentation. The fermentation process takes 3-4 days. During the fermentation process, the fermented rice must be washed with clean water 2 times a day in the morning and the evening to clear the mucilage and the musty smell caused by fermentation.

2) The fermented rice is milled into flour. During milling process, water must be added so that the flour does not stick to the hand-powered granite mill.

Then the fine flour is filtered through a nylon filter cloth to get a clean white flour. After that the flour is put in a plastic bag filled with water and salt for fermentation for 3-4 days. The water must be changed every day to prevent the musty smell from fermentation.

3) The water is removed from the dough by putting the dough into a white cloth bag and placing the heavy bag over it to remove the water and leave it for 3-4 days until the coagulation of dough occurs.

4) The dough put in a white cloth bag is boiled. It must be partially cooked.

5) The partially cooked dough is kneaded with the uncooked dough to get stickier dough. While kneading, hot boiled water must be added and a spatula is used to prevent the dough to stick on the container.

6) The dough is filtered by using a thin white cloth to separate the uncooked dough and get the fine dough.

7) The dough is extruded from a sieve with a plunger device into a boiled water with the temperature of 90-95 degrees Celsius. It is needed to wait for about 3-5 minutes until the steamed strands come up, then scoop them out of the pot.

8) Khanom chin strands are rinsed with cold water immediately to cool it down. Finally, Khanom chin strands are stacked on the prepared container.

At present, Khanom chin is distributed throughout all regions of the country. The process of producing Khanom chin affects the environment as it releases fermented flour or Khanom chin remaining from the production into water sources. The factories need to find measures for management or improvement of production methods that are more suitable and more environmentally friendly, as well as increasing efficiency as shown in the following section.

2.4.3 Problems of Khanom Chin Production and Solutions

Nowadays, Khanom chin production has been found in every province of Thailand, from the household level to the large Khanom chin manufacturing industry. Khanom chin production process releases waste affecting the environment from manufacturing components, including rice, water, fuels for boiling, electric power used for a kneading machine and lighting. The release of the waste that contains

relatively high organic substances into water sources from the fermentation process of rice or washing Khanom chin quickly reduces the oxygen content in the water sources. Flour and Khanom chin strands that flow into the water sources will be accumulated, causing a bad smell, affecting the surrounding communities. Therefore, Khanom chin production needs to be mindful of the effects of wastewater discharged into natural waterways. To make Khanom chin production not destroy the environment, it is necessary to optimize the production process by reusing waste as much as possible until no waste is produced. Khanom chin Factory has different production capacities according to the factory size. Khanom chin production uses rice around 3-14 tons per day, and 1 kilogram of rice can produce Khanom chin about 1.2-1.25 kilograms. The water consumption in the production is about 10-47 cubic meters. Water is mostly used for rice washing process which is carried out over 7 days. Electricity consumption ranges from about 9-20 kWh based on the size of each factory. The working hours are 5-10 hours per day. The fuel is from wood, rice husk, corn cobs and bamboo. Thus, reducing pollution from Khanom chin production process and increasing production efficiency are important, which can be done according to the following guidelines (Pollution prevention technology division office of water technology and factory pollution management department of industrial works, 2016).

1) Effective rice cleaning in the production process: The production of 11,000 kilograms of Khanom chin causes loss of approximately 281 kilograms of rice from the production process. The loss of rice from the rice washing process can be reduced by changing the rice washing device from the stirring blade to the air pipe.

2) Efficient use of water: Water is the fundamental factor for production. The average water used for Khanom chin production is 10-47 cubic meters. When considering the cost of water used for production, it does not exceed 2.28% of the Khanom chin production cost. The water used for production is from groundwater or natural surface water sources. There is the cost of the electricity used to pump water in production. Additionally, water consumption in each factory differs according to the production methods, such as using a bucket in the washing process, washing Khanom chin from the tap directly, cleaning Khanom chin strands by using a rubber hose or shower to cool Khanom chin strands down before putting it in the

container. Soaking Khanom chin strands in a bucket of water is considered the most water-saving method. Only 3.7 cubic meters of water per ton of Khanom chin is used.

3) Efficient use of electricity: The use of electricity is an average of 3-8% of the cost of Khanom chin production. The electricity is used in the rice milling machine, the flour sifter machine, the flour compressed machine and the dough kneading machine. The efficient use of electricity is based on the production process. The availability of appliances for the production of Khanom chin must be considered. For example, the flour sifter machine consumes more electricity than necessary if there is a blockage in the machine because the operation will be longer than usual. So, the machine must be cleaned regularly.

4) Efficient use of fuels: In Khanom chin production process, fuels are used for steaming the flour and boiling water in Khanom chin strands boiling process. Improving fuel efficiency can be done by reducing the loss of steam production from damaged insulation of the autoclave or leaking valve fittings. Fuels used in Khanom chin production process are mostly from firewood (70%) compared to other fuels.

5) Reducing the amount of Khanom chin waste: The amount of Khanom chin waste from the production process can be reduced depending on the management system, starting from rice quality selection to Khanom chin stacking process. The loss of Khanom chin strands is mainly caused by Khanom chin stacking process.

6) Issues in accordance with the principles of GMP or good production criteria in determining the basis of production, control, careful inspection on site, machinery, production equipment, sanitation, cleanliness and worker hygiene in producing quality food: Khanom chin production has the following main processes. Storing rice: The storage area must be considered. It must be protected rice from heat, moisture and insects. Khanom chin factories must be clean and free from insects with good ventilation. The water used in the production must meet the tap water quality standard of the year 2000 without any harmful microorganisms. To make the dough by removing the water from the flour, an efficient machine that does not contain contamination from the production must be used. The machine should be made of stainless steel. In terms of the hygiene of the manufacturers, it is also important as Khanom chin is made ready to eat, no more heat treatment before eating.

Therefore, workers in the production that directly contact with Khanom chin must follow good hygiene practices such as wearing clean robes, gloves, and hats and not wearing jewelry, avoiding the behaviors causing contamination such as coughing, smoking, sneezing.

Optimizing the production process, in addition to considering each step of Khanom chin's production, the improvement of raw materials and machinery related to Khanom chin production is also a necessity. The use of the dough kneading machine is recommended. Formerly, kneading dough of 1,000 kilograms stated from 8:00 AM to midnight. But, when the modern kneading machine is used, 800 kilograms of dough can be kneaded per hour. The appropriate procedures in accordance with the principles of safe production quality of the GMP principles mentioned above must also be considered by improving the production equipment layout to be in line with the production process in order to increase the efficiency of the production process. From the survey, it was found that general manufacturers lack knowledge of plant location planning and production control. Since Khanom chin production process takes many steps, including dealing with main raw materials namely rice, fuel, water and related raw materials, without a good management plan, it can result in the inefficient production. Production control planning to increase production efficiency does not only helps reduce production time, but it can also reduce the production costs and increase the quality of Khanom chin (Community Wellness, 2017; Manus Ratchakom & Surasarn Penaei, 2012). Increasing productivity can also be done by applying the principles of biology. Lactobacillus Plantarum can be added in Khanom chin fermentation process. It can reduce the duration of the flour fermentation process 3 times. Normally, the flour fermentation process takes approximately 3 days, but when Lactobacillus Plantarum is added, it takes only 1 day. This provides a positive effect on the production process as it takes less time, increases production volume and reduces the amount of wastewater caused by washing flour in the flour fermentation process (Nuttaporn Chanchai, 2015).

To upgrade the production of Khanom chin, besides processing Khanom chin products, the innovative development for extending the shelf life of Khanom chin and curry sauces is also done. Processing of Khanom chin products has made great progress. Khanom chin can be stored for up to 1 year. Originally, Khanom chin can be

kept for no more than 2 days. Otherwise, the smell and the taste are not suitable for eating. Extending Khanom chin's shelf life is an innovation called dry Khanom chin. It is a production using new technology. Dry or semi-finished Khanom chin quickly restores its shape without artificial flavoring or artificial colors and preservatives. It can be cooked by soaking it into water to make the strands loosen before boiling in boiling water. After leaving for 3 minutes, ready-to-eat Khanom chin is obtained. Moreover, Khanom chin has been developed to have 11 different types as follows. Purple Khanom chin is produced by adding an extract of pea flowers. Yellow Khanom chin is made from pumpkin. Green Khanom chin is a mixture of pandan leaves. Black Khanom chin is a mixture of squid. Brown Khanom chin is made from brown rice. Red Khanom chin is made from Sangyod rice. In addition, there are 9 types of instant curry sauces, including coconut milk curry sauce, sweet curry sauce, southern style curry sauce, spicy pork sauce, fish organs sour soup, green curry, vegetarian curry sauce and salmon curry sauce, which can be stored up for 1 year. This can respond to the needs of both domestic and foreign consumers (Sirichai Songsermphong, 2015)

Upgrading Khanom chin production should be done to provide quality, clean and safe food that meets the increasing demands of consumers in terms of nutritional value, convenience, and ease of eating. Farmers can also reduce both time and costs from better management. Waste can also be reduced from Khanom chin production. Upgrading Khanom chin production alone is not enough. It is also necessary to consider about the integration of Khanom chin production groups that can increase productivity, processing and marketing.

2.5 Core Concept

Cluster development depends on a number of factors, including the external factors and the internal factors affecting Khanom chin production. From the study of the concepts and related research, it was found that the elements related to the strong cluster development include the external factors such as the context of society, environment, economy and culture and the government policy supporting for the integration of processed agricultural clusters in many areas in Thailand and the way of

life under rice cultivation, including the consumption behavior of noodle dishes that are fast food. There are also the elements that support the group development, which includes 1) external support, 2) leadership and management, 3) process within the cluster, 4) production labor, 5) product development and 6) production development according to the market needs. These lead to the standardized market and the enhancement of innovation and the response to the target groups as a result of cluster development as shown in Figure 2.1: the elements promoting the cluster development.

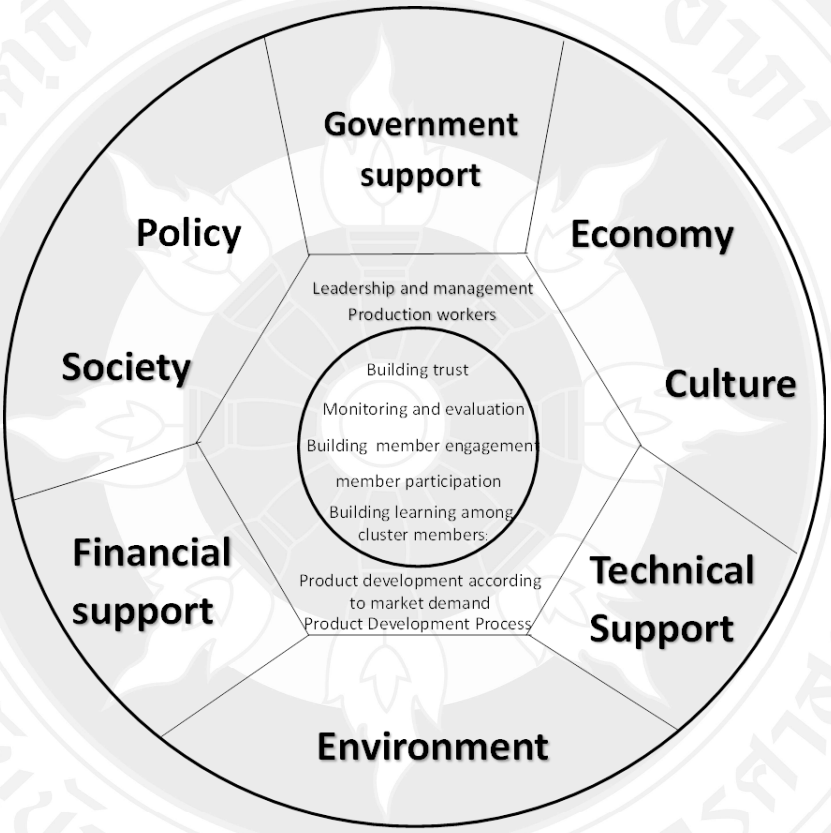

Figure 2.1 The Elements Promoting the Cluster Development

The elements mentioned above are related and coherent with one another as follows. There are two aspects of trust, including building trust with customers and building trust among the members. Research in Thailand has placed an emphasis on trust. Therefore, it is an interesting issue. Good collaboration builds on trust. Poor collaboration leads to non-transparency. Fear of being stolen of customers of each group will not result in collaboration.

Relationships of good collaboration lead to trust. Cooperation must be developed so that each member group have good coordination, which leads to the trust in the group, and the mutual understanding that they are in the same group.

The exchange of knowledge will provide opportunities to increase the quality of the product in a variety of ways, meeting the needs of customers. For example, one group may have health-conscious knowledge. The other group may have expertise in the image of food. Or, some groups may have the ability in processing food to make it easy to eat. The exchange of knowledge is, therefore, an important issue in enhancing competitiveness, creating the ability to expand the market even more because it covers a wide variety of consumer groups, including in the consumers who love health, the consumers who like eating instant food and those who want to save money but need good quality food.

For the production of products according to the market demand, product quality must be concerned. It must respond to the needs of various customers. Maintaining good quality of products will make consumers trust in the products. Therefore, the integration of group according to the cluster approach can respond to the sustainability of the group operation.

CHAPTER 3

RESEARCH METHODOLOGY AND DATA COLLECTION

The qualitative research methodology was employed to conduct the research entitled “Capacity Development Follow Cluster Khanom chin”. The issues for data collection were consistent with the research objectives in studying the model of Khanom chin business cluster, the important elements related to driving Khanom chin business cluster and the guidelines for enhancing the competitiveness of the small entrepreneurs / companies and related sectors at the cluster level in Khanom chin production. Nakhon Pathom Province is an area of rice planting. Rice is planted and processed into Khanom chin. It is also famous for exporting Khanom chin to other areas. Moreover, Khanom chin production is a traditional occupation of the people in the area for a long time. If this study is achieved, it can be used as the guideline for supporting sustainable integration of groups in Khanom chin production, processing, and marketing as well as creating security for rice farmers to be able to sell their products continuously. In terms of consumers, they will have a healthy diet that is suitable for the changing social conditions in modern times. It also affects society and community, resulting in food security. The details and the procedures of the research conduction and the validation of the data obtained from the data collection and the data analysis can be presented as follows.

3.1 Data Collection

In this study, both primary and secondary data were used. The primary data were obtained from in-depth interviews and non-participation observation. The secondary data included the documents from government and private officials, related articles, textbooks and research studies.

3.1.1 In-depth Interviews

Semi-structure interviews with a wide range of questions were used in the study. The questions were prepared in advance. Informal interviews with unlimited answers were administered. The interviewer only introduced the needs to the interviewees and let the interviewees tell their stories freely. Since the researcher had some theoretical concepts in the area of study, the questions were prepared briefly in order to gain the information answering the questions. Also, it was a focus interview or in-depth interview that the interviewer had to attract the interviewees' attention when they talked beyond the point of interest. The interviewer must try to connect to the point wanted to interview in order to get the needed information (Supang Chantavanich, 2009).

3.1.2 Non-participation Observation

Non-participatory observation was used to obtain the data that were true based on the context and the information of the atmosphere while doing activities related to Khanom chin cluster in the community that cannot be explained by people. Non-participatory observation was done in 2 ways: 1) observing cluster meetings to collect data about support and knowledge provided for the cluster members and 2) observing the rice fields and the locations for organizing activities in order to understand the information that the informants had explained. It was an observation that the observer did not participate in events or activities related to the model and the process of Khanom chin cluster. The observed data were used for the cluster analysis. There was a process to maintain the confidentiality of those who were observed by not revealing personal information and actual locations in the research report. Pseudonyms were used in the study presentation.

3.1.3 Collecting Documents, Textbooks and Relevant Research Studies

It was the study of secondary data from books, textbooks, documents, reports, publications, academic textbooks, articles, reports, plans and research related to clustering for production, processing and distribution. Data collection methods were based on the research objectives. The methods of data collection according to the research objectives can be classified as shown in Table 3.1.

Table 3.1 Objectives, Methods, and Content for Data Collection

Objectives	Methods	Content
1. To study the model/ characteristics of Khanom chin business cluster	Collecting documents, textbooks and relevant research studies	Studying the information about cluster for production, processing and distribution of products from reliable books, textbooks, research studies and various media, which can be systematically referenced and accepted. Clusters were classified and analyzed for differences and similarities. The appropriate cluster grouping model was created in the initial development of Khanom chin group.
	In-depth Interview	Collecting data about cluster for production, processing and product distribution from in-depth interviews with the key informants in order to get the appropriate cluster grouping model in developing Khanom chin group in the context of the Khanom chin cluster in Nakhon Pathom Province
	Non-participation observation	Observing the context of the community, ways of life, daily life living, food consumption and food production process for the analysis of cluster. Observation was part of data collection and analysis to comply with the context of Khanom chin cluster in Nakhon Pathom Province.

Objectives	Methods	Content
2. To study important components and guidelines for capacity development related to driving Khanom chin business cluster	Collecting documents, textbooks and relevant research studies	Studying the data on the components and the guidelines for capacity development to drive Khanom chin business cluster from reliable books, textbooks, research papers and media, which can be systematically referenced and accepted, including (1)external support, (2) leadership, (3) processes within the cluster, (4) workers' production skills, (5) production and product development (6) marketing.
	In-depth Interview	Studying the information about the components and guidelines for capacity development in driving Khanom chin business cluster in Nakhon Pathom Province from the key informants, including (1) external support, (2) leadership, (3) processes within the cluster, (4) workers' production skills, (5) production and product development (6) marketing.

3.2 Topics for In-Depth Interviews

In-depth interviews were administered with 45 key informants as follows.

3.2.1 Thai Farmers in the Cluster

Thirty Thai farmers in the cluster of Nakhon Pathom province: The interview location was at the headman's office. It was a qualitative study using in-depth interviews, both individual and small group interviews. In-depth interviews were used as the guidelines for obtaining useful information. The topics for in-depth interviews were divided into 5 main parts as follows.

Part 1: The basic information of the informants, including gender, age, education, marital status, religion, occupation, income, social position and duration of living in the area

Part 2: The definitions of clustering based on the perspectives of relevant people

Part 3: The clustering approaches of Khanom chin cluster, consisting of 3 important parts, namely integration for raw materials development, integration for processing development and integration for market development.

Part 4: The guidelines for capacity development to enhance Khanom chin production, consisting of 3 main scopes: (1) development of raw material sources through processing and marketing (2) development of organizational systems, namely the guidelines for the development products, executives and personnel (3) development of marketing strategies, consisting of processes within the cluster, leadership development in administration, market demand, external support, development of workers to have skills and expertise.

Part 5: The problems and obstacles in integration of Khanom chin cluster

3.2.2 Thai Entrepreneurs from Midstream and Downstream Groups

Six Thai entrepreneurs from midstream and downstream groups (processing and marketing) in the cluster of Nakhon Pathom province: The interviews were administered at the locations convenient for the interviewees, such as their establishments, stores and organizations. In-depth interviews were used as the guidelines for obtaining useful information. The topics for in-depth interviews were divided into 5 main parts as follows.

Part 1: The basic information of the informants, including gender, age, education, marital status, religion, occupation, income, social position and duration of living in the area

Part 2: The definitions of clustering based on the perspectives of relevant people

Part 3: The clustering approaches of Khanom chin cluster, consisting of 3 important parts, namely integration for raw materials development, integration for processing development and integration for market development.

Part 4: The guidelines for capacity development to enhance Khanom chin production, consisting of 3 main scopes: (1) development of raw material sources through processing and marketing (2) development of organizational systems, namely

the guidelines for the development products, executives and personnel (3) development of marketing strategies, consisting of processes within the cluster, leadership development in administration, market demand, external support, development of workers to have skills and expertise.

Part 5: The problems and obstacles in integration of Khanom chin cluster

3.2.3 People from Thai Network Support Groups

Nine people from Thai network support groups (external networks, government agencies and educational institutions) related to the cluster of Nakhon Pathom province: The interviews were administered at the informants' workplaces, consisting of the offices of government agencies and educational institutions. In-depth interviews were used as the guidelines for obtaining useful information. The topics for in-depth interviews were divided into 5 main parts as follows.

Part 1: The basic information of the informants, including gender, age, education, marital status, religion, occupation, income, social position and duration of living in the area

Part 2: The definitions of clustering based on the perspectives of relevant people

Part 3: The clustering approaches of Khanom chin cluster, consisting of 3 important parts, namely integration for raw materials development, integration for processing development and integration for market development.

Part 4: The guidelines for capacity development to enhance Khanom chin production, consisting of 3 main scopes: (1) development of raw material sources through processing and marketing (2) development of organizational systems, namely the guidelines for the development products, executives and personnel (3) development of marketing strategies, consisting of processes within the cluster, leadership development in administration, market demand, external support, development of workers to have skills and expertise.

Part 5: The problems and obstacles in integration of Khanom chin cluster

3.3 Data Validation

Data validation of interviews was carried out together with the participant observation and non-participant observation using triangulation, which is the consideration of different times, places, and people in order to verify the information obtained from the data collection to be as accurate as possible. The validation proceeded simultaneously with in-depth interviews. The summary of opinions on each issue related to the capacity development for integration by using clustering approaches to promote production, processing and marketing was conducted. In case of additional information other than the specified issues was obtained, it was considered and reviewed again for the completeness and accuracy.

3.4 Data Analysis

In this study, the data were analyzed simultaneously with data collection under the principles of qualitative data analysis. Descriptive analysis, describing the stories about the studied phenomena by arranging the data based on the order of content and classifying them into systems according to the research conceptual framework was employed. Logical analysis, which is an analysis of correlation based on reasoning was also used. The data analysis in this study consisted of 3 levels (Supannee Chaiamporn, 2013)

1) Primary level: The obtained data were organized in order to have meanings to questions, research issues/research questions. Analysis and interpretation of the information were also administered. Then, the data were categorized into the issues that needed answers.

2) Association or correlation level: The analysis was conducted with the three main models: (1) causative model which is believed to be able to identify or conclude what issues are the causes and which behaviors or phenomena are the effects and (2) associational model or correlational model which is the correlation analysis of each issue, which may not be clear which phenomena are causes and effects, depending on the context and conditions involved.

3) Functional model: It is the analysis with the aim to find out steps and / or functions reflecting the meaning and value as well as responding to humans.

Data analysis in this research can be processed into 5 main stages of qualitative research. Each step may not be clearly separated. Some steps may have to be done simultaneously. The details of each step were as follows (Supang Chantavanich, 2009).

1) Using theoretical frameworks to create the conceptual framework for analysis: In this step, the theoretical concepts with broad framework and systems for studying the phenomena were employed. Then, they were used to create the framework for the study in order to roughly define the issues in the study. The data were organized into various categories in a set of institutional logic that had been defined as the preliminary condition. This framework can be adjusted anytime as long as it was not sure if the conclusion was firm enough. In addition, this conceptual framework was not the whole theory of the studied phenomena.

2) Suspension of theory and data validation: In this step, the theoretical concepts were temporarily stopped using in order to expose to the phenomena and try to reach the method of explanation of phenomena as an insider without the influence of the theoretical concepts. This was done in order not to limit the data collection only to the conceptual framework set forth from the beginning and to let the data follow according to the actual phenomenon after the framework for analysis had been set. Prior to data analysis, the data were verified for reliability using the principle of triangulation, which is the method used to pursuit the reliability of data from different sources. The important principle of triangulation includes not being convinced that any source of information obtained from the outset is a reliable source. The researcher needs to search for other sources. When the data are processed together, duplicate data with matching content will be categorized to find out a conclusion.

3) Data indexing while verifying the data: After the data validation, the collected data were indexed, or known as coding in order to categorize the data. This was the way to organize the data and prepare them for further analysis.

4) Temporary conclusions and data removal: After the data had been indexed, the next step was to make temporary conclusions. That is, the ideas compiled from data indexing would be used to direct further data collection. It also helped to reduce the size of the data and eliminate unwanted information. Determining the direction of the data obtained from the study of phenomena can help to prevent the data from being too broad or too large that cannot be analyzed.

5) Conclusions and proof of conclusions: In this step, the preliminary findings based on verified temporary conclusions and removal of irrelevant information were obtained. Later, these sub-conclusions were linked to make conclusions for answering the research questions. Theoretical concepts were applied again in this step. The preliminary conclusions generated from the data were considered if they were consistent with one of the theories or not. Or, if the preliminary findings or the conclusions of the research were proven to be unlike any of the proposed concepts, verification of the conclusions until they were reliable may be done to create a new hypothesis or concept for describing the phenomena that occurred. Several qualitative data analysis methods were selected for data analysis in order to gain the most accurate and obvious study results. The method chosen to analyze the data in this study was analytic induction, a method of interpreting and making the conclusion from concrete or visible phenomena and summarizing it in the form of working hypothesis, which is the conclusion created during data collection and if it is true or not, it is still unknown. However, it must be summarized in order to conduct study and gather additional information to prove the facts. Therefore, for the data collection of each case, the conclusion for each issue and each individual must be conducted. In addition, temporary assumptions must be created. After that, additional information was gathered in order to find out abstract conclusions, as well as discussions and comparisons with relevant concepts in order to gain the model of enhancing the competitiveness of Khanom chin cluster in Nakhon Pathom Province.

In order to make the conclusions in this study, data were analyzed and summarized based on the qualitative research principles. Descriptive analysis, describing the stories about the studied phenomena by arranging the data based on the order without revealing the personal information of those involved in the research process, which should be respected and kept confidentially. In some cases, where

there were data flows, it may be necessary to consider whether it should be recorded or not. If there was a threat to confidentiality of the information or things that did not want to be visible to the public, the researcher and the research assistant would take it into account seriously and find out the suitable measures for data security and accuracy in accordance with the obligations in Data Protection Act, such as removal of identifiers by using aliases/pseudonyms in order not to cause risks to the mind, reputation, society and economy and impact on households or communities of the informants. To prevent the informants from the effects that might have on their mind, reputation, society and economy, the questions for in-depth interviews were submitted to them to consider before giving the interview and signing the consent form. If there were issues that the informants thought it would affect their mind, reputation, society and economy or have the impact on the family or the community, they did not have to answer those questions. However, in this study, the topic was about the capacity development of Khanom chin cluster which did not have the information about vulnerable groups, lacking physical ability and decision making ability such as children, pregnant women, patients and prisoners. Also, the content related to professional development did not affect the target groups since it was the research based on paradigms, interpretations and phenomenology. It was not action research and development.

CHAPTER 4

RESULTS

The study results were obtained from data collection, documents, textbooks and related research, in-depth interviews and non-participatory observation. The data about the context of Nakhon Pathom Province, Khanom chin production, models of Khanom chin business cluster, important elements related to driving Khanom chin business cluster and the development of the capability of Khanom chin production were collected. The results were as follows.

4.1 The Context of Nakhon Pathom Province

The context of Nakhon Pathom Province includes physical characteristics, location, political and administrative boundaries, topography, irrigation systems, water resources in the area, soil resources, socioeconomic conditions, population and main infrastructures affecting Khanom chin production in Nakhon Pathom Province.

4.1.1 Physical Characteristics of Nakhon Pathom Province

Khanom chin cluster is in Nakhon Pathom Province, which is in the western central Thailand, located in the Tha Chin River, a central lowland area, with the area of 2,168 square kilometers. It is located 56 kilometers away from Bangkok on Petchkasem Road or 51 kilometers on Borommaratchachonnani Road (Pinklao-Nakhon Chai Si Road) and 62 kilometers along the railway line. It is bordered by Song Phi Nong District, Suphan Buri Province to the north; Krathum Baen District and Ban Phaeo District, Samut Sakhon Province and Bang Phae District, Ratchaburi Province to the south; Sai Noi District, Bang Yai District and Bang Kruai District, Nonthaburi Province, Thawi Watthana District, Nong Khaem District, Bangkok, Bang Sai District, Phra Nakhon Si Ayutthaya Province to the east and Ban Pong District, Photharam District, Ratchaburi Province and Tha Maka District and Phanom Thuan

District, Kanchanaburi Province to the west. Based on the physical characteristics, Nakhon Pathom Province is adjacent to Bangkok, which is an important market supporting Khanom chin products. Therefore, it is considered a suitable production location.

The topographical feature of Nakhon Pathom Province is a flat land without mountains and forest areas. The area is above the sea level between 2-10 meters. The Tha Chin River flows from the north to the south. The northern area and the northeast area of Nakhon Pathom province are upland areas. In the central area, it is a lowland area with many natural canals that have been dug for agriculture and transportation. The land transport routes are under the responsibility of 2 agencies, which are 1) Nakhon Pathom Rural Road Office and 2) Nakhon Pathom Highway District. The transportation routes have been developed, so it is convenient to transport raw materials for Khanom chin production.

Natural water sources and irrigation systems affect rice production, which is a raw material for producing quality Khanom chin. Nakhon Pathom Province has an important natural water source, which is the Tha Chin River (the Nakhon Chai Si River), flowing through Nakhon Pathom Province from Bang Len District and ending at Sampran District, Nakhon Pathom Province. There are also 724 water resources, including rivers, streams and canals and 24 marshes. The irrigation projects in Nakhon Pathom Province consist of 8 operation and maintenance projects, which are 1) Bang Len Operation and Maintenance Project, 2) Kamphaeng Saen Operation and Maintenance Project, 3) Nakhon Pathom Operation and Maintenance Project, 4) Nakhon Chum Operation and Maintenance Project, 5) Phraya River Operation and Maintenance Project, 6) Phanom Thuan Operation and Maintenance Project 7) Phimphon Operation and Maintenance Project and 8) Phasi Charoen Operation and Maintenance Project. The areas of 1.036,626 rai or 76% of Nakhon Pathom Province have received benefits from the projects (Nakhon Pathom Provincial Office, 2016).

Khanom chin produced in Nakhon Pathom Province is distributed in all sub-districts. The public administration in the administrative areas of Nakhon Pathom Province has divided into 3 parts as follows: 1) the central administration directly under the supervision of the central unit, the organizations under other ministries, bureaus or departments, the organizations under the Ministry of Interior and

independent departments; 2) provincial government under the ministry, bureaus, the Ministry of Interior, the departments under the Ministry of Interior, 7 districts, 106 sub-districts and 904 villages and 3) local government administrative organizations, including 1 Provincial Administrative Organization, 1 City Municipality, 4 Town Municipalities, 189 Sub-district Municipalities and 93 Sub-district Administrative Organizations as shown in Table 4.1 (administrative districts) and Figure 4.1 (map of transportation routes and administrative districts in Nakhon Pathom Province).

4.1.2 Water Resources, Water Supply System and Electricity System

Water is an important factor in rice production, which is an important raw material for Khanom chin production. For meteorological and hydrologic conditions (climate analysis, rainfall analysis and runoff analysis) and rainfall of Nakhon Pathom Province, the data from Nakhon Pathom Meteorological Station, dating back 5 years (2012-2016) were collected. The rainfall was in the range 700-1,100 millimeters. The number of rainy days were 101 days. The year with the highest rainfall was in 2015 with the rainfall volumes of 1,175 millimeters. The least rainfall was in 2014 with the rainfall volumes of 759 millimeters. For the distribution of rainwater from various rainwater stations, it was found that the area with the highest rainfall was in Sam Phran District in 2012 with the amount of 1501 millimeters. The number of rainy days were 92 days. The area with the least rainfall was Bang Len District. It was measured in 2013 with the rainfall volume of 269 millimeters. The number of rainy days were 27 days. According to the average rainfall over the past 5 years, the amount of rainfall has been sufficient and consistent. It was drought in some years. But, there are the irrigation systems supporting rice cultivation as shown in Table 4.2 (the comparison of rainfall volumes of rain stations in Nakhon Pathom Province in the past 5 years (2012 - 2016))

The water supply system and the electricity system for Khanom chin production are sufficient. For the electricity system in 2015, Nakhon Pathom Province had 7 branches of Provincial Electricity Authority with a total of 294,636 electricity users, and the total of electricity distribution units was 4,194,967,746 Kilowatt / hour as shown in Table 4.3 (the electricity consumption in 2015).

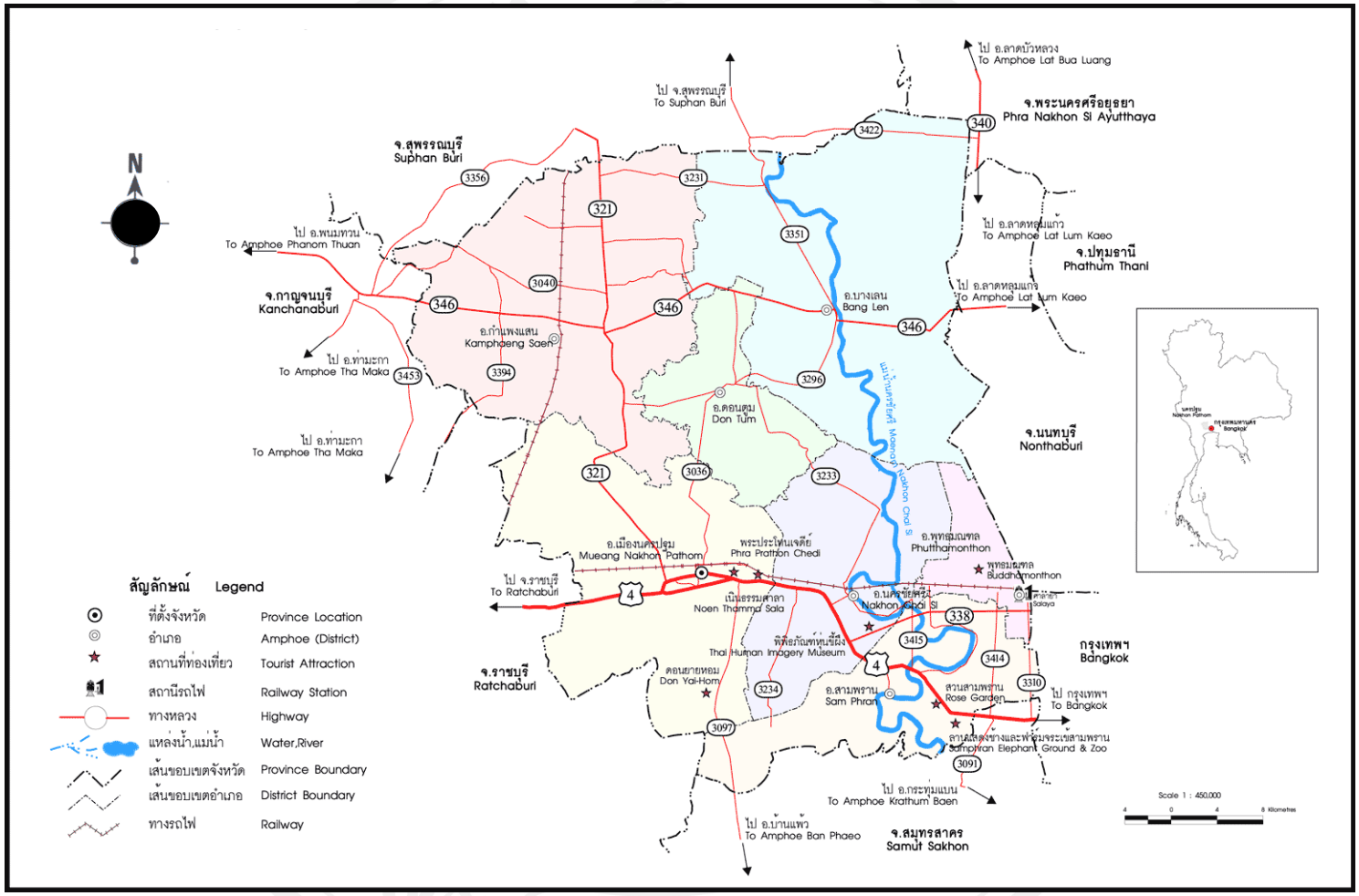

Figure 4.1 Map of Transportation Routes and Administrative Districts in Nakhon Pathom Province

Table 4.1 Administrative Districts

District	Area (Sqm.)		Number of parishes	Number of villages	Number of City Municipality	Number of Town Municipality	Number of Subdistrict Municipality	Subdistrict Administrative Organization	Distance from the province
	Total	(%)							
Nakhon Pathom City	417	19.3	25	214	1	1	5	21	9
Sampran	249	11.5	16	111		3	2	12	28
Nakhon Chai Si	284	13.1	24	108			3	22	21
Bang Len	289	27.1	15	180			4	15	
Kamphaeng Saen	405	18.7	15	204			1	15	33
Don Tum	171	7.9	8	69			1	6	38
Phutthamonthon	52	2.4	3	18			2	2	40
Total	2,168	100	106	904	1	4	18	93	

Source : Nakhon Pathom Provincial Office, 2016.

Table 4.2 The Comparison of Rainfall Volumes of Rain Stations in Nakhon Pathom Province in the Past 5 Years (2012 – 2016)

Stations	2012		2013		2014		2015		2016	
	Rainfall volumes	Rainy days	Rainfall volumes	Rainy days	Rainfall volumes	Rainy days	Rainfall volumes	Rainy days	Rainfall volumes	Rainy days
Nakhon Pathom City	1389	94	888	58	953	75	1014	64	1100	86
Nakhon Chai Si	782	83	637	47	582	59	855	35	624	62
Kamphaeng Saen	1139	78	789	53	951	62	1084	57	1050	78
Sampran	1502	62	1240	74	849	58	1152	45	1338	71
Don Tum	1183	63	496	30	566	51	1069	47	774	61
Bang Len	969	63	269	27	615	49	675	39	461	29

Source : Nakhon Pathom Provincial Office, 2016.

Table 4.3 The Electricity Consumption in 2015

No.	District	Number of consumers	KW / h
1	Nakhon Pathom City	96,259	1,027,571,953
2	Sampran	65,433	1,246,430,445
3	Nakhon Chai Si	37,322	669,406,152
4	Bang Len	28,400	590,055,618
5	Kamphaeng Saen	34,176	301,248,705
6	Don Tum	15,406	111,360,224
7	Phutthamonthon	17,550	248,894,649
Total		294,636	4,194,967,746

Source **:** Nakhon Pathom Provincial Office, 2016.

Khanom chin production uses the water supply system, which is sufficient. In terms of the water supply system, it was found that in 2016, Nakhon Pathom Province had 2 water supply locations. 1) The water supply of Nakhon Pathom Municipality: It distributed water in the municipality. There were 28,466 water users, and 29,436,540 cubic meters of water were produced. The volume of water sold was 18,986,568 cubic meters and the amount of water loss was 35.5%. 2) The water supply of the Provincial Waterworks Authority: The service areas were approximately 142 square kilometers. There were 433,825 cubic meters of water users and 31% of the water loss (Nakhon Pathom Provincial Office, 2016).

4.1.3 Soil Resources

The soil in Nakhon Pathom Province is very suitable for rice cultivation because it is originated from sedimentation of clay, sand and gravels in the old channel. Clay has accumulated in a line. Sediments were washed down from the channel and waterways according to the slope of the area with a depth of approximately 30-600 meters. There are 2 types of sediments in the study area as follows. The flood plain sediments: they are gray and brown clay sediments with very

fine thick layer and tend to have thin layers of silt. The tidal flat sediments: they are gray or dark brown and very sticky with scattered red spots (Department of Mineral Resources, 2015). Most of the areas in Nakhon Pathom Province are lowland areas with bad drainage. The soil Bang in Len District Nakhon and Chai Si District is suitable for rice planting which is an important raw material for making Khanom chin. If famers want to grow fruit trees, perennial plants or vegetables, the soil should be improved and raised to make a permanent groove (Chalermpon Srigaroon & Parinya Wongsriwattanakul, 1994).

4.1.4 Population and Socioeconomic Conditions

There are 903,629 people living in Nakhon Pathom Province. There are 433,619 males, 470,010 females and 377,547 households as shown in Table 4.4 (number of population and households in 2016 as of 31 December 2016). The average income per head is 256,501 baht per year. Most of the income is from the industrial production sector (58.2%), followed by wholesale and retail trade, repair of motor vehicles, motorcycles, personal items, household goods (12.1%) and agricultural sector (7.1%), respectively. Agricultural income generates little value for the province compared to the industry.

Table 4.4 Number of Population and Households in 2016 as of 31 December 2016

District	Male	Female	Total	Households
Nakhon Pathom City	132,992	145,490	278,482	109,383
Kamphaeng Saen	61,787	66,876	128,663	38,168
Nakhon Chai Si	52,442	57,873	110,315	42,314
Don Tum	23,492	24,795	48,287	14,422
Bang Len	45,935	47,124	93,059	31,853
Sampran	97,966	107,349	205,315	121,215
Phutthamonthon	19,005	20,503	39,508	20,215
Total	433,619	470,010	903,629	377,570

Source : Nakhon Pathom Provincial Office, 2016.

The total area used for agriculture is 796,662 rai, accounted of 58.7% of the whole province. Agriculture is an important production in Nakhon Pathom Province, and 17% of the population have agricultural careers. Important agricultural careers include rice farming, field crop farming, orchard and vegetable farming, animal husbandry and aquaculture and planting cash crops that generate income for the province, such as rice, sugarcane, fruits, vegetables and flowering and ornamental plants. The agricultural system in Nakhon Pathom Province has developed. Farmers learn new technologies and there is an increasing use of agricultural technology. There is the management of irrigation systems in the Chao Phraya River Basin, the Tha Chin River and the Mae Klong River. The production management planning is also operated for exports. In terms of rice planting areas that have the potential to grow rice for making Khanom chin in Nakhon Pathom Province, there are 334,211 rai for planting in-season rice and, 199,203 rai for planting off-season rice. In-season rice is cultivated from May – October and harvested from August – January. Off-season rice is cultivated from November - April and harvested from February - August. Nakhon Pathom Province has good irrigation systems that can be used for growing rice throughout the year. Within 2 years, rice can be cultivated for 5 times. For the rice production in 2016 of Nakhon Pathom Province, it was found that in-season rice varieties were both suitable and not suitable for Khanom chin production. In addition, 242,463 tons of in-season rice were produced. The planted area covered 334,211 rai. The average yield per rai was 733 kilograms. Moreover, 147,644 tons of off-season rice were planted. The planted areas covered 199,203 rai. The average yield per rai was 742 kilograms (Office of the National Economic and Social Development Board, 2014).

For the economic system in this study, the government's stimulus measures, loans provided to establishments, number of employees, integration of farmers, deposits and loan status were considered. It was found that the study area was stimulated by the government's measures according to various policies, resulting in economic expansion. In terms of deposits and loans in 2016, the overall deposit was 243,699.8 million baht with an increase of 9,864.6 million baht from the same month in 2015. Loans were 154,403.5 million baht with an increase of 2,222 million baht from the same month in 2015. The increase in loans was the result of the

government' s economic stimulus measures, such as small investment stimulus measures, monetary and fiscal measures to promote SMEs in an urgent phase, fiscal measures for stimulating the real estate sector economy as well as the competition for credit granting of commercial banks consistent with the government policy as shown in Table 4.5 (deposits and credits of Nakhon Pathom Province in 2016 (million baht)).

Table 4.5 Deposits and Credits of Nakhon Pathom Province in 2016 (Million Baht).

List	Deposits				Credits			
	As of 31 December 2016	As of 31 December 2015	High / (low)	(%)	As of 31 December 2016	As of 31 December 2015	High / (low)	(%)
Commercial Bank	175,921	169,501	6,420	3.7	105,324	101,303	4,021	3.9
Government Savings Bank	40,279	39,531	747	1.8	13,128	17,671	(4,542)	
Government Housing Bank	2,873	3,465	(592)	17.1	25,801	23,918	1,882	7.8
Bank for Agriculture and Agricultural Cooperatives	24,626	21,336	3,289	15.4	10,150	9,288	861	9.2
Total	243,699	233,835	9,864	4.2	154,403	152,181	2,222	1.4

Source **:** Nakhon Pathom Provincial Office, 2016.

In terms of establishments and employees in 2016, Nakhon Pathom Province had a total of 6,745 establishments, with a total of 206,655 employees. Of these, 2,448 establishments had a maximum of 1-4 employees, followed by 1,779 establishments having employees of between 5-9 people, respectively. In Khanom chin business operation, there are no more than 50 employees in each manufacturing factory, as shown in Table 4.6 (the business established from the integration of farmers or people in small communities).

For the cooperatives in 2016 in Nakhon Pathom Province, there were a total of 93 cooperatives and farmer groups, consisting of 21 agricultural cooperatives, 52 non-agricultural cooperatives and 20 farmer groups. The total members of cooperatives and farmer groups were 80,322 people. The total business volume was 15,485,709,393 baht.

Table 4.6 The Business Established from The Integration of Farmers or People in Small Communities

Employees	**Number of establishments**	**Number of employees**
1-4 people	2,448	5,701
5-9 people	1,779	12,318
10-19 people	855	11,674
20-49 people	905	28,731
50-99 people	348	24,667
100-299 people	299	50,148
300-499 people	60	23,505
500-999 people	36	23,927
Up to 1,000 people	15	25,984

Source **:** Nakhon Pathom Provincial Office, 2016.

There were 11 groups of rice farmers with 905 members, and 4 groups of field crop farmers with 346 members. Moreover, there were 4 groups of horticulture farmers with 599 members and 1 animal husbandry group with 50 members. Therefore, there were 20 farmer groups with a total of 1,900 members. The business volume was 11,590,951 baht. At present, there are 187 savings groups for production operations with 23,691 members. The accumulated Saja savings is 220,031,325 baht, and 104,983,735 baht is borrowed by the members. The integration of farmers in various forms such as cooperatives, farmer groups and savings groups for production is associated with the integration of the Khanom chin cluster because these groups

contribute to funding, storage and rice processing delivered to Khanom chin factories for Khanom chin production.

4.1.5 Khanom Chin Production in Nakhon Pathom Province

The steps of Khanom chin produciton in Nakhon Pathom Province are as follows. The group of farmers (the upstream group) select rice varieties that are suitable for Khanom chin production, namely Suphanburi, Chainat and Leuang Patew rice varieties. Then they are cultivated in the fields of the farmers. It takes about 4 months for cultivation. When the paddy is produced, the farmers harvest and sell it to the mills or the agricultural cooperatives in the planting areas. Therefore, the mills and the agricultural cooperatives are the main mechanisms collecting and storing paddy for Khanom chin factories. There are 3 steps of Khanom chin processing process.

4.1.5.1 Checking the quality of paddy by randomly checking the paddy from the paddy warehouses of the mills and the agricultural cooperatives in Nakhon Pathom Province: Khanom chin factories need rice varieties with amylose molecules higher than 26% such as Suphanburi, Chainat and Leung Pathiu rice varieties. These rice varieties are suitable for producing quality Khanom chin (Sirichai Liengamnuay, 2019).

In order to get soft Khanom chin, the paddy planted for not less than 110 days, but not more than 140 days, and stored for up to 8 months, but not more than 2 years is needed. In the processing of Khanom chin, Khanom chin factories will randomly check the quality of the rice obtained from milling of paddy by using the method of cooking rice and observing whether cooked rice is cooked or not and if it can be stored for at least 3 days without spoilage. This is the technique for checking rice quality suitable for producing Khanom chin, which is the wisdom of Khanom chin factories. It is a more economical method than checking if amylose molecules is higher than 26%. Checking amylose molecules will cost several thousand baht.

4.1.5.2 The processing of rice into Khanom chin: It starts from the process of processing rice into Khanom chin flour. Rice fermentation process is needed. The traditional fermentation process takes many days for getting quality Khanom chin flour for making Khanom chin. For the processing rice into Khanom

chin, 1 kilogram of rice can produce about 2 kilograms of Khanom chin. Producing Khanom chin from rice has lower production costs than using ready-made Khanom chin flour from flour factories. Nowadays, Khanom chin factories use both rice and ready-made Khanom chin flour to produce Khanom chin in order to continuously respond to the market demand. Processing Khanom chin from ready-made flour takes 2-3 hours by using modern machinery. Khanom chin production usually starts around 07.00 a.m. Khanom chin is ready to deliver to the market at around 09.00 a.m. If rice is used in the production, it takes 2-3 days for the fermentation process before grinding the fermented rice into flour. Also, the flour must be left for another 2days before making Khanom chin.

4.1.5.3 Delivering Khanom chin to the market: Khanom chin factories deliver Khanom chin to the wholesale markets such as Pathom Mongkhon market, Khlong Toei Market, Thai Market and Ratchaburi Market. The wholesale price of Khanom chin is 20 baht per kilogram and Khanom chin made from riceberry is 24 baht per kilogram. Khanom chin is packed in plastic baskets with various sizes according to the market demand: 5-kg basket size is the largest size, followed by the 3-kg basket size, the 2-kg s basket size, the 1-kg basket size, and the smallest is a half kilogram basket size, respectively. Currently, Khanom chin is sold 24 hours. The staff take turns selling Khanom chin. During various festivals, there is a higher demand for Khanom chin such as the New Year festival and other important days. As a result, Khanom chin factories have to increase production to meet the increased demand of customers. Khanom chin stores also pick up Khanom chin directly at Khanom chin factories (Anek Thaptim, 2019).

4.2 The Models of Khanom Chin Business Cluster in Nakhon Pathom Province

Khanom chin clustering in Nakhon Pathom Province was originated from the private sector. Khanom chin factories needed quality rice to produce Khanom chin, so they submitted a letter to Dhamma Center, Nakhon Pathom Province by specifying the need for quality rice to make Khanom chin. At present, Khanom chin factories have encountered the problem of poor quality rice for Khanom chin production

(Kittima Khunprayoon, 2019). In Nakhon Pathom Province, there are the areas with the potential to grow a variety of rice that is needed by both the government and the private rice markets. The government and the private sector will notify the demand for various rice varieties that they want purchase and support and encourage farmers to grow them. For this reason, rice varieties suitable for making Khanom chin are less planted in the area. There is not enough paddy for delivering to Khanom chin factories. At present, Khanom chin factories buy rice suitable for making Khanom chin from the farmers outside the area such as Phetchaburi Province, Upper Central and Northeastern regions (Anek Thaptim, 2019; Chananporn Chaiwiang, 2019; Kittima Khunprayoon, 2019; Sirichai Liengamnuay, 2019).

However, the demand for quality rice for Khanom chin production have still existed, so it is necessary for the government sector, the private sector, farmer groups and various agencies to form groups to promote Khanom chin production capacity. The groups have been formed. The upstream group (rice farmers), the midstream group (processing group) and the downstream group (those relevant to Khanom chin markets) have discussed together. Four types of group integration have been found as follows.

4.2.1 Nakhon Pathom Model

Nakhon Pathom Model for promotion of production and marketing of integrated quality rice (large khanom chin land plots)

4.2.1.1 Background: The Committee on Agriculture and Cooperatives had a policy to set the guidelines for agricultural development in Nakhon Pathom Province in order to solve the problem of insufficient rice suitable for producing Khanom chin to meet the needs of the private sector (Anek Thaptim, 2019; Sirichai Liengamnuay, 2019). In addition, the Committee on Agriculture and Cooperatives had a policy to reduce costs and increase the efficiency of agricultural production as well as the opportunity to compete for agricultural products.

4.2.1.2 Objectives: The objectives are 1) to enable the group of farmers operating the large rice-field land plots to produce quality rice for processing in order to add value in a systematic manner, 2) to increase the distribution channels of quality rice for the members of the large rice-field land plots of Nakhon Pathom Province,

3) to encourage people to consume quality and safe food, and 4) to increase income and security in the career of farmers.

4.2.1.3 Group operational guidelines: Farmers were encouraged to participate in the project promoting the production of quality rice for making Khanom chin, as well as linking with the markets by pushing for having the management for balancing between the demand and the supply of products. The integration of group for developing the capacity of Khanom chin production was promoted. the government pushed to establish Nakhon Pathom Model for promotion of production and marketing of integrated quality rice (large Khanom chin land plots). The integrated production linking throughout the concrete production, processing, and marketing, moving towards the city of food innovation was created. The operations were as follows.

1) Production planning and marketing: All sectors, namely farmer groups, entrepreneurs, provincial cooperatives, and government agencies such as Provincial Agriculture and Cooperatives Office and Provincial Commercial Office collaborated in carrying out activities for the farmers participating in the project in accordance with the guidelines for knowledge transfer by using the rice production system in accordance with GAP standards. The group integration was promoted and supported. The internal control system of the group was managed by using rice-field land plots for commercial purposes. Rice varieties were inspected and certified. The government participated in developing, marketing promotion and branding Khanom chin.

2) Memorandum of Understanding (MOU) was made among farmers, mills, Khanom chin factories and related sectors to show cooperation in raising the price of paddy according to the production plan and integrated rice marketing in the agricultural groups participating in Nakhon Pathom Model for promotion of production and marketing of integrated quality rice (large Khanom chin land plots). Three conditions were set in the MOU as follow. First, the government sector has to support and promote production and marketing according to the production plan and integrated rice marketing, solve problems that occur in time and carry out supervision in the production system in order to obtain quality paddy. The rice varieties specified by the government must be used. The criteria of buying paddy

from the farmers who are the members of the agricultural promotion system (large rice-field land plots) must be set so that the farmers can fairly buy and sell paddy. Second, the private sector and the rice mills participating in the project determine the paddy buying price bought from the farmers which is higher than the market price by 300-500 baht per ton based on class / quality / type of paddy. Also, the process of buying paddy from the farmers must be transparent and compliant with relevant laws / regulations, such as the accurate use of scales and moisture meter. Khanom chin factories purchase rice that has been processed by the mills under the specification of type / quality / quantity at the market price. But, the price must not be lower than 15 baht per kilogram. Third, it includes farmer institutions / farmer groups. Paddy that will be sold to the mills must be grown in the target areas as announced by the Ministry of Agriculture and Cooperatives on the subject of determining target areas to promote rice cultivation and the development of rice cultivation systems in accordance with the guidelines / specified methods. Also, the farmers must sell the rice that they have cultivated and registered with the Department of Agricultural Extension in Nakhon Pathom Model for promotion of production and marketing of integrated quality rice (large Khanom chin land plots) (Cooperative Promotion Department, 2017).

4.2.1.4 Five important elements in driving the integration of group to increase the capability of Khanom chin business.

1) External supports: It included policy, budget and academic support. The study results revealed that the government provided the policy support to drive the integration of Khanom chin group to increase the capability of Nakhon Pathom Khanom chin business model. The government agencies under the Ministry of Agriculture and Cooperatives, Nakhon Pathom Provincial Commercial Office, Provincial Agricultural Extension Office, District Agricultural Extension Office, Provincial Agricultural and Cooperatives Office, Rice Seed Center, Nakhon Pathom Agricultural Research and Development Center, Nakhon Pathom Provincial Irrigation Office and Office of Agricultural Economics put the policy into practice. The support was provided to 57 farmers participating in large rice- field land plots (the upstream group) in Bang Len District. The area for rice planting was approximately 1,500 rai. The farmers were encouraged to join the group to reduce costs and increase

production efficiency. The government agencies supported various production factors such as rice varieties suitable for the market conditions, development of Khanom chin production capability by supporting the integration of Khanom chin production group in Nakhon Pathom Model, and promoting the signing of the MOU on Khanom chin clustering in Nakhon Pathom Province. The budget support was also provided for the government agencies involved in the management of the project, such as organizing a meeting to sign the MOU and providing suitable rice varieties for Khanom chin production. For the academic support, Kasetsart University Kamphaeng Saen Campus supported the area for organizing project activities. Rice Department provided rice varieties suitable for producing quality Khanom chin (Anek Thaptim, 2019).

2) Leadership and administration of Khanom chin cluster or network in Nakhon Pathom Province, it was found that the government sector was the leader of the integration of Nakhon Pathom Khanom chin business model. The mill group was the center for managing the rice of the farmer groups and coordinating with the Khanom chin factories' rice needs. The government was the network manager. The price of paddy bought for making Khanom chin from the farmers was higher than the actual price around 300-500 baht per wagon.

3) The process within the cluster to increase the capability of Khanom chin production:

First, it was the cooperation within the Khanom chin production network. Based on the survey, it was found that there was a collaboration of 3 groups in Khanom chin production, namely the upstream group, including farmer groups, the midstream group and downstream groups, which were the mills and Khanom chin factories in Nakhon Pathom Province and the support group, namely government agencies and educational institutions. The government sector was the driving force for cooperation among various groups to increase Khanom chin production capacity.

Second, it was the trust that formed "Nakhon Pathom Khanom chin business model". Trust was created by signing the MOU. However, if the members lose benefits from the actual operation, the agreement will be terminated because MOU signing is not enforced by the law. It is just a recording to create

mutual understanding in the operation, which does not create trust in the actual implementation of the plan.

Third, it was the relationship among Khanom chin cluster or network. The government sector was the leader of the group. The relationship of the group is in the form of considerateness as when the government agencies requested cooperation, the groups had to give collaboration in accordance with the needs of the government as shown in Nakhon Pathom Khanom chin business model.

Fourth, it was collaborative learning. For the collaborative learning in Khanom chin cluster or network, the government supported for learning and discussions. The forum was organized on 8 May 2017. The government was the leader in organizing the meeting for collaborative learning among 3 sectors, namely 1) the government sector, including Nakhon Pathom Province, the representatives from the government agencies under the Ministry of Agriculture and Cooperatives, the Ministry of Commerce And Kasetsart University Kamphaeng Saen Campus; 2) the private sector, such as Chok Thavorn Rice Mill Co., Ltd. and the owner of Khanom chin Thap Luang Factory, 3) farmer Institutions and farmers groups, including the farmer groups of the large rice-field land plots from Bang Pla Sub-district and Phai Hu Chang Sub-district, Bang Len District, Nakhon Pathom Province. This collaborative learning led to enhancing the capability of Khanom chin production in Nakhon Pathom Province.

Fifth, the labor sector had skills and expertise in production. Production expertise consisted of educating the farmers about the rice varieties suitable for Khanom chin production. Provincial Agricultural Extension Office and Rice Department provided knowledge to the farmers about the new rice varieties suitable for production. As for the rice cultivation methods, the farmers in Nakhon Pathom Province have already had expertise in rice cultivation. In terms of labor skills in rice processing into Khanom chin, it was found that Khanom chin factories in Nakhon Pathom Province have already has expertise in processing. The formulas of Khanom chin production have been concealed as the secret of the production. There have been different formulas.

Sixth, it was about monitoring and evaluation and production traceability system. It was found that paddy was randomly inspected by

Khanom chin factories in order to check its quality before sending it to Khanom chin factories. The monitoring and evaluation were operated by the government agencies.

4) The development for effective production: First, there was the production planning. It was found that the joint production planning in the network group was supported by the government sector. The network group consisted of the farmer groups (upstream), the mill group and Khanom chin factories (midstream and downstream). For the production planning regarding access to the production factors in Nakhon Pathom Province, it was found that the quality of paddy in Khanom chin production decreased because Nakhon Pathom Province area can cultivate rice varieties that the market needs, such as RD43, which is young rice. The cultivation period is less. But, it is not suitable for Khanom chin production (Sirichai Liengamnuay, 2019). Khanom chin factories linked with paddy from nearby provinces such as Phetchaburi Province or the provinces in the upper central region in order to solve the problem of insufficient paddy for making Khanom chin. however, when the quality paddy was not enough, Khanom chin factories used Khanom chin flour for Khanom chin production instead. Second, access to the production factors of the upstream network group or farmers: It consisted of the land for rice cultivation. There was sufficient arable land for planting rice for Khanom chin production because the farmers cooperated to join Khanom chin rice production group for approximately 1,500 rai. However, when considering the ownership of land for rice cultivation, it mostly fell into capitalists. As a result, some farmers had to rent rice fields to grow rice. The areas were also used for other purposes in order to be in accordance with the prosperity of the city that may occur in the future. As for the capital factor, it was found that the farmers accessed to the funding source by borrowing money from the mills, the cooperatives and informal loan. The farmers borrowed the production factors for using in rice planting. The debt of the production factors was deducted from the paddy that was produced and sold. For the labor production factor, it was found that in the study area, there were sufficient rice laborers who were the contracted labors in the paddy production and Khanom chin production. Finally, the infrastructures required for Khanom chin production consisted of electricity, water supply, roads and paddy warehouses. The infrastructures for the group integration to increase Khanom chin production capability were sufficient for carrying out group

activities. The mills were responsible for storing paddy for up to 8 months. The mills had enough paddy warehouses and expertise in paddy storage and maintaining the quality of paddy.

5) Product development according to the market demand: For the product development to meet the needs of consumers, a variety of Khanom chin products must be developed as alternatives for consumers such as riceberry Khanom chin and turmeric Khanom chin. There was the integration of Khanom chin manufacturers to increase the capacity of product development, product standardization and branding so that customers can remember the products. Packaging was also improved so that consumers can choose to buy the product consistent with their needs. Khanom chin package sizes were raged from 0.5 kg to 10 kg (Anek Thaptim, 2019).

4.2.1.5 The integration of cluster or network of "Nakhon Pathom Khanom chin business model" encountered the following problems, so the operation was stopped.

1) Paddy transportation cost: The cost of transporting paddy from the farmers to the mills participating in the project was higher because the distance of transportation was 15-30 kilometers longer than before. The mills participating in the project were located in Kamphaeng Saen District. The rice fields were in Bang Len District. The Khanom chin factories were in Mueang District. This was different from before joining the project that the farmers sold paddy to the mills near the rice fields (Anek Thaptim, 2019; Chananporn Chaiwiang, 2019; Kittima Khunprayoon, 2019; Pooyai, 2019; Sirichai Liengamnuay, 2019). For this reason, farmers requested for additional shipping charges from the mills because the rice transportation cost increased. But, the mills did not agree with this and reported that they had bought rice with the price that was higher than the market price. Due to the increasing cost of rice transportation, some groups of farmers did not send paddy to the mills participating in the project because they did not receive the expected compensation. The mills cannot also be responsible for additional transportation costs because they may risk the loss. For this problem, it cannot be concluded which group must be responsible for the increasing cost of rice transportation.

The farmers agreed to plant rice as supported by the government, but the mills did not pay for the transportation cost as agreed. Normally, the farmers sent paddy to nearby mills with a fee of 100 baht per ton. But, transporting paddy to the mills in the MOU cost 200 baht per ton. The farmers had to pay additional transportation fees. Also, the mills said that they cannot pay for additional transportation fees because they may risk the loss. The farmers knew that the mills were not losing and they gained a lot of profits (Pooyai, ,personal communication, October 20, 2019).

2) The problem of trust in the integration of cluster or network of "Nakhon Pathom Khanom chin business model": The distrust in the integration found in 2 issues. (1) There was the lack of trust in the quality of the rice that the farmers delivered to Khanom chin factories, so Khanom chin factories had the mill to check the quality of rice (Anek Thaptim, 2019).On the other hand, Rice Department improved the quality of rice for Khanom chin production, and it was delivered to the farmers in the group to produce rice suitable for Khanom chin production (Kittima Khunprayoon, 2019). (2) The mills distrusted Khanom chin factories. The mills had to purchase paddy from the farmers and store it for not less than 8 months. This was the capital of the mills. As a result, the mills were not confident that Khanom chin factories would be able to buy all the paddy. There was a risk of storing paddy for sale to Khanom chin factories. In addition, only one Khanom chin factory singed the MOU (Anek Thaptim, 2019). Although the government created a process of signing the MOU to build trust and cooperation among cluster groups, leading to the production of quality rice for Khanom chin production that met the needs of the Khanom chin factories. The entire rice production process was inspected by the government officials and the production in each production plot was guaranteed. But, the implementation of the plan of Khanom chin cluster group was unable to fulfill the agreement because all groups wanted the highest interests for their groups. Moreover, they were not sure whether they may risk the loss because of the agreement. Therefore, they refused to comply with the signed MOU (Kittima Khunprayoon, 2019).

3) The problem in the process of storing paddy: The process of storing paddy was also an important problem in the integration of Nakhon Pathom Khanom chin business model because it was unable to determine the sources of the paddy or the duration of storing paddy. The mills managed all paddy. When the paddy was obtained from the farmers, the mills brought the paddy together and there was no separation of the paddy. To comply with the normal standards of the mill, if there is a separation of the paddy, the mill management cost will increase. However, the mills used random quality inspection methods before sending the rice to Khanom chin factories, making it impossible to identify the sources of the paddy. In signing the MOU, there was no mandatory detail in the paddy's storage procedure (Anek Thaptim, 2019; Sirichai Liengamnuay, 2019). The operation of "Nakhon Pathom Khanom chin business model" is now ceased because the above problems have not been resolved. But, it is proceededin the form of a collaborative network created by the private sector because the private sector still needs quality paddy to produce Khanom chin. Khanom chin clustering group has been adapted in other ways as follows.

4.2.2 Integration of Farmers or Agricultural Marketing Cooperative (AMC Model)

The operation of Nakhon Pathom Khanom chin business model was stopped due to the cost of transportation of paddy. No party was responsible for the increased transportation cost. Moreover, there were the problems of trust and management of paddy. However, the collaborative network created by the private sector was proceeded continuously because the private sector still needed quality paddy to produce Khanom chin. Khanom chin clustering group was adapted into the integration of farmer groups or Agricultural Marketing Cooperative (AMC Model).

4.2.2.1 Background: Farmer group integration or Agricultural Marketing Cooperative (AMC Model) occurred from the adjustment of the Khanom chin production network group. It was an adjustment of Nakhon Pathom Khanom chin business model, which originally had the mills as the intermediary for the purchase of quality paddy as required by Khanom chin factories, but it was changed to the BAAC network, called Agricultural Marketing Cooperative (AMC Model),

acting as an intermediary to perform the same duties as the mills. Therefore, the mill group was not involved in AMC Model's operation. Agricultural Marketing Cooperative was an agency established from the collaboration of Cooperative Promotion Department, Department of Cooperative Auditing. The duties of AMC were to operate buying, selling and providing various services to the farmers who were the group members. That is to say, AMC was the representative of the members to procure agricultural supplies or consumer products and other necessities for the members; gather agricultural products for distribution and provide other agricultural services, resulting in stronger bargaining power. AMC Model consisted of a group of farmers who were the members of Agricultural Marketing Cooperative, Nakhon Pathom Province and the private sector or Khanom chin factories in Nakhon Pathom Province. BAAC (AMC) was the center linking among the supply, the demand and the paddy market used for Khanom chin production.

4.2.2.2 Objectives: The objectives are (1) to be an organization of farmers in solving problems or promoting marketing, production factors and agricultural products, (2) to be an organization of farmers in response to the government policies that help solve problems or promote marketing, production factors and agricultural products, (3) to be an organization of farmers in cooperating with businesses in the private sector and the government agencies to solve problems or promote marketing, production factors and agricultural products and (4) to be an organization of farmers responsible for transferring agricultural knowledge, making the farmers have knowledge in living life, resulting in a better quality of life and applying modern technology that is suitable for the needs of farmers.

4.2.2.3 Group operational guidelines: AMC Model aimed to support the farmers who were the members of BAAC and promote the integration of quality rice production for Khanom chin processing and integrated rice marketing. The farmers voluntarily participated in Agricultural Marketing Cooperative of BAAC in Bang Len Sub-district. The integration of the group to support the production of Khanom chin started in 2018. The integration of Khanom chin production group by the introduction of Agricultural Marketing Cooperative in Nakhon Pathom Province linked with the upstream group or the farmers who were the members of BAAC and supported the production factors of rice varieties suitable for making Khanom chin,

and was responsible for storing paddy and rice milling for Khanom chin factories. BAAC (AMC Model) had the mills affiliated with the cooperatives to produce quality rice required by Khanom chin factories and the logistics system for delivering quality rice to Khanom chin plant factories. It also promoted production and marketing of Agricultural Marketing Cooperative in Nakhon Pathom Province. The conditions of operation in each group were as follows. (1) Agricultural Marketing Cooperative supported/ promoted quality rice production for making Khanom chin for the farmers who were the members of BAAC group. BAAC (AMC) had to store quality paddy for at least 8 months. The paddy that had been checked for quality from Khanom chin factories would be milled and delivered to Khanom chin factories according to the pre-contracted sales agreements. (2) Khanom chin factory group determined the purchase price of rice according to the market price. Now, the purchase price of the polished paddy with the delivery to Khanom chin factories is 18 baht per kilogram. (3) The farmers in the BAAC network were supported with seeds, fertilizer and pesticides according to their needs. The paddy obtained from the cultivation of farmers was bought by the mills in the BAAC network (AMC).

4.2.2.4 Key elements in driving the integration to enhance the capability of Khanom chin production: There were 5 key elements driving the integration to enhance the capability of Khanom chin production as follows.

1) External support driving the integration of Khanom chin group: Bank for Agriculture and Agricultural Cooperatives provided financial support such as loans, and gave advice on the administration of various resources to the farmers who were the members of BAAC and supported the farmers who operated the large rice-field land plots (upstream group) to reduce costs and increase production efficiency, and promoted production factors such as rice varieties suitable for Khanom chin production.

2) Leaders and administration in the integration of Khanom chin production of AMC Model: The private sector was the leader in the integration and proposed the demand for quality paddy to BAAC (AMC Model). But, for the management of the group of the paddy production network of the farmers, BAAC (AMC Model) played a role in connecting the farmer groups and preparing production factors for farmers, storing quality paddy and communicating the needs of Khanom

chin factories. For the management of Khanom chin group, the market force was used to determine the price for the purchase of paddy from farmers. BAAC (AMC) collected paddy from the farmers (upstream group) and stored it in the rice warehouse in order to obtain the paddy with appropriate quality for making Khanom chin before sending it to Khanom chin factories for processing it into Khanom chin.

3) The process within the cluster group: Firstly, 3 groups had collaboration in the integration of Khanom chin production group. First, it was the upstream group, which was the farmers. Second, it was the midstream group and the downstream group, which were Khanom chin factories and BAAC (AMC). Third, it was the support group which was BAAC. BAAC (AMC) drove for the cooperation in the preparation of quality paddy meeting the needs of the Khanom chin factories. Second, it was mutual trust. As a result of the agreement in the form of the sale contract legally enforceable in operation, it resulted in the trust in the joint operation within the network group. Third, it was the relationship within the network of BAAC (AMC). The members had close relationship because they were the villagers known each other well. They have had a long relationship, like siblings. Fourth, it was the collaborative learning of the farmers, leading to cooperation in solving the lack of production factors. For example, for the water shortage problems in rice cultivation, the network group had ongoing group discussions in order to plan for production. The groups were also formed to cooperate with the government projects such as vocational trainings and participation in the conference on promoting production and marketing of integrated quality rice (large Khanom chin land plots). The government was the leader in doing this. Fifth, it was the development of labor skills in production. Agricultural Marketing Cooperative provided knowledge to the farmers in the group to grow rice varieties suitable for Khanom chin production. The farmers in the area had skills and expertise in rice cultivation. For rice processing into Khanom chin, Khanom chin factories in Nakhon Pathom Province were responsible for buying paddy from the farmers through the mills in the network. In terms of Khanom chin processing skills, Khanom chin factories in Nakhon Pathom Province had expertise and specific formulas for Khanom chin production. Sixth, it was the follow-up evaluation and traceability system of the sources of the product. The sources of paddy can be inspected. Agricultural Marketing Cooperative was the intermediary managing

this issue and also randomly inspected paddy before delivering it to Khanom chin factories.

4) Production development: First, there was the development of Khanom chin production process. Khanom chin production process was a traditional production process, not much change was made. Machinery was used to facilitate the production of Khanom chin, so Khanom chin can be produced faster in the processing of Khanom chin flour to be Khanom chin. The production time can be reduced. The original production process took 7 days to produce Khanom chin, but now it takes about 3 days. Second, it was the production planning of Khanom chin production network group. “AMC” organized the meeting with the group members and Khanom chin factories in order to know the demand of the quantity of paddy for making Khanom chin. Agricultural Marketing Cooperative planned the whole production process. It also planned with the farmers who were the members of BAAC in rice planting areas and provided paddy storage areas. The government agencies did not participate in the planning process. The private sector cooperated with Agricultural Marketing Cooperative. When experiencing operational problems, Agricultural Marketing Cooperative would solve the problems. Third, the infrastructure was the key to the development of the capacity of Khanom chin production of AMC Model. At present, there is not enough paddy storage space for making Khanom chin. Paddy must be kept for more than 8 months. Currently, Agricultural Marketing Cooperative has managed many types of paddy to support many groups of customers. According to the forecast of the trend, the number of paddy for Khanom chin production will increase in the future. So, paddy warehouses are needed.

5) Product development according to the market demand: Agricultural Marketing Cooperative has processed agricultural products from BAAC members such as ready-to-eat rice in vacuum packs or paddy that is a raw material for Khanom chin production. Khanom chin factories have developed products to meet the market demand. For example, there is a variety of packaging sizes, ranging from 0.5 kg to 5 kg. Khanom chin has also been improved by adding herbs such as turmeric, butterfly pea and Pandan leaves into it. Product standards have also been established. Brands have also been created so that customers can remember the products.

4.2.2.5 Problems encountered in the integration of “AMC Model”: Agricultural Marketing Cooperative was the center in connecting between the farmers and Khanom chin factories. There were not enough paddy storage areas. For making quality Khanom chin, paddy must be kept for at least 8 months. As a result, the amount of rice was not enough to meet the needs of the Khanom chin factories in Nakhon Pathom Province (Chananporn Chaiwiang, 2019). Such problems caused Khanom chin factiores in Nakhon Pathom Province to expand rice planting network in order to increase Khanom chin production capability outside Nakhon Pathom Province. Phetchaburi Province was chosen as it can produce high quality rice.

4.2.3 Khao Yoi Model

Integration of farmers in Khao yoi district, Phetchaburi Province, Khao Yoi agriculture cooperative limited, Kasetsart University Kamphaengsaen campus and khanom chin factories in nakhon Pathom Province (khao Yoi model)

4.2.3.1 Background: Kasetsart University Kamphaengsaen Campus linked the cooperation between Khao Yoi Agriculture Cooperative Limited and Khanom chin factories in Nakhon Pathom Province to increase the capability of Khanom chin production and reduce the shortage of quality paddy for Khanom chin production in Nakhon Pathom Province. Khanom chin factories in Nakhon Pathom Province discussed with Khao Yoi Agriculture Cooperative Limited, Khao Yoi District, Phetchaburi Province in order to find ways to build cooperation. In Khao Yoi District, the farmers of the large rice-field land plots have grown Leuang Patew rice, suitable for the production of Khanom chin. Khao Yoi Agriculture Cooperative Limited was an important management center for linking a group of farmers of the large rice-field land plots growing Leuang Patew rice in Khao Yoi District, Phetchaburi Province, Kasetsart University Kamphaeng Saen Campus and Khanom chin factories in Nakhon Pathom Province.

4.2.3.2 Objective: The objective is an encourage the members to conduct business together and help each other and the general public by using moral principles and good ethics according to human basis for a good quality of life and economics of all members as defined by the cooperatives regulations.

4.2.3.3 Group operational guidelines: To increase production capacity of Khanom chin production, the implementation plan was negotiated in June, 2019. The farmer group, Khao Yoi Agriculture Cooperative Limited, Khanom chin factories in Nakhon Pathom Province, National Agricultural Extension and Training Center, Kasetsart University Kamphaeng Saen Campus visited the area together. The farmers in Khao Yoi District cultivated Leuang Patew rice, suitable for making Khanom chin. The farmers did not have to modify the rice variety at all. Leuang Patew rice is well-cultivated in flooded areas, in accordance with the area of Khao Yoi District, Phetchaburi Province which is a flood plain. The integration of group to increase capability of Khanom chin production allowed the farmers planting Leuang Patew rice to be able to sell rice with higher price than before without changing their production behaviors. The need of rice planting areas was likely to increase in order to produce sufficient paddy for Khanom chin production. The grouping conditions were as follows.

1) The farmers of the large rice-field land plots in Khao Yoi District planted Leuang Patew rice which can resist diseases and flooding conditions. It needs not much fertilizers and pesticides. However, it can be produced less than other popular varieties. But, when comparing the profit ratio, it is not different from other rice varieties. Leuang Patew rice is a popular rice eaten with curry because after being cooked, it is soft. In addition, the paddy is suitable for producing Khanom chin. The farmers plant Leuang Patew rice only during the flooding season because there is usually a high level of floods in Khao Yoi District, which is not suitable for planting other rice varieties.

2) National Agricultural Extension and Training Center, Kasetsart University Kamphaeng Saen Campus organized trainings for the farmers in Khao Yoi District, Phetchaburi Province to provide knowledge and understanding of rice varieties matching the needs of Khanom chin factories and rice cultivation in areas consistent with the landscape. The information on the rice situation trends and the cooperation in Khanom chin network of Khanom chin factories in Nakhon Pathom Province was also provided. The farmers in the group of Khao Yoi Agriculture Cooperative Limited cooperated in planting Leuang Patew rice according to the needs

of Khanom chin factories. From the quality examination of Leuang Patew rice of, it is suitable for Khanom chin production.

3) Khanom chin factories in Nakhon Pathom Province brought the farmers in Khao Yoi District to visit Khanom chin factories in Nakhon Pathom Province, and the farmers also had Khanom chin factories in Nakhon Pathom Province to visit the rice fields used to grow rice for Khanom chin factories. For the negotiation of Khanom chin group of Khao Yoi Model, National Agricultural Extension and Training Center, Kasetsart University Kamphaeng Saen Campus was the intermediary connecting the farmers in Khao Yoi District, Khao Yoi Agriculture Cooperative Limited, Petchaburi Province and Khanom chin factories in Nakhon Pathom Province. In terms of the price, there was the negotiation between Khao Yoi Agriculture Cooperative Limited and Khanom chin factories. Khanom chin factories reported the demand for the amount of Leuang Patew rice, which was around 3 tons per day. But, Khao Yoi Agriculture Cooperative Limited did not have the potential to store paddy, resulting in insufficient quality of paddy meeting the needs of Khanom chin factories. Only some paddy can be delivered to Khanom chin factories. In addition, in order to obtain enough Leuang Patew rice needed by Khanom chin factories per day, the production from the upstream (farmers) regarding paddy production areas must be improved. For the midstream, the paddy storage area was also expanded in order to be able to store enough paddy to meet the needs of the Khanom chin factories.

4) Khao Yoi Agriculture Cooperative Limited supported the farmers to plant Leuang Patew rice by lending them pesticides and seeds along with equipment used for rice production, such as water pumps and harvesters, so that farmers can use various production factors. But, after getting the paddy, the borrowed production factors must be returned to Khao Yoi Agriculture Cooperative Limited. Moreover, there was a loan service for the farmers. The loan limit for planting Leuang Patew rice was 50,000 baht with an interest rate of 5 percent per year. Khao Yoi Agriculture Cooperative Limited also bought paddy from the farmers. The paddy must be stored at the paddy warehouse of Khao Yoi Agriculture Cooperative Limited for not less than 8 months. The paddy must be stored to be old paddy, so that it can be polished to separate the rice to be sold to other customers who like to eat Leuang

Patew rice, such as the restaurants selling rice topped with curry. However, Khao Yoi Agriculture Cooperative Limited sold only broken Leuang Patew rice for Khanom chin production. For the rice, Khao Yoi Agriculture Cooperative Limited sold it with a higher price than those sold for Khanom chin production. Khanom chin factories bought broken-milled rice of approximately 15 baht per kilogram, but the quality must be checked by Khanom chin factories. Normally, broken-milled rice is sold only 8 baht per kilogram. So, Khanom chin production is added value to broken-milled rice. Also, Khao Yoi Agriculture Cooperative Limited must inspect the quality of paddy before milling the rice. It was a collaborative process between Khanom chin factories and Khao Yoi Agriculture Cooperative Limited. After inspecting rice and obtaining quality paddy for making Khanom chin, the mills of Khao Yoi Agriculture Cooperative Limited would mill the rice and deliver it to Khanom chin factories.

4.2.3.4 Key elements in driving the integration of group: The Key elements in driving the integration of group were as follows.

1) External support: Kasetsart University provided academic support in developing Khanom chin production capability by transferring knowledge about rice production and Khanom chin production standards. The government did not provide direct support. Khao Yoi Agriculture Cooperative Limited provided financial support to the farmers who were the members of the cooperatives with a loan of 50,000 baht with interest rate of 5 percent per year and rice production factors, such as Leuang Patew rice seeds, fertilizers, and water pumps, for the production of paddy suitable for Khanom chin production (Chananporn Chaiwiang, 2019).

2) Leaders and administration: The private sector, or Khanom chin factories in Nakhon Pathom Province was the leader in the integration of Khanom chin business group. The private sector needed quality paddy as a raw material for Khanom chin production. The needs of paddy were then communicated to Khao Yoi Agriculture Cooperative Limited, who was the leader of the group of farmers in Phetchaburi province. Khao Yoi Agriculture Cooperative Limited had 2 main roles, namely, managing the production factors of paddy production for the farmers and storing paddy and inspecting the quality of paddy before delivery it to Khanom chin factories. The plan for the management of both parts was discussed together. The market force was used to determine the price of paddy. Khao Yoi

Agriculture Cooperative Limited was the intermediary for purchasing paddy from the farmers. In terms of the capital management, the farmers who lacked funds can borrow money with the interest rates of 5 percent per year. For the production management, quality paddy was stored to meet the needs of the Khanom chin factories. There was also the management of basic necessities such as paddy warehouses, irrigation systems and transportation systems in rice fields. Khao Yoi Agriculture Cooperative Limited purchased the products from the farmers without lowing the price. Khao Yoi Agriculture Cooperative Limited was the intermediary connecting the needs of Khanom chin factories and used the information to plan together with farmers to produce quality paddy for Khanom chin production.

3) The process within the cluster group affecting the enhancement of the capacity of Khanom chin network group: First, it was cooperation. The cooperation in Khanom chin network started from the cooperation of Kasetsart University Kamphaeng Saen Campus with Khanom chin business network group, consisting of 3 sectors: farmers (upstream group), Khanom chin factories in Nakhon Pathom Province, and Khao Yoi Agriculture Cooperative Limited (midstream and downstream groups) and Kasetsart University Kamphaeng Saen Campus (supporting organization). Second, it was mutual trust. The signing of rice futures contracts made the members confident in the activities of the network group. The signing of the sales contract is legally enforceable. Contract parties must abide by the conditions under the specified time period. Making a contract was a way to build trust within Khanom chin network group (Khao Yoi Model). Third, it was the relationship of the group members. There was the relationship among the members of the agricultural cooperatives under the supervision of the agricultural cooperatives. The Agricultural Cooperatives Act supports rights and defines clear duties, affecting the relationship of the farmers and the agricultural cooperatives. The agricultural cooperatives supported for loans and production factors. When the agricultural cooperatives can make profits, dividends were shared among the members of the agricultural cooperatives. Fourth, for the collaborative learning of Khao Yoi Model, Kasetsart University Kamphaeng Saen Campus provided the knowledge about Khanom chin and production of quality paddy for Khanom chin production. Important production information was exchanged, and Khao Yoi Agriculture Cooperative

Limited visited the rice planting area together with Khanom chin factories in Nakhon Pathom Province. Fifth, it was the development of labor skills in production. The farmers in Khao Yoi District usally have good skills in planting Leuang Patew rice because it is the local rice variety. The farmers are skilled in the production of the raw material. But, they must be promoted with the skills in properly storing paddy for the production of Khanom chin, because it takes at least 8 months for storing paddy as well as maintaining the quality of paddy. Regarding the rice processing process to be Khanom chin, Khanom chin factories already have expertise in processing. Each factory has different formulas of Khanom chin production. Sixth, it included the follow-up evaluation and traceability system. The sources of paddy of Khanom chin network group (Khao Yoi Model) can be inspected. The paddy must be randomly inspected by the Khanom chin factories in order to check its quality before sending it to Khanom chin factories.

4) Production development: It consisted of research studies, production planning, easy access to production factors and necessary infrastructures. The integration of Khanom chin production network (Khao Yoi Model) did not have any research for development of Khanom chin production, but there was the production planning in Khanom chin network integration. Khanom chin factories, Khao Yoi Agriculture Cooperative Limited and the farmers planned the production planning together. The government sector did not participate in the production planning. As for the access to the production factors of paddy, Khao Yoi District is an area with good access to production factors because there is a comprehensive transportation route that is convenient for linking with the production factors. Khao Yoi Agriculture Cooperative Limited was the intermediary facilitating the connection of the production factors of paddy to the farmers. For the funding, adequate support was provided by Khao Yoi Agriculture Cooperative Limited for the members. When the products were produced, they were deducted with the loans they had borrowed to grow rice at the beginning of the season. As for the labor factor, the agricultural laborers were sufficient in the production of paddy. In terms of the infrastructures needed for Khanom chin production in Khao Yoi Model, there was the problem of inadequate paddy storage area because the paddy must be kept for up to 8 months. The paddy storage area of the agricultural cooperatives was also needed to expand in

order to be able to store more paddy. The area for storing the paddy of approximately 1,440 tons was needed in order to meet the needs of Khanom chin factories throughout the year (Officer of Provincial Agricultural Extension Office, 2019).

5) Product development according to the market demand: Nowadays, consumers have turned to pay attention to heathy food. Food is not only a factor of living, but it is also the matter of health which affects the system of the body and promotes health. Khanom chin is easily digestible suitable for the elderly. It is eaten together with fresh vegetables, which is good for the body. It can be eaten quickly and conveniently. For the development of Khanom chin, it has been mixed with various herbs. Khao Yoi Model is aware of the needs of consumers and has the concept of jointly developing products to be in line with the market demand. At present, however, it is still in the process of consultation and cooperation in the development of quality paddy meeting the needs of Khanom chin factories in Nakhon Pathom Province.

4.2.3.5 Problems encountered in the integration of Khao Yoi Model: The paddy storage area was not enough because it required space to store paddy specifically for Khanom chin production. It cannot be mixed with other types of paddy and requires a longer storage period of more than 8 months. In addition, the potential of producing Leuang Patew rice was not enough for the needs of the Khanom chin factories in Nakhon Pathom Province. Khao Yoi Agriculture Cooperative Limited had to support the farmers to grow more rice in accordance with the needs of the Khanom chin factories.

4.2.4 Bua Lam Chang Model

Integration of group to increase the capability of Khanom chin production in Bua Lam Chang Sub-district, Bang Len District, Nakhon Pathom Province (Bua Lam Chang Model)

4.2.4.1 Background: “Bua Lam Chang Model” was formed by the integration of the farmers in Bua Chom Chang Community, Bang Len District, Nakhon Pathom Province. The group of farmers had rice planting areas for Khanom chin production in Nakhon Pathom Province. They were inspired after attending the meeting organized by the government sector in promoting the integration of Khanom

chin production group (Nakhon Pathom Model). As a result, the community leader applied the idea to develop Khanom chin group in Bua Lom Chang Sub-district. The budget for supporting the 9101 project for rice processing into Khanom chin was requested from the government to raise the value of rice and develop sustainable agriculture. The government supported for the budget of the 9101 project, which was a sustainable agriculture project with the goal of strengthening the farmers and the community by applying principles, theories and solutions to various agricultural problems according to the philosophy bestowed by His Majesty King Bhumibol Adulyadej. Farmers can reduce expenses and find ways to increase incomes by managing agriculture to meet the needs of the community market, resulting in community economic stimulation and causing the money flow in the community. The important principle of operations of the group integration is that the community is an important part of self-operation. Plan must be done together within the community. Materials in the community must be used, resulting in cooperation in the implementation of sustainability in the community.

4.2.4.2 Objectives: The objectives are 1) to strengthen the farmers and the community with the principles, theories and solutions for various agricultural problems according to the philosophy bestowed by His Majesty King Bhumibol Adulyadej and 2) to promote and support the farmers to plant rice more efficiently, focusing on reducing costs, increasing products, processing agricultural products, developing the quality of agricultural products to meet standards and increasing income for the farmers and the community.

4.2.4.3 Group operational guidelines: The group operational guidelines were as follows. The farmers registered with the Department of Agricultural Extension and were ready to participate in the project. They had to apply for the project according to the rules and details of the Khanom chin integration project and must be approved by the community. The community committee selected the farmers to participate in the project. There was the integration of the group of farmers in Bua Lom Chang Sub-district in order to raise the value of paddy grown by the group members by processing paddy into Khanom chin. The committee of Khanom chin group consisted of the community leaders. The committee jointly planned Khanom chin production, starting from the process of forming a group of farmers in the

cultivation area of RD41, which is the rice variety that is suitable for making Khanom chin. The seeds were provided by the government agencies. The government supported the budget for the purchase of ready-made Khanom chin making equipment, so Khanom chin flour can be proceeded into Khanom chin quickly. The government also supported for the budget for hiring laborers and purchasing raw materials during the project implementation period. But, now the government does not support for this. So, Khanom chin production group (Bua Lam Chang Model) has to manage the operation by the group's budget. The operational guidelines of the groups can be classified as follows.

1) The farmers (upstream group) was supported with rice varieties by the government. After obtaining paddy, it must be stored for 8 months before processing into Khanom chin. Bua Lam Chang Community has mills and the rice paddy warehouses of the community with sufficient potential to store paddy for Khanom chin production.

2) The farmers (midstream group) processed the polished paddy into rice and then Khanom chin. The community operated this activity by their own group, not relying on the mills or Khanom chin factories.

3) The farmers (downstream group) distributed Khanom chin produced and sold with curry and fresh vegetables. Khanom chin with curry was sold in the community market and community shops. The sellers were the farmers who are the members of the group.

4.2.4.4 Key elements in driving the integration of group

1) External support: the government agencies supported for policy and budget for Khanom chin group in the 9101 project, which was a project for sustainable agricultural development. But, it lacked academic support from educational institutions in the area, which was different from other Khanom chin groups. The government supported many projects related to the development of the Khanom chin group, such as the policy of large rice-field land plots pushing for the integration of rice farmers to combine rice fields in order to reduce production costs of paddy and increase production efficiency along with supporting various production fundamentals. For the integration of group in the community for Khanom chin production, the central government agencies monitored the progress of the Khanom

chin group development project on 14 July 2017. General Chatchai Sarikalaya, Minister of Agriculture and Cooperatives, followed up on the progress of the 9101 project, following the footsteps of His Majesty the King for sustainable agricultural development at the Agricultural Productivity Efficiency Increasing Learning Center at Hin Moon Sub-district, Bang Len District, Nakhon Pathom Province to listen to a briefing on the progress of the project and to meet the farmers and visit the project area. It can be concluded that the use of rice produced by the farmers in a project from large rice-field land plots to make Khanom chin can add value in the sale of rice from 100 kilograms of not exceeding 1,500 baht to 5,000 baht. After that, the income was used as the fund for the project. It can be used as working capital for ongoing projects by focusing on the use of materials within the area in order to enable the farmers to get mutual benefits.

2) Leaders and administration: Khanom chin production group (Bua Lam Chang Model) was led by the village headman who was respected by the villagers. He was the leader bringing change and encouraging the villagers to see things around, creating a vision for the development of their own community, leading to the successful integration of Khanom chin group, helping to raise the value of paddy produced by the farmers from the production of Khanom chin. In addition, there were the projects developed by the community itself, such as the community mill and the community learning center managed by the village headman. The government pushed for the group integration and provided budget for driving the group into integrated production, processing and marketing. Nevertheless, the integration has not yet truly been based on the market force. The management during the implementation of the project plan supported by the government budget cannot reflect the true cost of Khanom chin production. However, the farmers of Khanom chin group benefited from the experiment of the integration of Khanom chin group in terms of processing, production and selling Khanom chin to the market. The management of rice of the group of farmers can add value to the rice in the community several times higher than before. Generally, the average price of paddy for Khanom chin production is 8,000-10,000 baht per wagon. The price of paddy for making Khanom chin is 8-10 baht per kilogram. Also, 1 kilogram of paddy is used to

produce 1 kilogram of Khanom chin, but the selling price of Khanom chin in the market is 20-25 baht per kilogram. So, processing results in multiple times of value.

3) The process within the cluster group: First, there was collaboration among upstream, midstream and downstream groups. All groups provided good cooperation because they were the farmers in the same community and familiar with each other. Second, there was mutual trust from familiarity as living in the same community, leading to the trust in the activities of the group members. This is considered a social capital existing in the community. Third, for the relationship among the members, the government was the driving force in the integration of Khanom chin group. The relationship of the group between the community and the government was in the form of considerateness as when the government agencies requested cooperation, the groups had to give collaboration in accordance with the needs of the government. But, the relationship in the network was like kinship relationship. Fourth, collaborative learning in Khanom chin group occurred from meetings and trainings of Khanom chin group (Bua Lam Chang Model) in order to upgrade the production of Khanom chin in each step. Fifth, it was the development of labor skills in production of paddy suitable for the production of Khanom chin with the support of seeds from Provincial Agricultural Extension Office. As for the rice planting skills, the farmers in the community had expertise in rice cultivation. The processing of Khanom chin from Khanom chin flour also met the requirements of consumers. Nevertheless, the group lacked skilled labors to process rice into quality Khanom chin flour, and be able to produce Khanom chin that is soft and meets the market demand. Khanom chin group is now waiting for the educational institutions to provide knowledge and training on producing Khanom chin flour from rice having quality meeting the market demand. Sixth, it included the follow-up evaluation and traceability system. The integration of Khanom chin group (Bua Lam Chang Model) was unable to trace the products due to lack of expertise in rice processing into Khanom chin flour, so they had to buy ready-made Khanom chin flour from Khanom chin flour factories for making Khanom chin. But in the future, if the group is supported with the knowledge and skills in processing rice into flour for making Khanom chin, it will be able to trace back to the farmers growing rice for Khanom chin production.

4) Production development: First, for the production planning, the government agencies were the project consultants. There was a joint plan between the government and the farmers. The farmers produced paddy and Khanom chin and sold Khanom chin by themselves in their own community. But at present, the operation of Khanom chin group (Bua Lam Chang Model) has stopped because of the problems of production cost management and marketing. The group is waiting for the government to help solve the problems so that Khanom chin production can be proceeded. Second, for the access to capital, it was found that the farmers were supported with the financial resources from the government in the 9101 project. As for the labor factor, it was found that there were sufficient rice laborers to produce paddy and Khanom chin. Third, the basic infrastructures needed for Khanom chin production, namely irrigation systems, electricity, roads, community mills, and warehouses for preserving the quality of rice suitable for making Khanom chin were sufficient for the group's operations.

5) Product development according to the market demand: There was the need to develop the production of Khanom chin. Khanom chin must be soft. But, now the group lacked the skills to transform rice into quality Khanom chin flour. Nevertheless, this problem was initially resolved by purchasing quality Khanom chin flour from the factory for processing it into Khanom chin in the early project implementation. In addition, the group developed Khanom chin products in line with the market demand by selling Khanom chin with curry and fresh vegetables so that consumers can eat it at an affordable price. It was fresh produce because it was produced day by day.

4.2.4.5 Problems encountered in Bua Lam Chang Model.

1) The farmers lacked knowledge in the process of processing rice into Khanom chin flour meeting quality requirements of consumers. When the farmers produced Khanom chin from Khanom chin flour processed by their own group, it was found that Khanom chin was not soft and it was easy to tear. The problem of lacking of knowledge in processing Khanom chin flour from rice was solved by buying ready-made Khanom chin flour to produce Khanom chin at the beginning of the project so that the group can operate the group' s operations according to the budget plan proposed to the government. But, the operation of

Khanom chin production was halted because when assessing the income after deducting the expenses, the average income per person was less than 300 baht, lower than the minimum wage. For this reason, the members of Khanom chin group decided to be the day laborers instead as they can earn higher income. The cause making the income from Khanom chin production less than the daily wage was that the farmers did not use the rice grown in the community to make Khanom chin, but they used Khanom chin flour bought from the factory to produce Khanom chin. So, the cost of Khanom chin production was high, resulting in low profits from the sale of Khanom chin.

2) There were the marketing problems. During the production process of Khanom chin, they tried to sell Khanom chin in the community shops. The amount of Khanom chin at least 200 kilograms must be produced per day to be worth the production. As a result, the group must have more marketing plans to deliver Khanom chin to other markets and create the brand of Khanom chin group (Pooyai, 2019).

> "When forming the group to produce Khanom chin, we got only a hundred bath each. It is better to work in other things. In doing something, we have to see if it is worth the investment or not. When it is not worth, why we have to do it." (Pooyai, personal communication, October 20, 2019).

4.3 Important Elements and Guidelines for Capacity Development Related to Driving Khanom Chin Business Cluster in Nakhon Pathom Province

4.3.1 Key Elements in Driving Khanom Chin Business Group

There were 5 key elements in driving capacity development of Khanom chin business group found in this study.

4.3.1.1 External support, including policy support, academic support and financial support: The government attempted to support the integration of Khanom chin production group in two main forms.

First, it was the integration of Khanom chin cluster by signing the Memorandum of Understanding (MOU) in the integration of "Nakhon Pathom Model". It was the promotion of the integrated Khanom chin production network from the upstream group (farmers), the midstream group and the downstream group (Khanom chin factories) and support organization (the government). The government also provided support at the community level to upgrade the rice processing to Khanom chin of Bua Lam Chang community, called "Bua Lam Chang Model". It was the development of the group integration to increase production capability, causing the adaptation of the network group in Nakhon Pathom Province. As a result, knowledge was communicated. There were the official meetings held at the provincial level. The government also drove various groups related to Khanom chin production. The integration of group was a starting point for the development in increasing the ability to implement the policy. It also led to the signing of the MOU for the cluster integration of "Nakhon Pathom Model" and the integration of group at the community level, which was "Bua Lam Chang Model". However, each group experienced various problems while carrying out the activities. When the government finished proceeding the initial phase of the project plan, the group operations were also terminated as they faced with problems that cannot be solved by the group. Help and support were needed. In terms of academic support, it was found that only the upstream group or the farmers participating in large rice-field land plots was supported to produce quality rice suitable for Khanom chin production. Academic support was provided by

Rice Department. But, the support of processing and marketing was not clearly found. Khanom chin processing was still operated by the private sector. The external support was in the form of developing the capability of Khanom chin production or “Nakhon Pathom Model” was done to solve the shortage of quality paddy for Khanom chin production.

“Bua Lam Chang Model”, which was the integration at the community enterprise level pushed by the government, aimed to raise the value of paddy. However, the group still had the problems of the knowledge in producing Khanom chin with the quality needed by the market. The group had insufficient raw materials. Also, previously, the group was supported by the government for the rice storage facilities. In addition, the mills of the group had sufficient potential to operate within their own group. However, in order to create sustainability, there should be the support for linking operations in Pracharath Rak Samakkee (Thailand) Co., Ltd. in Nakhon Pathom Province, which was established in 2016 with the aim to generate income for the people by the civil society, namely the government, the private sector, the academic sector, the civil society and the public sector. There are also the development guidelines for the 3 groups, namely agriculture, processing and community tourism. The main missions were to develop and create efficiency, including accessing to production factors, creating knowledge, marketing, communication, creating sustainable awareness and management. The missions of Pracharath Rak Samakkee (Thailand) Co., Ltd. are in line with the Khanom chin community development guidelines, which will help solve problems of Khanom chin product development to be in line with market demand and develop the ability in competition. For the external support of “Khao Yoi Model” and “ACM Model” which were the groups integrated by the adaptation of Khanom chin factories that needed the network to support quality rice. The government supported for tax measures that should be deducted to promote the integration of group. The academic support was provided by Kasetsart University. There was a variety of Khanom chin processing, such as semi- processed Khanom chin mixed with turmeric.

The government should support the group integration continuously by pushing at the provincial level by establishing a joint committee in Khanom chin business cluster. The agricultural cooperatives, the farmer groups and Khanom chin

factories and other relevant network partners should be appointed as the committee of Khanom chin business cluster in order to formulate the strategic plan for the cluster operations in the upstream group, the midstream group and the downstream group in order to enhance the capability of the group in production and processing process of Khanom chin products.

4.3.1.2 Leadership development and administration: It was found that when studying the leadership and the administration of Khanom chin production network in Nakhon Pathom Province, it was consistent with the society, called "atomistic-type society", which is the society where the individual is the primary concern in being the leader. The social conditions emphasize on the interdependence and the interests of groups or individuals. In terms of behavior, it tends to be careful of others and focus on short-term benefits. The reciprocal basis is always considered. People do not trust each other. They usually see others as competitors, but try to give themselves and close relatives the most benefits (Honigmann, 1968). The original Khanom chin production group in the area was based on relative grouping and local clustering created by the faith from the modern nation state that decentralized into the local area and used the map symbols on the census. To empower leadership development, change leadership, leading to the determination of the vision, strategy, culture, promotion of innovation and technology of cluster integration must be promoted in order to encourage the followers to look at various things around them and connect them to see the benefits of the successful integration of the Khanom chin cluster beyond personal benefits. The ability and the welfare of the followers should also be aware of. As for the administration according to the cluster concept, the capability of the whole production process, including the production process of quality rice, effective Khanom chin processing, reducing production costs in the rice storage and not causing pollution to the environment as well as innovative Khanom chin products safe for consumers should be promoted. These will benefit all parties involved. The integration of the Khanom chin cluster requires ongoing meetings, group registration and membership fee collection for the benefit of the cluster operations. The grouping must not seek for profits or earn income to share. Regulations are needed to be established as the guidelines and they must not interfere with politics.

4.3.1.3 The process within the cluster: The survey of the integration of Khanom chin group revealed that cooperation and trust in production of Khanom chin were the collaboration among relatives. It was an industry based on the family in the production and processing of Khanom chin. It was being a kind of trust in the kinship relationship. The members shared and learned about the problems together. The group interaction was at the level of close ones. The skills of laborers were developed to create expertise and knowledge. The wisdom of Khanom chin production was passed on to relatives and close friends. Trust in relatives and acquaintances developed a change in cluster integration, leading to trust in the form of commercial contracting, causing the exchange of information and cooperation to produce quality products and establishment of the standards of products, causing trust among consumers, leading to the demand of the consumer market.

4.3.1.4 Production development: It is necessary to formulate a strategic plan for producing quality raw material that is organic rice and use the original rice variety suitable for making Khanom chin such as Leuang Patew rice, Suphanburi rice, so a non-toxic paddy yield can be obtained. Paddy seeds must be kept free from pesticide residues so that the quality and safe paddy used in Khanom chin processing process can be gained. In the Khanom chin processing process, modern machinery must be used to help increase production to meet the needs of consumers. The use of biological techniques to put bacteria in the rice fermentation process for making Khanom chin flour is also recommended, so it can take less time in rice fermentation (Anek Thaptim, 2019).

4.3.1.5 Product development according to the market demand: The strategy of Khanom chin processing that responds to the consumers concerning about health and convenience in eating should be determined. The cooperation with the organic vegetable network group, and the Khanom chin curry group that is clean, tasty and hygienic should also be built. Khanom chin product innovation, development of processing of ready-to-eat Khanom chin and semi-processed Khanom chin that can be kept for almost 1 year for export should also be done because there are many Thai customers in foreign countries. Changes in Khanom chin food innovation that can affect the acceptance of people in Thai society must have the following characteristics: (1) Khanom chin innovation that is beneficial to the way of

consumption of people in society, (2) consistent with the culture in Thai society, (3) not creating much complexity in consumption and (4) being seen and understood easily (Rogers, 1995).

4.3.2 Capacity Development Guidelines Related to Driving Khanom Chin Business Cluster in Nakhon Pathom Province

The study of Khanom chin production capacity development considered 3 important areas as followed.

4.3.2.1 Raw material source development: In term of raw material sources for Khanom chin production in Nakhon Pathom Province, it is an area with fertile soil and enough water to grow rice throughout the year. In the past, the farmers did not have a joint plan for paddy production. Actually, the farmers had expertise and skills in paddy production. In 2017, there was a problem of drought crisis, causing the farmers to get together to negotiate with the irrigation office in the area to provide water to the rice planting areas in order to help alleviate drought. This event was the beginning of the group integration of the farmers in the area, leading to further cooperation in other projects. The drought crisis caused by natural phenomenon, known as " El Niño" that caused the country' s average temperature to rise by 1-2 degrees Celsius and have a period of low rain had affected rice cultivation in Nakhon Pathom Province. Therefore, the farmers required an increased use of water in irrigation systems for rice production. Then they proposed the request to the Irrigation Department to make a water management plan meeting the needs of the farmers who planted rice. The integration of the farmers was the key to capacity enhancement in solving the problem of rice production.

The government had a policy to develop rice production capability by grouping the farmers in the project called "Large Agricultural Land Plot Project". The area-based approach for agriculture was promoted. It was conducted in an integrated manner among related departments. The manager of the land plot was appointed to manage all activities in the area and the supply chain. So, there was an in increased capacity through joint management in rice production planning consistent with the market demand. The market was continuously support the production. Also, the farmers reduced production costs from sharing production factors together and

jointly improved the standard of rice products to be in line with the market demand. The agricultural promotion was based on Zoning by Agri-Map with the aim to support and encourage farmers to change inappropriate production in the area to suitable production in line with the potential of the market area (Office of Agricultural Economics, n.d.). In Nakhon Pathom Province, the soil is suitable for producing a variety of rice varieties and there was the integration of large rice-field land plots, so the government can solve the water shortage problem for cultivation and support various production factors. For this reason, the production costs were reduced from sharing production resources and collaborating in supplying production resources, resulting in having the bargain power of price and quantity of production factors.

The development of rice production capacity for Khanom chin production must be based on the principles of development and promotion of the areas that are suitable for rice production. It can be done by creating a management system with the manager managing the total land plots obtained from grouping. The overall supply chain management is also needed. From the survey, it was found that the groups that managed the land plots which led to the integration of current production groups were the agricultural cooperatives, Agricultural Marketing Cooperative and the mills. They played a role in the integration of farmers to promote production. There was the coordination with Khanom chin factories that had the demand for rice used in Khanom chin production. In terms of supply chain management in Khanom chin production, collaboration with all networks related to supply chain activities consistent with the production process, raw materials, processing and marketing as well exchanging information and understanding from the upstream group to the downstream group is required. Khanom chin production supply chain management must include an integrated plan of raw material procurement, Khanom chin processing, delivery of raw materials / products and return of products.

The integration of the farmers to grow rice into large rice-field land plots was consistent with the principles of Zoning by Agri-Map. The farmer group process was supported by clearly determining water sources used for rice cultivation which was enough to grow rice for Khanom chin production. The Khanom chin group must consider the market that supports the products and improve the quality of paddy cultivation for Khanom chin production by using organic farming method, which is

the rice cultivation system using natural principles on the agricultural areas without pesticide residues and soil, water and air contamination. Soil fertility and biodiversity in the ecosystem must be promoted without using chemicals or those derived from GMOs. Standardized production factors for rice production through organic production provide abundant production with value and safety, leading to a good quality of life of both farmers and consumers. Organic rice farming is the rice planting that does not use agricultural chemicals such as chemical fertilizer, substances for growth control and prevention of rice insect pests as well as chemicals used to prevent insect pests in the rice storage. Organic rice production does not only provide high quality rice production that is from toxic substances, it is also a conservation of natural resources and sustainable agricultural development. Growing rice using organic farming methods focuses mainly on nature in order to maintain the natural balance and utilization of nature for sustainable production, such as improving soil fertility by crop rotation, using organic fertilizer in the fields, controlling diseases and rice insect pests by using a mix-method without chemicals, selecting rice varieties suitable for natural resistance, maintaining natural balance of pests, properly managing soil and water for the needs of rice in order to make the rice grows well and abundant. Managing the environment that is not suitable for the outbreak of the diseases, insects and pests of rice is also required.

Regarding rice varieties suitable for producing Khanom chin, aside from being able to produce quality Khanom chin as the market demand, it should also be the varieties suitable for the area characteristics, such as withstand flooding conditions in the flood season such as Leuang Patew and Suphanburi rice varieties. In the areas without flooding problems, a variety of ice varieties can be grown for producing quality Khanom chin according to the market demand. The rice varieties suitable for Khanom chin production must have amylose molecules higher than 26%. The quality of flour can be analyzed in the laboratory. Originally, Khanom chin was made from the native varieties of rice such as Khao Gaw Diaw, Puang Nahk and Nahng Kiew rice varieties. Now, these rice varieties are less planted because of low yield. There is an improvement of other rice varieties that provide high yields and can grow as off-season rice because they are not sensitive to light and can be grown throughout the year such as Chai Nat 1and Suphan Buri 1 rice varieties (P.S.CH.

Group Co. Ltd, 2016). In terms of paddy storage for Khanom chin production, newly harvested rice can be used to produce Khanom chin less than the rice stored for more than 3 months because starch cells will change, so it affects Khanom chin production which is higher quality than using newly harvested rice. The requirements of rice from Khanom chin factories include the paddy planted for more than 110 days but not more than 140 days and stored for more than 8 months but not longer than 2 years. In addition, using broken rice will help to reduce the cost of making Khanom chin because the price is cheaper than full grain rice. However, the rice should not be too small because in Khanom chin production process, rice starch will dissolve easily in water (Anek Thaptim, 2019).

4.3.2.2 Organizational system development: It includes the guidelines for development of executives / personnel as well as marketing strategies and the integration of the Khanom chin production group or " Nakhon Pathom Model" for increasing production capacity. The number of mills and Khanom chin factories participating in the project must be increased as they are the important centers of cooperation in Khanom chin production network. The organizational system development requires cooperation to make connection and support for each other until Khanom chin products are enhanced and the quality of life of all groups of members in Khanom chin cluster is improved. All groups of members receive mutual benefits as follows.

1) Educational institution: It is responsible for developing the skills of the network members in production, processing and marketing. The connection within the group is to expand the opportunities for marketing and create business alliances. Joint committee is established to upgrade Khanom chin products. All parties determine strategies and develop marketing together.

2) Khanom chin factories in Nakhon Pathom Province: The group is formed as SMEs that are privately owned. The strategic marketing approaches in creating shared value must be set.

3) Agricultural cooperative: It is another key driving organization in raw material preparation for running Khanom chin businesses in Nakhon Pathom Province. It plays a role in encouraging the members to work together and help each other by using the principles of morality and ethics based on

human basis for the benefit of members, leading to the improvement of the quality of life in both the economic and social aspects of the farmers who are the members. Agricultural cooperatives provide funds for growing rice suitable for Khanom chin production and support knowledge about rice production suitable for Khanom chin production, such as rice varieties, paddy storage and maintaining the quality of paddy so that the paddy has quality meeting the requirements of Khanom chin factories (Chananporn Chaiwiang, 2019).

4) Agricultural Marketing Cooperative (AMC) is another important driving organization. It is classified as an agricultural cooperative according to the cooperative registration. It is a limited cooperative that does not operate credit business. The operations are the same as other general businesses. It aims at helping the members and the cooperatives to promote well-being and better quality of life. From the study, it is the organization having effective approaches in collecting quality paddy for Khanom chin production. Also, marketing strategies should be developed. It should not only be a rice collector, but it should also operate aggressive marketing. The group of processing paddy into ready-made flour for making Khanom chin should also be formed in the future in order to provide an alternative to small Khanom chin factories that want to use ready-made flour to make Khanom chin as it is convenient for them in making Khanom chin that does not want to process rice to flour. At this point, it can be operated by agricultural cooperatives and Agricultural Marketing Cooperative. It can also be the guidelines for sustainable development for the farmers who plant rice as well.

The integration of Khanom chin business group is a network. Because of the uncertainty of demand and supply of the products as well as the environmental uncertainty regarding the sources of suppliers of paddy that change according to the market force, it affects the coordination and causes rapid change in administration with a short life span. The distribution of information is also extremely important under the uncertainty from the rapid change in the production demand. These uncertainties make Khanom chin production network become more independent in order to be flexible and able to respond to a variety of situations, market conditions and consumer needs and to meet the needs of the environment in terms of costs and time that must be reduced. In addition, it is an eco-centric network. The integration of

the Khanom chin network is a connection with individuals. The network relationship of Khanom chin factories is in the form of exchanging raw materials and business goods. However, for Khanom chin processing process that each factory has its own specific formula, it is in the form of relative relationship, which is the bond of blood and marriage, reflecting the relationship between the roles of the family.

The management approach of Khanom chin network by having Khanom chin clustering is a solution to the weaknesses of Khanom chin network integration in terms of information restrictions or the promotion of the production of quality rice for Khanom chin production. The development of Khanom chin network grouping in accordance with Khanom chin production cluster in Nakhon Pathom Province to promote the integration of Khanom chin clustering must start from developing a group of farmers (upstream group) who produce quality rice for Khanom chin production, fertilizer producers, machine controllers for Khanom chin production, the group supporting production factors that promote Khanom chin production, Khanom chin packaging, and the group related to Khanom chin delivery to the market, Khanom chin wholesale and retail groups as well as related government agencies private sector, such as an organization that sets standards for food safety, trade association, occupational training group related to food career development, research group and food preservation support groups.

The integration of Khanom chin cluster is very necessary in Khanom chin production group because the current competition in the food industry is increasing in terms of the quality of healthy food products and convenience. Not only the inputs for Khanom chin production or the size of the production factory are considered. Producing quality products requires cooperation from many groups as it cannot be done by only one group. With more complexity under the competitive conditions that product quality is needed to be improved, only Khanom chin business group or Khanom chin factories cannot develop high technology due to the lack of labor skills. In addition, since there is the tax burden that must be paid to the government, the operating profits are not very high. Therefore, tax reduction measures should be implemented to support agricultural product processing operators. It is considered as the indirect support given to farmers (Anek Thaptim, 2019).

Clustering of various groups, including the upstream group or the farmer groups, the midstream group related to paddy storage for Khanom chin production and the downstream group related to the consumers affects the operation efficiency. Access to various production factors and processing technology results in a variety of Khanom chin products. Development based on Creating Shared Value (CSV) is the issue gaining the interest at a global level. It emphasizes on promoting sustainable economic and social values as well as human potential, which are parts of the consideration of operating costs. It is the sharing or the mutual benefit of the organization and society, especially the business sector. The operation of Khanom chin business that concerns about the effects having on society and environment is not just creating a good image, but it is the creation and sharing of values of the organization and society (Voraparn Euaarporn, 2014). It is the creation of eco-efficiency or improving Khanom chin production process to be efficient, focusing on reducing unnecessary costs, such as saving energy in the Khanom chin production process, reducing flour loss in the production process in order to reduce pollution caused by waste water from production, or setting the CSV guidelines for green marketing. It also focuses on making a difference with the environmental friendliness of Khanom chin packaging, such as using Khanom chin container that is safe to the environment and can be biodegradable, not causing residue in the environment.

4.3.2.3 Process and strategy for capacity development: Studying concepts and theories about the approaches for cluster development, including the concept of 4 factors of integration purposed by Michael E. Porter and summarizing the capacity development approaches is the development process for developing the capability of Khanom chin production for competition by considering all 4 factors of integration, including 1) production conditions, 2) demand conditions, 3) related and supported industries and 4) competition contexts and strategies (Porter, 1998). This concept has been taken into consideration to develop the capability of Khanom chin cluster in Nakhon Pathom as follows.

1) Analysis of the conditions of production factors: For the integration of groups to increase the capability of Khanom chin production, there is no problem of the lack of laborers in rice cultivation for Khanom chin production in Nakhon Pathom Province. Moreover, Bang Len districts is an area suitable for rice

cultivation with good irrigation systems that can support rice planting throughout the year. There are also a large number of farmers who are highly skilled in planting rice with quality that the market needs. There is an infrastructure system that is well-equipped with communication networks, irrigation systems, electrical systems and community water systems. There are also sufficient warehouses to store paddy for making Khanom chin. In terms of integration, the government supported " Nakhon Pathom Model" and "Bua Lam Chang Model", but the groups that were not supported by the government were the groups formed from the cooperation of the private sector and the cooperative groups, which were " AMC Model" and " Khao Yoi Model" , which still face a shortage of paddy warehouses for Khanom chin production.

2) Demand conditions: Regarding the tendency of consumers, they want more convenient food. Khanom chin is an alternative apart from eating steamed rice or sticky rice. In addition, Khanom chin can be eaten with many types of curry that consumers in each region can choose. However, there are still restrictions on the quality of Khanom chin as Khanom chin can only be kept for not more than 3 days. So, it is the limitation in exporting to foreign countries. So, semi-finished Khanom chin is needed. Technically, semi-finished Khanom chin can be made. However, most consumers nowadays require fresh Khanom chin.

3) Related industries supporting Khanom chin production: Khanom chin production activities according to the supply chain include cooperation in exchanging information, knowledge and personnel skills development. Kasetsart University Kamphaengsaen Campus has provided academic support and connected various network groups related to the production of Khanom chin. As for the financial support, Bank for Agriculture and Cooperatives has supported for the source of funds for farmers for Khanom chin production or the production factors for rice cultivation in order to provide quality rice products for making Khanom chin.

4) Competition contexts and strategies: The groups have been formed to increase Khanom chin production capacity concretely. The government has pushed for the integration of group to promote production and integrated marketing of quality rice (large Khanom chin land plots). The farmers voluntarily participate in the groups. There are farmer groups in Bang Pla Sub-district and Phai Hu Chang Sub-district, Bang Len District, Nakhon Pathom Province. There is an integrated

production linkage throughout the production, processing and marketing chain, moving towards the city of food innovation as well as promoting the transfer of knowledge for farmers in the group to produce standardized rice for Khanom chin production in the Khanom chin industry competition. At present, a variety of Khanom chin products are produced, such as turmeric Khanom chin, Pandan leaf Khanom chin and riceberry Khanom chin in order to attract more consumers to buy Khanom chin. In the private sector, Khanom chin factories are competing to procure quality rice for making Khanom chin. Each Khanom chin factory has its own specific formula of Khanom chin production. It also has the strategies to create the appearance of Khanom chin products that is different from other Khanom chin factories.

CHAPTER 5

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

The purposes of the study entitled “Capacity Development Follow Cluster Khanom chin” were 1) to study the model of Khanom chin business cluster in Nakhon Pathom Province and 2) to study the important components and the guidelines for capacity development related to driving Khanom chin business cluster in Nakhon Pathom Province. This was qualitative research. The data were collected by in-depth interviews and from the documents obtained from government officials, research, related textbooks and informal interview with open-ended questions. The interviewees told their stories freely and the interviewer informed them about the needs regarding various matters related to the integration of Khanom chin business group in Nakhon Pathom Province. In order to obtain the data covering the content and diverse target groups, 45 informants were selected, including 30 farmers from the upstream group, 6 processing and market entrepreneurs from midstream and downstream groups and 9 people from support groups, including external networks, government agencies and educational institution. Observation was also done to get real information such as observing group meetings, rice fields and the location of Khanom chinbusiness activities. The conclusion of the study was as follows.

5.1 Conclusion of The Study

Khanom chin production in Nakhon Pathom Province consisted of 5 productions, processing and marketing cycles as follows. 1) The famers of large rice-field land plots planted specific varieties of rice for Khanom chin production. 2) The mill group or the cooperative group bought paddy and stored paddy for a period of not less than 8 months. Once the quality paddy was obtained, it was polished and sent to Khanom chin factories. 3) Khanom chin factories processed Khanom chin. 4) Khanom chin was distributed to Khanom chin wholesale markets

(wholesale trade). 5) Khanom chin was distributed to stores (retail trade) as shown in Figure 5.1: Khanom chin production process in Nakhon Pathom Province.

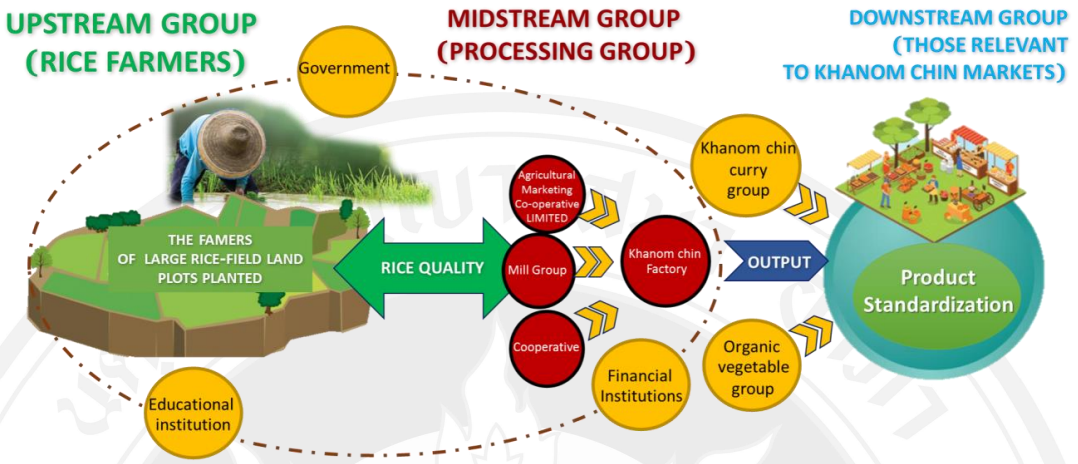

Figure 5.1 Khanom Chin Production Process in Nakhon Pathom Province

5.1.1 Khanom Chin Business Cluster in Nakhon Pathom Province

Khanom chin clustering in Nakhon Pathom Province was originated from the private sector. Khanom chin factories needed quality rice to produce Khanom chin, so they submitted a letter to Dhamma Center, Nakhon Pathom Province. Then the Committee on Agriculture and Cooperatives had the policy to set the guidelines for group integration in order to increase Khanom chin production capability. For this reason, "Nakhon Pathom Model" was established to promote the production and marketing of quality rice (large Khanom chin land plots). In 2017, the meeting was held among three related groups, namely 1) the government sector supporting the production, 2) the private sector, which was the group of Khanom chin factories and 3) the group of farmers in Nakhon Pathom Province. For the implementation of "Nakhon Pathom Model", when the project was carried out until the quality paddy was produced according to the market needs, there was the problem of the cost of transporting the paddy to the mills located in Kamphaeng Saen District. There was no host responsible for the transportation costs. Previously, paddy was sent to the mills near the rice fields located in Bang Len District. But in this project, the mills participating in the project were far from the rice planting areas about 30 kilometers. The farmers had to deliver paddy to the mills participating in the project because the

paddy storage area had been prepared. They cannot send paddy to the rice mills nearby the rice fields because the paddy storage area was not prepared specifically. No party was responsible for the increased transporting costs, approximately 200 baht per wagon. As a result, some farmers did not send paddy to the mills participating in the project. In addition, the mills participating in the project were not sure when all of the paddy they had bought from farmers would be bought by Khanom chin factories because the purchase time had not been specified. So, the risk of implementing the project was at the mills only. For this reason, the implementation of the project was terminated.

The integration of "Nakhon Pathom Model" faced the problem of managing rice logistics costs and trust in joint operations of the group. Moreover, the problem of shortage of quality rice still persisted. Therefore, the private sector tried to cooperate with other agencies instead of the mill group. It cooperated with Agricultural Marketing Cooperative in Nakhon Pathom Province, established by the cooperation of the Cooperative Promotion Department and the Cooperative Auditing Department at the provincial level. Agricultural Marketing Cooperative operated trading business and provided services to farmers who were the members of BAAC. Some operations were similar to those of the mill group, such as providing loans and production factors for the farmers who were the members of the group in advance and buying agricultural products from the farmers who were the members of BAAC. After selling agricultural products, their loans were deducted. The integration of Agricultural Marketing Cooperative (AMC) done to replace the mill group is called "AMC Model". The integration of the farmers in large rice-field land plots in the network of Agricultural Marketing Cooperative aimed to produce quality rice meeting the needs of Khanom chin factories, but it experienced infrastructure problems. The warehouse for storing special paddy rice for Khanom chin production was not enough because paddy must be stored for more than 8 months, and Khanom chin factories had a lot of demand for paddy. From the problem of insufficient storage space, the production of quality rice for making Khanom chin of "AMC Model" was not enough for the needs of Khanom chin factories.

Later, Khanom chin factories in Nakhon Pathom Province were supported by Kasetsart University Kamphaeng Saen Campus, which was the intermediary in

linking the production chain with the farmers in Khao Yoi District and Khao Yoi Agriculture Cooperative Limited, Phetchaburi Province in order to increase the quality of rice for Khanom chin production in Nakhon Pathom Province by the integration model called “Khao Yoi Model”. For the integration of “Khao Yoi Model”, Khao Yoi Agriculture Cooperative Limited cooperated the integration of the group of farmers in order to promote rice production suitable for Khanom chin production and to store paddy with the quality needed by Khanom chin factories. However, there was the problem of insufficient paddy storage area because paddy collected for making Khanom chin required a lot of storage space. It must be stored for at least 8 months. This was the same problem as “AMC Model”.

In addition, the government also promoted the integration of Khanom chin group at the community level in order to enhance the farmers planting rice for processing into Khanom chin to increase the value added for the farmers. This group integration was operated in Bua Lum Chang Sub-district, which was called “Bua Lum Chang Model”. The government supported the budget for purchasing Khanom chin production machines and the project implementation at an early stage for the farmers in the group. The farmers in Bua Lum Chang community joined in planting rice, processing rice into Khanom chin and distributing Khanom chin in the community market. “Bua Lum Chang Model” was in operation for a while and found that Khanom chin produced by the group had poorer quality than Khanom chin sold in the market since it lacked Khanom chin flour production techniques. So, the farmer group solved the problem by buying ready-made flour from Khanom chin flour factories for making Khanom chin. From the operation of “Bua Lum Chang Model”, it was found that the revenue generated from Khanom chin production was lower than that of general employment. For this reason, Khanom chin production was stopped due to the high cost of production since the group had to buy flour from the factories, and the farmers lacked knowledge and techniques of rice processing into quality Khanom chin flour meeting the needs of the market. Also, the market supporting Khanom chin production was less than the capacity of Khanom chin making machines.

The integration to improve the capacity of Khanom chin production of all 4 models can be compared in terms of the integration initiatives, the forms of integration, the elements of group members, the characteristics of Khanom chin

products, the government support, the support from educational institution, the support for funds and production factors for the group's operations, the leadership and administration, the trust, the problems arising from the integration and the current operational status as follows.

The comparison of Khanom chin business integration revealed that for Khanom chin business integration that the government sector was the main leader in the group integration, was "Nakhon Pathom Model". The group integration led by the private sector was "AMC Model". The group initiated by Kasetsart University Kamphaeng Saen Campus was "Khao Yoi Model". The group initiated by the village headman was "Bua Lum Chang Model".

In terms of the forms of the integration, the groups which were the network integration with complete production cycle were "Nakhon Pathom Model", "AMC Model" and "Khao Yoi Model" while the farmer group integration with complete production cycle was "Bua Lum Chang Model".

The members of "Nakhon Pathom Model" consisted of 1) the famers of large rice-field land plots in Nakhon Pathom Province, 2) the mills, 3) the government agencies both from the central sector and the organizations at the provincial level, 4) Khanom chin factories in Nakhon Pathom Province and 5) Kasetsart University Kamphaeng Saen Campus. The members of "AMC Model" were 1) the famers of large rice-field land plots (the farmers bringing their rice together to produce quality rice in Nakhon Pathom Province), 2) Agricultural Marketing Cooperative and 3) Khanom chin factories in Nakhon Pathom Province. The group members of "Khao Yoi Model" were 1) the famers of large rice-field land plots (the farmers bringing their rice together to produce quality rice in Nakhon Pathom Province and Phetchaburi Province), 2) Khao Yoi Agriculture Cooperative Limited, Phetchaburi Province, 3) Khanom chin factories in Nakhon Pathom Province and 4) Kasetsart University Kamphaeng Saen Campus. The group members of "Bua Lum Chang Model" were 1) the farmers in Bang Len District and 2) the government agencies.

In terms of support, the groups supported by the government were as follows. First, it was "Nakhon Pathom Model". The government sector helped in organizing the meeting to integrate members involved in the complete production process. Second, it was "Bua Lum Chang Model". The government provided the budget to

support the 9101 project for sustainable agriculture development in procurement of Khanom chin making machinery and budget for production of Khanom chin. However, “AMC Model” and “Khao Yoi Model” were not supported by the government. It was the operation of the private sector and Khanom chin processing network according to the market force.

For the support from the educational institution, it was found that the groups integrated to increase Khanom chin production capability supported by Kasetsart University Kamphaeng Saen Campus were as follows. “Nakhon Pathom Model” was supported by Kasetsart University Kamphaeng Saen Campus in facilitation of the venue for signing the Memorandum of Understanding (MOU). In addition, “Khao Yoi Model” was supported with the connection of the farmer’s groups in Khao Yoi Agriculture Cooperative Limited, Phetchaburi Province with Khanom chin factories in Nakhon Pathom Province. “AMC Model” and “Bua Lum Chang Model” were not supported by the educational institution related to the enhancement of Khanom chin production capacity.

In terms of the support of funds or production factors for Khanom chin production groups, it was found that all groups received the support of funds or production factors. The support can be classified into 2 ways. 1) The support of budget and production factors: “Nakhon Pathom Model” received quality rice seed support for Khanom chin production. “Bua Lum Chang Model” was supported by the government with the budget to invest in Khanom chin production project and buy Khanom chin production machines. 2) The support for loans and production factors: Loans must be repaid after yielding. For example, for “AMC Model”, the farmers of BAAC can borrow money and the production factors for rice production in Khanom chin production. When the rice was produced, the farmers had to sell it for deducting the debts and receiving the remaining money from the production. Likewise, for “Khao Yoi Model”, the farmers, who were the members of Khao Yoi Agricultural Cooperative Limited can borrow money and the production factors for rice production in Khanom chin production. Once the rice was produced, the farmers had to sell it for deducting the debts and receiving the remaining money from the production.

For the leadership and administration, 3 characteristics of leaders and administration were found in the study. 1)The government sector was the leader and

administered of “Nakhon Pathom Model”. 2)The private sector was the leader and administered of “AMC Model” and “Khao Yoi Model”. 3) The farmer group was the leader and administered “Bua Chom Chang Model”. The administration in each form affected the trust of the members and the driving of Khanom chin cluster.

The trust in Khanom chin business groups was created from the following 3 operations: 1) signing the Memorandum of Understanding (MOU)” which was administered by “Nakhon Pathom Model” to create trust in joint operations, 2) signing the forward contract, which was done by “AMC Model” and “Khao Yoi Model”, and 3) strong community leaders trusted by community members, resulting in the movement of Khanom chin group, which was found in the integration of “Bua Lum Chang Model”.

For the management to increase the capability of Khanom chin production, it was found “Nakhon Pathom Model” had the mill group as the intermediary in buying rice from farmers, storing it for having good quality and polishing it before delivering it to Khanom chin factories in Nakhon Pathom Province. The farmers were supported by the government. Provincial Agricultural and Cooperatives Office provided quality rice seed support in order to obtain the rice with the quality complying with the requirements of Khanom chin factories. The integration of “AMC Model” was is managed by Agricultural Marketing Cooperative, acting as the intermediary in planning the production of paddy for the farmers. The famers were able to borrow the rice production factors, and Agricultural Marketing Cooperative bought paddy from the farmers. Agricultural Marketing Cooperative stored quality paddy and polished it before it was delivered to Khanom chin factories. “Khao Yoi Model” was managed by Khao Yoi Agricultural Cooperative Limited, Phetchaburi Province. It was the intermediary in the production planning for the farmers of large rice-field land plots at Khao Yoi District, Phetchaburi Province. It provided loans and production factors for the farmers, purchased paddy from the farmers, stored and sent it to Khanom chin factories. For “Bua Lum Chang Model” and the committee of Bua Chom Chang community jointly managed the production of Khanom chin. They planned together for rice planting process, storing rice, polishing rice and processing and distributing Khanom chin products. The government supported for the budget for the project and the procurement of Khanom chin production machines.

The problems in the group integration to increase the capability of Khanom chin production were as follows. “Nakhon Pathom Model” encountered the following problems. 1) There was an increase in the cost of transporting paddy because the rice mills in the project were far from the rice fields. 2) There was the problem of trust in buying rice bought and stored by the mills. The reason was that the mills did not know the exact time period and the duration that the Khanom chin factories would buy rice because it was not clearly stated in the signing of MOU. The problem that “AMC Model” and “Khao Yoi Model” had faced was the same. it was the problem of not having enouhg warehouse area for storing quality paddy meeting the needs of Khanom chin factories. There were 2 problems of the operation of “Bua Lum Chang Model”. 1) There was the lack of knowledge in the production of quality Khanom chin flour for making Khanom chin meeting the needs of consumers. So, there was the need to buy ready-made flour to solve the production problem, resulting in higher production costs than Khanom chin flour processed from farmers’ rice. 2) The buying market was still a community market which can support a limited amount of products. But, a lot of Khanom chin can be produced from Khanom chin production machines. Currently, there is still not enough market to support the group’s production capability.

The current operational status of the group integration to increase the capability of Khanom chin production revealed that “Nakhon Pathom Model”and “Bua Lum Chang Model” which were the groups supported by the government has now ceased their operations. They are still waiting for the government to implement additional support programs to solve the problems. The group integration led by the private sector and the cooperative group acting as the intermediary in managing farmers and the production of paddy included “AMC Model” and “Khao Yoi Model”. Now, they are still continuing to produce quality rice which is the raw material for Khanom chin production and deliver it to Khanom chin factories in Nakhon Pathom Province as shown in Table 5.1: Comparison of the integration of Khanom chin business groups in Nakhon Pathom Province.

Table 5.1 Comparison of The Integration of Khanom Chin Business Groups in Nakhon Pathom Province

Comparison of the integration of Khanom chin business groups	**Nakhon Pathom Model**	**AMC Model**	**Khao Yoi Model**	**Bua Lum Chang Model**
1) Initiative group	Gover-nment	Private sector	Educati-onal institution	Commun-ity
2) Leadership and Management Group	Gover-nment	Private sector	Private sector	Headman
3) Members of the Khanom chin group				
(1) Farmer group	√	√	√	√
(2) Private mill group	√			
(3) Khanom chin Factory	√	√	√	
(4) Agricultural Cooperatives		√	√	
4) The government support		-	-	
(1) Signing the Memorandum of Understanding (MOU)	√			
(2) Support budget for project implementation				√
5) the support from educational institutions		-		-
(1) Buildings and Places	√			
(2) The integration of business group			√	
6) Financial support				
(1) BAAC provides loans to farmers	√	√	√	
(2) Government funded projects				√
7) The problem of integration.				
(1) Lack of financial support to transport paddy	√			
(2) Inadequate packing warehouse		√	√	
(3) Lack of knowledge in producing quality Khanom Chin flour				√
(4) Lack of market to support the production				√
8) The current operation status				
(1) Discontinued operations	√			√
(2) In progress		√	√	

5.1.2 The Key Elements and the Capability Development Approaches Related to Driving Khanom Chin Business Cluster in Nakhon Pathom Province

In this study, 5 key elements were found as follows. 1) External support affecting the capability development in Khanom chin business group consisted of the policy support, the academic support and the financial support. The external support found in each group was like the prong of the ring helping to secure the cluster. 2) Leadership and management development were the important parts of Khanom chin production network integration in Nakhon Pathom Province because it corresponded to the society called “atomistic-type society”, which is the society that values people as the leader of the society that focuses on interdependence between individuals. Therefore, for the support for group integration, leadership capacity building that allow the leaders to encourage the followers to look at things around and connect to see the benefits of the success of Khanom chin cluster integration must be considered. In terms of management, market force must be considered in driving cluster integration. 3) The processes within the cluster consisted of creating learning, commitment, trust, training, skilled workers, cooperation and systematic monitoring. 4) Production development which was safe for the environment without causing pollution such as waste water and toxic fumes was also operated. 5) Product development was done to meet the market demand and respond to consumers with health-conscious tastes requiring convenient and fast food to eat. Also, the cooperation with organic vegetable network group, and Khanom chin curry group that is clean, tasty and hygienic should also be built. In addition, the cooperation to produce ready-to-eat products for the consumers who want to eat convenient food should also be built. The production of semi-finished Khanom chin for exporting to foreign markets should also be operated. (as shown in Figure 5.2: Key elements in capability development of cluster)

Figure 5.2 Key Elements in Capability Development of Cluster

5.2 Discussion

5.2.1 Trust in Cluster Integration

Trust is an important factor in capacity development for integration. From the research review, the focus is on the components of trust of group members which affect the operations in the group to achieve the goals set by the group. Trust concept of Putnam (1993) defined social capital as a distinctive feature of social organizations in terms of trust, leading to the ability to improve the efficiency of the organization by promoting and supporting, giving cooperation and having mutual action (Supannee Chaiamporn, 2013). The research related to trust affecting the cluster members, resulting in the exchange of members' knowledge, acceptance of the terms, rules and mutual agreements can be found in the research on the development of chemical-free vegetable cluster in the western area of Nakhon Pathom Province (Boonanan Phinaitrup, 2012). Trust also helps the cluster to standardize products so that customers trust in the products as shown in the study of the factors that contribute to the success of industrial group operations in Thailand (Ariyaporn Suranartyuth, 2010). This is consistent with the study of developing service quality for spa establishments in the Active Beach Tourism Cluster, Thailand, which stated the needs of customers for tourism services. The tourism cluster must provide the services that can crate higher satisfaction than the level expected by customers. The quality of the service

provided must meet the needs of customers until reaching the maximum trust, leading to (Anan Chieochankitkan, 2013). The components of trust influenced the development of the capacity of the integration of Khanom chin business group in Nakhon Pathom Province, so it was taken into consideration in the study of Khanom chin cluster.

According to the findings of Khanom chin business integration in Nakhon Pathom Province, trust in doing business together was the key to driving business. Trust was an important issue leading to the cooperation of the members of Khanom chin business group. “Nakhon Pathom Model” created cooperation by signing a Mutual Memorandum of Understanding (MOU) with various network groups involved in the production, processing, marketing and support groups in Khanom chin business in Nakhon Pathom Province. MOU signing is not legally binding. It is just a memorandum of understanding for mutual understanding, but does not create trust in the implementation of the plan of each Khanom chin business group. Two mistrust issues affecting the capacity development of the integration of Khanom chin group in “Nakhon Pathom Model” were found. First, there was the lack of trust in the quality of rice, so Khanom chin factories only accepted the rice that passed quality checks. Second, there was the mistrust of the mills towards Khanom chin factories. The mills wondered how long all paddy purchased from farmers in advance would be bought by Khanom chin factories because the mills would bear the risk if Khanom chin factories did not buy the paddy. Or late purchases may cause the loss to the mills. Trust can be achieved through forward contract signing. It will create trust among all parties in the group involved in the Khanom chin business because it is legally enforced in the operation. Forward contract signing was found in “AMC Model and “Khao Yoi Model. The trust of “Bua Lum Chang Model” was caused by the trust in the leader of the group, resulting in driving operations within the group. Therefore, trust in the integration of Khanom chin group can be created by making clear forward contracts. Leadership also affected the trust of Khanom chin group at the community level.

In summary, in terms of trust and cluster integration, according to the concept of clustering of Michael E. Porter, various groups involved in the production, processing and marketing need to rely on each other as a related chain. The need to collaborate when having long-lasting dependency leads to trust. But, it is not an issue

that matters because the operation has clear standards and the implementation is based on the agreed standards. This is different from Thai society that the integration of production, processing and marketing still adhere to trust which leads to cooperation. Trust is the key to the capacity development in the integration of Khanom chin business group in Nakhon Pathom Province.

5.2.2 Appropriate Cluster Size

From the review of concepts and related research studies, the priority is given to the number of entrepreneurs in each of the production components, affecting the ability to increase competitiveness. It will help enhance the ability to produce products and services. The concept of cluster has defined that groups of businesses and related institutions have integrated to operate business in a nearby area with cooperation, support and connection to promote business both vertical, which is the connection of business operators from upstream to downstream and horizontal connection which is the connection of various supporting industries, educational institutions and government agencies. Porter believed that small and medium-sized enterprises are the smallest production units. Clustering is not the only cost reduction, but it also helps increase the productivity of the group (Porter, 1998; Ratima Gajanandana, 2015). The appropriate size of clustering is not clearly specified. From the review of concepts and related research studies, clustering ranges from small and medium-sized enterprises to large industrial clusters. Importantly, cluster must be systematically integrated in each related group and the members must provide cooperation. These will result in enhancing the value of the products and increasing the competitiveness of the group.

According to the review of related research on the cluster at the small and medium-sized enterprise level and the integration at the cooperative level, there was the study about capability development of SMEs through cluster-based approach: healthy food industrial cluster in Nakhon Ratchasima Province (Suthanan Phochathan, 2016). For the study of the integration at the cooperative level, there was the study entitled “study of integration at agricultural cooperative level in integrating manufacturer clusters for cooperative business development” which was conducted by Fishery and Livestock Cooperatives Development Group and Dairy and Beef Cattle

Cooperatives Development Group, Agricultural Sector Cooperatives Development Division. Santner (2018) studied about the cluster of small and medium-sized enterprises in the study of the relationship between companies in SMEs and the connection with marketing performance. The size of cluster groups can be classified according to employment and the amount of fixed assets. The cluster sizes are different. The integration of Khanom chin business group in Nakhon Pathom Province consists of the following groups. First, it is the upstream group or farmers. Now, there are a large number of farmers supported by the government and the educational institution to improve the quality of rice production. Second, they are the midstream and downstream groups, such as the mill group and the cooperative group. There are the mill association and the cooperative group with a large number of members. But, unlike Khanom chin factories, there is currently no organization of Khanom chin factories in Nakhon Pathom Province. Khanom chin is produced freely, ranging from the household industry and industry in the community to small and medium-sized industries. Therefore, good clustering requires grouping in a collaborative manner in nearby areas and integrated components for production, processing, marketing, as well as an organization that provide academic support and the connection of the cluster groups that are connected in both vertical (upstream to downstream groups) and horizon (support groups).

In summary, the appropriate size for the smallest unit clustering should be the cluster of small and medium-sized enterprises. It should also be linked together with many groups, both in the vertical level in the production, processing and marketing processes and in the horizontal level in the supporting industry groups, educational institutions, government agencies and other relevant organizations. The connection both at the vertical level and the horizontal level requires a large number of members to participate in, which will lead to competitive advantage and enhancement of the products. In the area, there is Khanom chin clustering in the vertical level among the rice farmers of large rice-field land plots who are paddy producers and processing groups, such as Khanom chin factories, agricultural cooperative group, Khanom chin community, and market groups such as Khanom chin factories and Khanom chin sellers. The clustering in the horizontal level includes packaging industry group,

educational institution or Kasetsart University Kamphaeng Saen Campus and the agricultural organizations in Nakhon Pathom Province.

5.2.3 Leadership and Clustering

Leadership is a factor leading to success in group development. Clustering according to the concepts mentioned above focuses on the development of competitiveness by integrating business groups and related institutions together. Each group is linked together and supports each other. In coordination among various groups, leaders play an important role in creating connection among each group in the production cycle. From the review of related research, the focus is on the importance of leadership with the success in increasing the capacity of the group. In addition, transformational leadership affects the efficiency of clustering as shown in the results of the study of transformational leadership, effectiveness of sustainable cluster development and commitment of silk product cluster members in Ubon Ratchathani Province (Laaiad Maturos, 2012). Also, from the study of factors affecting the successful implementation of the community enterprise promotion policy: a case study of Mueang Krabi District, Krabi Province, it was found that the leadership affected the policy implementation to a high level and also affected the strength of the cluster (Sasipa Pitaksarn, 2013).

The results of the study showed that in the integration of Khanom chin group, the leaders were needed to drive the integration. The desirable characteristics of the leaders leading the cluster in Nakhon Pathom Province to achieve the goals should be as follows. 1) Leaders must be knowledgeable and capable and trusted by the group members. This is consistent with the research on factors affecting implementation of community enterprises in San Pa Tong District, Chiang Mai Province (Supunnee Khodphue, 2008). 2) Leaders must be honest and do not take advantages of customers, concern about safety and responsible for own manufactured products. This is consistent with the study of the opinion of service motorcycle drivers on operative establishment: a case study of Ban Pong District, Ratchaburi Province Somjate Tiyanont (2008). 3) Leaders must be clear in policies, objectives, goals, and working procedures that enable practitioners to implement them effectively. This is in line with the study of factors contributing to success of community enterprises of 5 star OTOP

in Lampang Province (Pattratida Wattanapunkitti, 2016). 4) Leaders must be advisors to members to encourage the members to work systematically to achieve the objectives of the Khanom chin cluster. This is in line with the study of factors contributing to the success of operations of the industrial group in (Ariyaporn Suranartyuth, 2010). 5) Leaders are strong and sacrificed so that the cluster is strong. It is consistent with the research on the development of chemical-free vegetable cluster in the western area of Nakhon Pathom Province (Boonanan Phinaitrup, 2012). 6) Leaders must allow members to participate in managing cluster. This is consistent with the study of the effects of industry cluster knowledge management on innovation performance (Hsu et al., 2014).

For example, the leader of "Bua Lum Chang Model" was a village headman, respected and trusted by the villagers. He was the leader with transformational leadership, encouraging the villagers in the community to work together to form a group to produce Khanom chin. He also led the discussions and meetings, leading to the connection of various factors of Khanom chin production. He also coordinated with the government to request budget to support the group and created cooperation among all parties involved in determining the vision, strategies, and management of the whole production process, starting from the production of quality rice to effective Khanom chin production in order to raise the value of rice of the community.

In conclusion, leadership with clustering is important. But, clustering based on the Michael E. Porter's concept does not focus on leadership as a key issue, which is in line with the Western context that is based on standards and regulations rather than individuals. System management as a chain of interrelated links results in automatic collaboration and group forming to strengthen each other. However, leadership is an important element in enhancing the efficiency of grouping in Thai society context because the chain does not have strong connection. This is consistent with various research studies and phenomena in the area of study that give importance to leadership with the capacity development in grouping.

5.2.4 Chains within Khanom Chin Cluster

The network concepts together with the links between the chains within Khanom chin cluster for developing groups to increase capacity in production,

processing and marketing in the context of economy and society: Development of business in the form of family, relatives and friends leads to the network connection among business groups deeply rooted for a long time. Development of clustering requires the application of network concepts in order to achieve cooperation within the cluster. In addition, clustering in Thailand should bring the idea of network integration to carry out the operation of the group. The integration of the network organization is to create cooperation in the production of raw materials, processing and marketing. The network relationships are applied flexibly according to the business situation. From the review of concepts and related research, network management is a collaborative operation using informal social systems both within the organization and relations between organizations. Cooperation between organizations is a joint effort to produce products and sophisticated services that occur in the environment that is highly uncertain and competitive (Miles & Snow, 1992). There was a study conducted to review the use of networks together with clustering in collaboration as human capital and social capital from the network of relatives in the clothing clusters in the North of Vietnam to strengthen the group development and collaboration of clothing clusters in the North of Vietnam and the networks of relatives in foreign countries related to exports (Nam et al., 2010). The study of the structure and the relationships of networks among SME groups indicated that collaboration resulted in network connection and greater cluster marketing success (Lamprinopoulou & Tregear, 2011). Supannee Chaiamporn (2013) also studied the social capital implementation ability of Ban Bang Phrai Community, Bangkhonthi District, Samut Songkram Province and found the development of cooperation of the agencies in the network on industrial promotion, knowledge integration and work process coordination.

The integration of Khanom chin cluster should apply the network approach together with the cluster approach to increase capacity in production, processing and marketing according to 4 conditions of Khanom chin business as follows. 1) There is the uncertainty of product demand and supply stability, which may be caused by the suppliers of raw materials, customers, competitors and financial status. Under the uncertainty, group integration tends to disintegrate into independent units, leading to the basis of subcontracting. The uncertainty affects the cluster management that uses

the network management approach. 2) Khanom chin is a highly specific product. The exchange of human capital or the producers of Khanom chin requires the exchange of interdependence between organizations due to the specificity of the production of raw material and Khanom chin and the marketing of Khanom chin. This form of exchange requires the organization to expand cooperation with closer and more frequent exchange. 3) There is complexity in production, processing, and marketing of Khanom chin. Khanom chin is needed to be developed to look attractive, creative and diverse under the pressure of time because it takes 2 days for producing Khanom chin and it needs many different inputs. There is also complexity in coordinating activities under limited time. The production, processing and marketing operations need to adapt, communicate and share information quickly, helping to reduce complicated work hours. 4) There is the frequency of exchanges between related groups within the Khanom chin business network, including the frequent for exchanging information with each other and personnel development as well as development of profound knowledge and continuous interactions to create trust and build reciprocal relationships.

In summary, the network concept and the connection between the chains within the cluster need to be shared. Khanom chin business model has evolved from a family business and extended to relatives. The adjustment in the uncertainty of demand of the products and supply stability is also required. In addition, the processes of production, processing and marketing of Khanom chin production are relevant to various groups. Therefore, the integration of network management and cluster development is important for the Khanom chin business in Nakhon Pathom Province.

5.3 Recommendations

5.3.1 Khanom Chin Product Development Guidelines

The integration of Khanom chin production cluster should expand the chain and connection in order to lead to cooperation, such as the connection with the groups planting popular organic vegetables eaten with Khanom chin such as cashew nut leaf, stink bean, Luk Rieng, olive leaf, thammang leaf, Luk Ching leaf, acacia seeds, cucumber, water mimosa, winged bean, yard-long bean, bean sprouts, eggplants, gotu

kola, pickled vegetables, shallots, pickled garlic, young jackfruit, sweet pickled turnip, pickled cabbage, pickled bamboo shoots, vegetables boiled in coconut milk and other side dishes, including soft boiled egg, deep fry fish and steamed red curry with fish. The connection should also be created with the groups making Khanom chin curry sauces such as fish coconut milk curry sauce, fish and anchovy curry sauce, spicy fish coconut milk curry sauce, crab curry sauce, chicken leg curry sauce, tilapia curry sauce, sweet curry sauce, vegetarian spicy coconut milk curry sauce, mushroom spicy curry sauce, tuna coconut milk curry sauce, snake-head fish coconut milk curry sauce, sweet curry sauce, crabmeat curry sauce with chaplo leaves, canned fish curry sauce, tuna curry sauce, mushroom panang curry sauce and spicy pork sauce. At present, there are more than 15 curry sauces and more than 20 kinds of vegetables eaten with Khanom chin. So, it can be developed for marketing in operating Khanom chin franchises.

Nowadays, the demand of consumers in eating Khanom chin has risen because it can respond to the fast-paced lifestyle of people and it is easy to eat. There is a variety of curry sauces eaten with Khanom chin and the price is affordable. People can also gain fibers from vegetables that are good for health. Freshly produced Khanom chin is more popular among consumers than semi-finished Khanom chin. Moreover, semi-finished Khanom chin is still harder to find than general instant noodles. The opening of the Khanom chin franchises by providing Khanom chin with vegetables and curry sauces should be promoted as Khanom chin is becoming popular among consumers, whether those with low income or the tourists staying at hotels. Inheritance of the knowledge of Khanom chin production was originated from a long-standing family business. At present, the families inherited with the knowledge of Khanom chin production, which is local knowledge in the community, have expanded their business into community enterprises and small and medium-sized enterprises, which rely mainly on family labor in production management. Each family has its own formula for making Khanom chin. To enhance the production capacity from the production based on family to upgrade and distribute Khanom chin to other provinces or abroad, it is necessary to have the integration of group to help promote the value of Khanom chin. The study revealed that there are many forms of integration, each of which is still only the group integration to support the production for consumers in

Nakhon Pathom Province and nearby provinces. There is still the lack of production to export. The study also pointed out that Khanom chin can be exported to foreign countries since it is the food eaten in ASEAN countries, but it may vary according to the eating culture in each country. So, it is considered another option of consumers in foreign countries. There are also many Thais living abroad who like eating Khanom chin, but cannot buy it at present. Khanom chin development must be promoted by the government in raising its value for export. The government must play a role in stimulating the mechanism of driving the groups involved in Khanom chin production to discuss and work together to improve Khanom chin for export to neighboring countries in ASEAN and the countries in which Thai people live. The government is one of the important mechanisms in supporting and driving the capacity development of the group integration for Khanom chin production.

5.3.2 Recommendations for the Government Support

The government should support the production of raw materials (upstream) of farmers by providing production factors and knowledge on producing quality rice to farmers who are interested in joining to produce rice for Khanom chin production. As for the integration of Khanom chin cluster, joint committee from various groups involved in the production of Khanom chin, such as Khanom chin processing group, farmer group, cooperative group, educational institute, mill group and government agencies, should be appointed. The main mission of the cluster integration is to raise the value of rice by processing into Khanom chin using innovative approaches to expand the market both domestically and internationally, such as producing Khanom chin with unique characteristics like semi-finished Khanom chin or Khanom chin mixed with herbs that are beneficial to health. The committee formed by the cluster will help develop the group and plan regional marketing strategies together. Currently, the private sector of Khanom chin production is still trying to find ways to develop Khanom chin group at Nakhon Pathom Province level only, so it causes limited cooperation. Therefore, the government should promote the cooperation of the group in the development of capacity in group integration in order to transform rice into Khanom chin or other related products at the regional level and to have diverse groups of participants with a growing number of members.

Signing Memorandum of Understanding (MOU) supported by the government for developing capability of Khanom chin production cluster is a good way to create participation in Khanom chin business cluster. However, a working group is needed to find solutions to the problems in the group's operations so that the group can continue operating. Supporting the integration of Khanom chin cluster started in 2017. It was a collaboration of Khanom chin cluster to get quality paddy for making Khanom chin. However, now the network has been expanded to the areas outside Nakhon Pathom Province in order to obtain quality rice sufficient for Khanom chin production. Under the competitive conditions of the Khanom chin market, net profits are not enough to improve the capability of Khanom chin production. Tax deductions should be supported for Khanom chin producers in order to develop Khanom chin manufacturing business. The government should also support the creation of quality rice stock database for Khanom chin production. Especially, when storing rice at paddy warehouses, rice should be sorted based on its sources. Sorting of paddy is an operation to create confidence for Khanom chin factories as they will get quality rice meeting their needs. It also reduces the cost of checking the quality of rice before being produced into Khanom chin and the risk of contaminating paddy that does not meet the quality requirements of Khanom chin factories. An important mechanism to drive the integration of the Khanom chin cluster is to have markets to support Khanom chin. Therefore, the government led by the provincial commerce department and the private sector or Khanom chin factories should establish cooperation in finding markets to support Khanom chin produced in the province and jointly push for distributing to other provinces or exporting to foreign countries.

If farmers wish to join the group to process rice into Khanom chin but still lack the knowledge of processing meeting the standards required by the market, there should be the government agencies that are specifically responsible for this issue. For example, Provincial Agricultural Office should support for production factors and Kasetsart University Kamphaeng Saen Campus should promote the knowledge of agricultural product processing in accordance with the market demand. The public sector should cooperate with Kasetsart University Kamphaeng Saen Campus to organize the project to educate farmers interested in developing a career in rice processing into Khanom chin. Government agencies should help support the creation

of product performance and strengthen the organizations so that they are able to continue operations within their own groups. For the development of the Khanom chin cluster of the government sector led by Provincial Agricultural and Cooperative Organization, it should promote the integration of small groups that support Khanom chin production. For instance, the farmers in large rice-field land plots should be supported to have production improvement approaches suitable for the area to reduce production costs and the use of chemicals as well as improvement of rice varieties suitable for Khanom chin production in order to get quality paddy for making Khanom chin. Khanom chin quality inspection standards should also be established. Each brand of Khanom chin should be randomly inspected. Moreover, the quality certificates to ensure that Khanom chin products are safe and free from contaminants should also be issued. In addition, the government should have the monitoring system to monitor the agricultural projects supported by the government budget. For example, the operating results of the projects, the projects that are currently operating, the projects having problems and needing more support or the projects that are inappropriate and needed to be terminated should be monitored by the monitoring system.

5.3.3 Recommendations for Farmers

The farmers in Nakhon Pathom Province should improve the production that reduces the use of chemicals, increase more organic agriculture and elevate the agricultural products with special characteristics. In creating added value of the agricultural products, the farmers in large rice-field land plots should work together to make the group stronger in order to ask for the support from the government and the private sector in raising the standards for quality paddy production. Furthermore, the meetings should be held for discussing about production plans that are in accordance with the market demand. The directions for the development of rice farmers should also be determined.

5.3.4 Recommendations for Khanom Chin Factories

The development should be based on the Creating Shared Value (CSV) concept which focuses on Khanom chin production according to economy, society

and sustainable human potential. It should be part of the consideration of operating costs. It is sharing or the mutual benefit of the organization and society. It is the operation of Khanom chin business that considers the impact on society and the environment, not just creating a good image. It is the creation and sharing of values of organization and society.

5.3.5 Recommendations for Agricultural Cooperatives

Agricultural cooperatives are the important mechanism in driving the integration of Khanom chin cluster. The roles of agricultural cooperatives in supporting Khanom chin business group are as follows: 1) being the source of funds and production factors for farmers, 2) buying rice from the farmer groups that follow the standards set by agricultural cooperatives, 3) storing paddy with the standards required by Khanom chin factories and sorting rice to inspect the sources of rice cultivation, 4) being the mediator in negotiating the price of paddy so that farmers can sell rice with an appropriate price according to the market situation and 5) checking the quality of paddy and milling paddy to produce rice for Khanom chin factories.

5.3.6 Recommendations for the Mill Group

The mill group has been an important group of rice production since in the past. But, now the competition for rice trading has increased. There are more intermediaries on rice operations, such as agricultural cooperatives and Agricultural Marketing Cooperative, which are the groups that buy rice from farmers like the mill group. However, the enhancement of Khanom chin production needs the cooperation of all groups. The mill group has the potential in managing warehouses to store paddy. It also has modern machinery and staff with experience in maintaining quality paddy. However, it is necessary to discuss about rice management methods because the storage method of rice for making Khanom chin is different from other types of rice. For example, the paddy used to make Khanom chin should be sorted separately from other types of paddy that the rice mill has bought. Also, it should not be poured and mixed together with other types of rice. Otherwise, it is unable able to clearly distinguish the quality of rice and random quality checks must be done every time Khanom chin factories need rice to produce Khanom chin.

5.3.7 Recommendations for Khanom Chin Clustering

The costs of transporting raw materials to the processing plant and the consumers must be considered because they affect the value of the product. Khanom chin group should be integrated with the cluster having appropriate transportation costs that are not higher than usual. “Bua Lum Chang Model” has the potential to promote as a tourist destination in the community because it is an area with natural agriculture and able to develop into the agricultural tourism village model. The promotion of the integration of Khanom chin production group and the trust building in Khanom chin clustering should be done with a stronger approach than signing a Memorandum of Understanding (MOU). Legally binding contract signing is recommended in order to be able to proceed according to the specified plan.

5.4 Recommendations for Further Research

The integration of Khanom chin cluster revealed that the chain of Khanom chin cluster has expanded to the organic vegetable group and Khanom chin curry group, which are the groups related to Khanom chin. So, the types of integration and the ways of capacity development should be studied further in order to enhance Khanom chin-related products. In increasing the value of rice, it cannot only be processed into Khanom chin, but it can also be processed into cosmetics and other products. Currently, the farmers in Nakhon Pathom Province also focus on online rice marketing. They use vacuum packaging method to pack a specialized rice variety such as RD43, which is suitable for diabetic patients because it contains low sugar, and sell it online. This is the way to process paddy into rice using the community mill. However, the study for enhancing rice processing into various products are still needed. The study of the guidelines for clustering to improve the production of products from agricultural products is one of the development approaches that helps promote the development and enhancement of members in various groups and the development of product quality in accordance with the needs of consumers

according to the changing situations. In addition, the study about clustering in accordance with clustering guidelines should be conducted in other agricultural groups in each region in order to find ways for further development.

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