



**SUPPLY CHAIN MANAGEMENT IN RUBBER PLANTATION  
IN CHIANG RAI PROVINCE**

**SUTTINEE JAMNIYOM**

**MASTER OF BUSINESS ADMINISTRATION  
IN  
LOGISTICS AND SUPPLY CHAIN MANAGEMENT**

**SCHOOL OF MANAGEMENT  
MAE FAH LUANG UNIVERSITY**

**2014**

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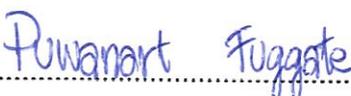
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2014

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### **ABSTRACT**

The objectives of this thesis paper were to study supply chain management of rubber business and the trend of rubber investment in Chiang Rai Province. As Chiang Rai Province has rubber plantations the most in Northern Thailand and Thailand is one of the main rubber producing countries in the world, it is necessary to know rubber supply chain. Although the Thai government required for being a leading country of natural rubber producing and exporting, it still lack of readiness to the world market.

Data collections of the study are from primary and secondary sources, analyzing by both qualitative and quantitative methods. For qualitative research, Five Forces Model by Michael E. Porter is used for analyzing the current situation of rubber market together with SWOT Analysis that used for analyzing the strength, weakness, opportunity and threat of rubber business. The statistic data concerned with rubber plantations, rubber-tapping zone, rubber yield and its value collected from the Office of Rubber Replanting Aid Fund Chiang Rai in 2011-2013 are used for analyzing the current trend of rubber investment in quantitative research.

In fact, there are several factors involving in rubber supply chain in Chiang Rai Province and supply chain activities are also mentioned in this paper. In order to see the problems occurred and develop rubber business in Chiang Rai Province or larger section, the whole supply chain of rubber need to be understood. Lastly, the explanation of rubber supply chain in Chiang Rai Province will be displayed.

**Keywords:** Rubber Plantation/Supply Chain/Management



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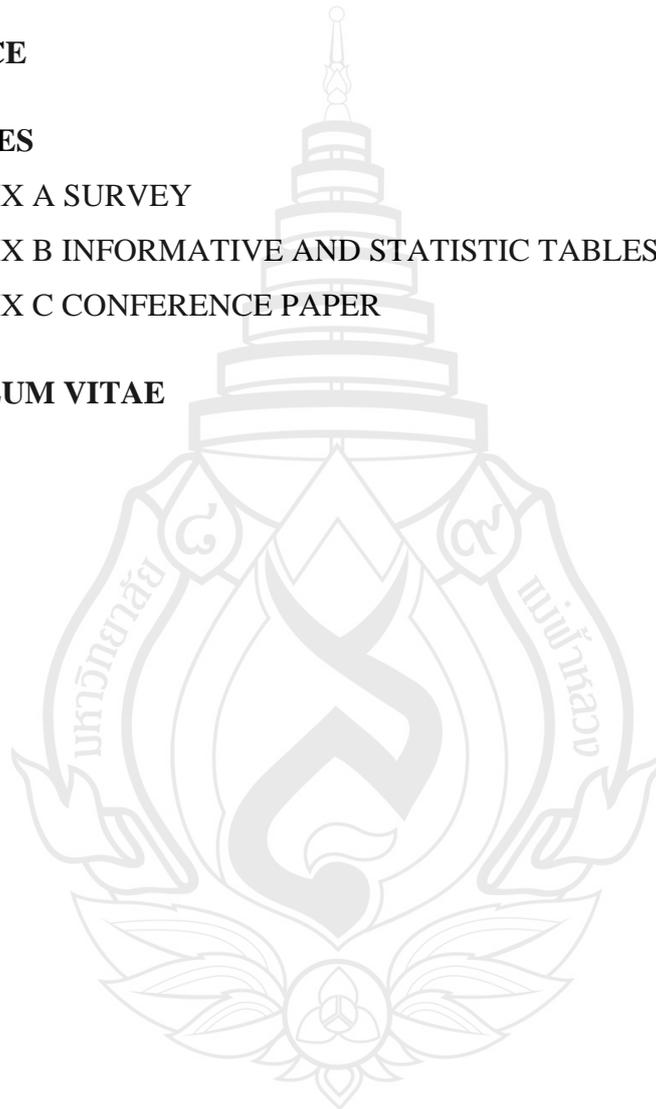
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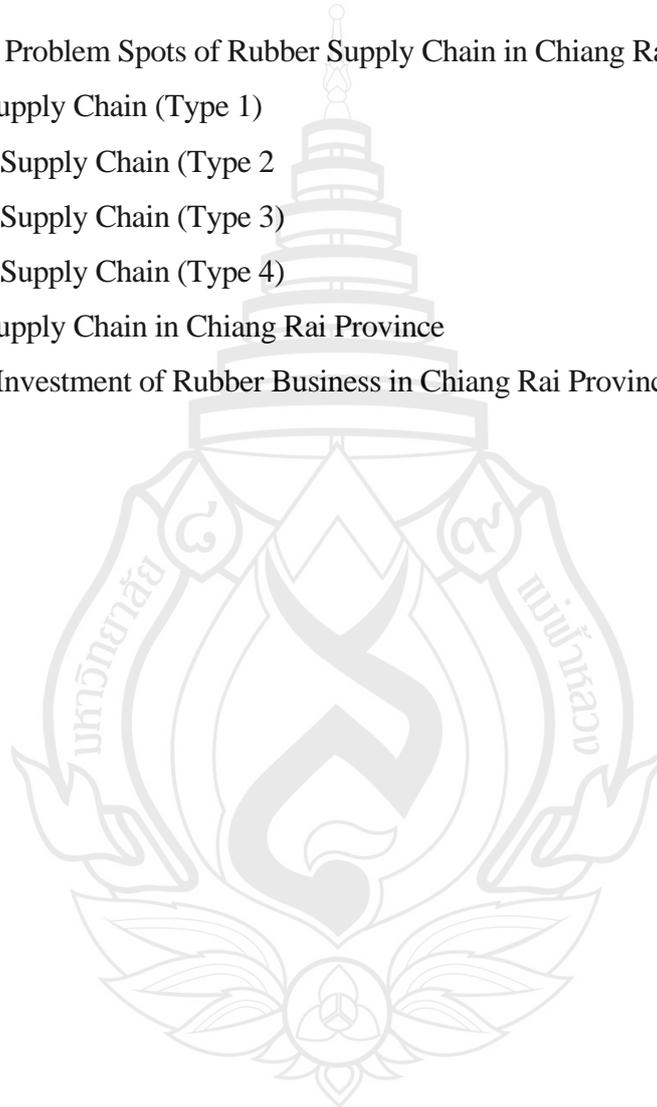
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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Background of Study**

#### **1.1.1 Rubber Market in Chiang Rai Province**

According to the Office of Rubber Replanting Aid Fund News in Bangkok, Farmers in Northern and Northeastern Thailand have become paying attention to the rubber plantations recently because the prices of rubber product have been increasing continuously. Rubber business creates job opportunities for working labors over one period of a year. It reduces numbers of immigrants from rural to urban area. It also helps strengthen love and understanding among family members. The Thai Government and the Ministry of Agricultural and Cooperatives have been working on the policies to reduce the problems occurred.

The first rubber tree in Chiang Rai Province is over 40 years old. It had been growing near Phathat Kukaew, Janjawa Sub-district in Mae Chan District and the first rubber plantation owned by the private sector is YoNok Rubber Company Ltd., with the areas covered 203 Rai and the 20 years old rubber trees in Janjawa Sub-district as well. (Matichon, 2013)

Uthai Sornlaksap, chairman of the Thai Rubber Council said that there are policies to push forward the farmers in Chiang Rai Province and the Northern Thailand since the year of 1988. Besides the weather in Northern Thailand is in good condition for rubber trees and close the huge market like Southern China. Therefore, it always comes with unlimited demand from People's Republic of China.

Uthai also mentioned about the amount of rubber plantations in Northern Thailand that it seemed likely to increase. Therefore, the government should support by having the barrier control by the Department of Agriculture at Chiang Saen Port.

Moreover, the Thai Government is being pushed forward to promote the practical projects to support rubber planting in Northern and Northeastern Thailand with the budget of 16,000 Million Baht (533 Million USD) to support rubber plantations for four million Rai. There are one million Rai in Northern Thailand and another three million Rai in Northeastern Thailand. (Matichon, 2013)

In Chiang Rai Province, there are over 350,000 Rai of rubber plantations. The people and farmers are ready in marketing strategy and transportation in order to bring rubber products to the world market. (Pradu Wanchuen, 2010)

**Table 1.1** Rubber Plantations in Chiang Rai Province in 2013

No.	Districts in Chiang Rai Province	Rubber Plantations (Rai)	Numbers of Rubber Farmers	Rubber - Tapping Zone (Rai)
1	Chiang Khong	63,596	4,240	34,038.5
2	Thoeng	46,978	3,132	25,734.5
3	Doi Luang	43,603	2,907	24,223.5
4	Wiang Chiang Rung	34,292	2,286	18,843.5
5	Chiang Sean	29,420	1,961	14,532.5
6	Phya Mengrai	28,008	1,867	14,773.5
7	Wiang Kaen	27,614	1,841	15,378.0
8	Mueang Chiang Rai	22,687	1,512	11,750.0
9	Wiang Chai	17,443	1,163	8,538.0
10	Mae Chan	16,257	1,084	8,704.0
11	Mae Suai	9,633	642	5,010.0
12	Wiang Pa Pao	9,361	624	4,904.5
13	Phan	9,122	608	4,929.0
14	Mae Fah Luang	6,972	465	5,457.0
15	Mae Lao	5,006	334	2,942.0
16	Khun Tan	4,496	300	1,746.0

**Table 1.1** (continued)

<b>No.</b>	<b>Districts in Chiang Rai Province</b>	<b>Rubber Plantations (Rai)</b>	<b>Numbers of Rubber Farmers</b>	<b>Rubber - Tapping Zone (Rai)</b>
17	Pa Daet	2,748	183	1,376.0
18	Mae Sai	538	36	419.9
<b>Total</b>		<b>377,774</b>	<b>25,185</b>	<b>203,300.40</b>

**Source** Thatphong Wongphum (2014)

From Table 1.1, the highest numbers of rubber plantation is in Chiang Khong District which accounts for 63,596 Rai and there are over 4,200 farmers working in this district with 34,038.5 product plantations. Meanwhile in Mae Sai District, there are 538 Rai of rubber plantations with 419.9 Rai of Product plantations and only 36 farmers working in this district.

In details, rubber trees can be planted in every district in Chiang Rai Province already and the numbers of rubber yield are quite satisfied.

**Table 1.2** Rubber Yield in Chiang Rai Province in 2013

<b>No.</b>	<b>Districts</b>	<b>Yield (kg./Rai/Year)</b>
1	Mae Lao	293.40
2	Mueang Chiang Rai	285.54
3	Wiang Kaen	268.46
4	Wiang Pa Pao	268.04
5	Phya Mengrai	264.55
6	Pa Daet	243.20
7	Mae Chan	236.43

**Table 1.2** (continued)

<b>No.</b>	<b>Districts</b>	<b>Yield (kg./Rai/Year)</b>
8	Phan	234.61
9	Mae Suai	233.76
10	Thoeng	232.82
11	Khun Tan	232.66
12	Wiang Chai	227.26
13	Mae Sai	226.67
14	Chiang Khong	224.34
15	Doi Luang	224.28
16	Chiang Sean	211.14
17	Mae Fah Luang	198.56
18	Wiang Chiang Rung	191.81
<b>Production Average</b>		<b>238.75</b>

**Source** Thatphong Wongphum (2014)

From the table above, it shows that rubber product is produced in Mae Lao District the most which accounts for 293.40 kg./Rai/ Year Meanwhile Wiang Chiang Rung District is the least rubber producing district in Chiang Rai Province which accounts for 191.81 kg./Rai/Year.

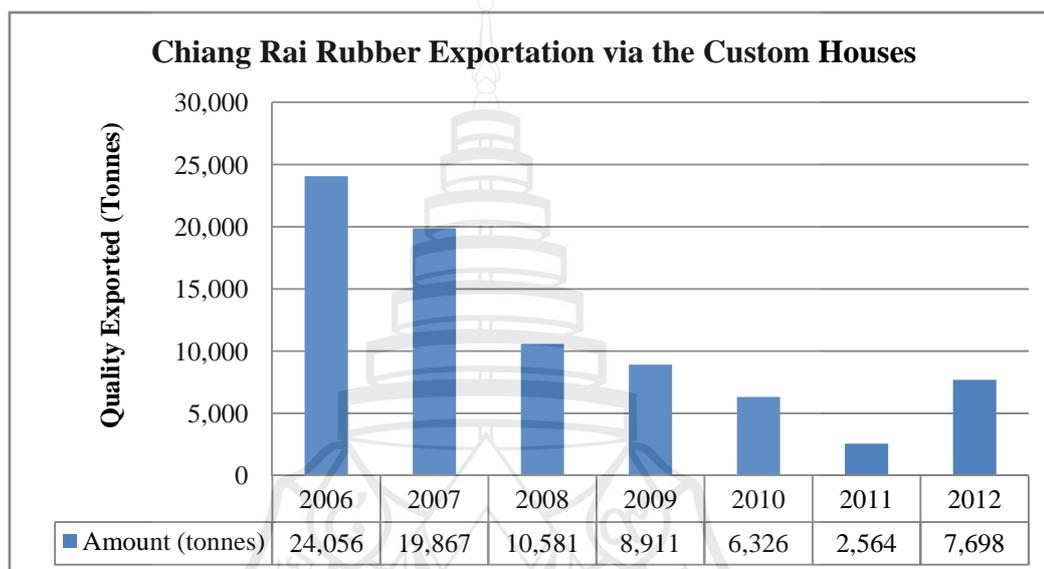
**Table 1.3** Rubber Value and Prices in Chiang Rai Province in 2013

No.	Districts in Chiang Rai Province	Rubber- Tapping Zone (Rai)	Volume of Rubber Yield (tonnes)	Value of Rubber Production (Million Baht)
1	Chiang Khong	34,038.5	7,636.00	267.26
2	Thoeng	25,734.5	5,991.50	209.72
3	Doi Luang	24,223.5	5,432.84	190.14
4	Wiang Chiang Rung	18,843.5	3,614.37	126.50
5	Chiang Sean	14,532.5	3,294.08	115.29
6	Phya Mengrai	14,773.5	3,908.32	136.79
7	Wiang Kaen	15,378.0	4,131.19	144.59
8	Mueang Chiang Rai	11,750.0	3,355.09	117.42
9	Wiang Chai	8,538.0	1,940.34	67.91
10	Mae Chan	8,704.0	2,057.88	72.02
11	Mae Suai	5,010.0	1,171.13	40.99
12	Wiang Pa Pao	4,904.5	1,314.60	46.01
13	Phan	4,929.0	1,156.39	40.47
14	Mae Fah Luang	5,457.0	1,083.54	37.92
15	Mae Lao	2,942.0	863.18	30.21
16	Khun Tan	1,746.0	406.22	14.22
17	Pa Daet	1,376.0	334.64	11.71
18	Mae Sai	419.9	95.17	3.33
<b>Total Price</b>				<b>1,664.67</b>

**Note.** Cup Lump Rubber Annual Average Price 35 Baht /kg.

**Source** Thatphong Wongphum (2014)

In the year of 2013, the district with the highest number of rubber-tapping is Chiang Khong District. The rubber tapping-zone in Chiang Khong District accounts for 34,038.5 Rai, produced 7,636 tonnes, and gained 267.26 Million Baht. Meanwhile the total price of rubber products in Chiang Rai Province accounts for 1,664.67 Million Baht.

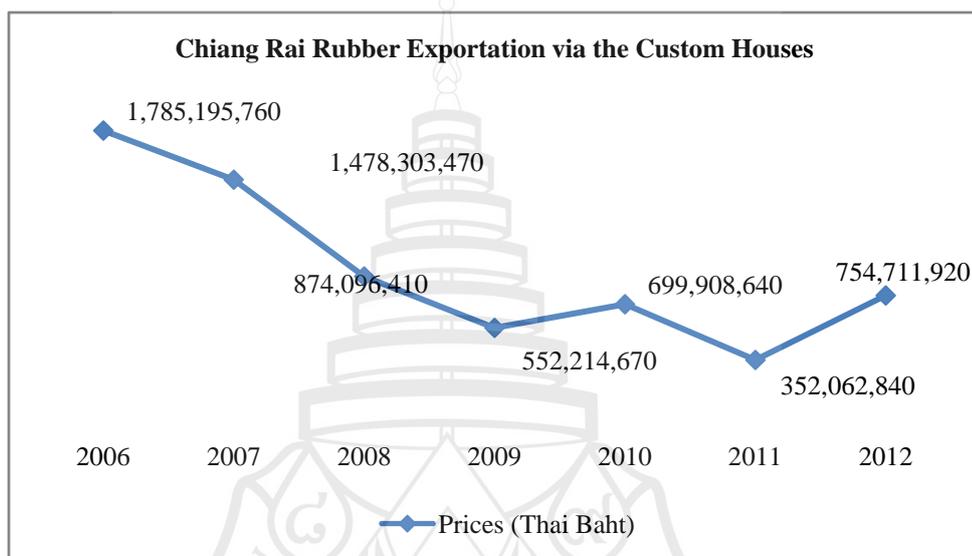


**Source** Thatphong Wongphum (2014)

**Figure 1.1** Amounts of Chiang Rai Rubber Exportation via the Custom Houses (Chiang Saen, Chiang Khong, Mae Sai)

According to the data from The Office of Commercial Affairs Chiang Rai, cited in The Office of Rubber Replanting Aid Fund Chiang Rai (2014), the report in the year of 2013 shows that the total amount of rubber imports and exports are 35,977.62 Million Baht (34,313.37 Million Baht Exports and 4,073.62 Million Baht Imports). The main partnerships are China, Myanmar, and Laos which transported the products by trucks and cargo ships. Rubber products being exported by the ships at Chiang Saen Port 2 and the main product is ribbed smoked sheet (RSS3).

For Rubber Trade within Thailand, private buyers will collect rubber products and transfer to processed factory in Northeastern Thailand particularly in Udon Thani, Nong Khai, and Bueng Kan Province. Only small amounts are being sent to Southern Thailand particularly in Surat Thani and Nakorn Sri Thammarat Province.



Source Thatphong Wongphum (2014)

**Figure 1.2** Values of Chiang Rai Rubber Exportation via the Custom Houses in Chiang Saen, Chiang Khong, Mae Sai (Thai Baht)

Chiang Rai Rubber Exportation via the Custom Houses in form of Prices showed that since the year of 2006, the values of Chiang Rai Rubber Exportations were continuously decreasing until the year of 2009. After that the value went up to reach the point of 699,908, 640 Baht. However, in the year of 2011, the value decreased again before it rose up in the year of 2012. There are also various factors that caused the raising of rubber prices in Chiang Rai Province. In-depth details will be explain in the next chapters.

### **1.1.2 Government Policies which Support Rubber Business for Better Marketing Strategies**

Recently, Thai government required to be a leading country of natural rubber producing and exporting. The policies have made to promote and enhance the ability to compete with others in the world market in the future. The government has instituted a scheme promoting the cultivation of rubber trees particularly in 11 provinces of Thailand where the management is on process of expanding the cultivating area. (Sri Trang Agro-Industry Public Company Limited, 2013)

Furthermore, Thai government has announced the policy of enabling the rubber plantation cultivating area to the Northern and Northeastern Thailand with the practical projected called “Rubber Plantation for Income Improvement and Enrich Farmers in New Cultivating Areas” This project had been proposed the rubber cultivating plan during the year of 2004-2006 by enlarging the number of natural rubber cultivating area to 1,000,000 Rai and emphasizing on Northern provinces accounts for 30% and Northeastern provinces about 70%. All together, in the year of 2010, Thailand has the total areas of rubber plantations about 18.32 million Rai. (Rubber Research Institute of Thailand, 2010)

### **1.1.3 Opportunities of Rubber Products from Chiang Rai Province to The World Market**

Udomrat Sa-nguansiritham (2013) Vice President of the University of Chiang Rai had summarized the report of the seminar under the topic of “Trading Development among Neighboring Countries of Thailand in ASEAN+6” The analysis of the opportunity in Chiang Rai Province are;

1.1.3.1 The location of Chiang Rai Province is closed to Myanmar, China, Laos, Vietnam, Cambodia and India. Therefore, the opportunity of promoting special economic border trade areas can be provided.

1.1.3.2 Chiang Rai has the possibility to be a passage way while the products are being on the flow from China to other countries in ASEAN.

1.1.3.3 Chiang Rai has more opportunity to develop to the special economic area which their own law and the legalized system to achieve the utmost benefits.

Somchai Sienglai (n.d.) Former Permanent Secretary of Ministry of Culture mentioned that the upcoming opportunity of ASEAN 2015, Thailand has various opportunities for doing exports and imports. He analyzed the readiness of Northern Thailand towards ASEAN 2015 that there are plenty of products from Thailand ready for the international market but still lack of the readiness in many ways. Sample products with high quality but still lack of readiness to the world market

**Table 1.4** Products with High Quality but Lack of Readiness to the World Market

Products	Details of readiness
Iron and steel products	<ol style="list-style-type: none"> <li>1. High number of raw materials imports</li> <li>2. Lack of the upstream products (suppliers)</li> </ol>
Jewel and decoration	High skill labors but lack of raw materials
Rice	Low production volume comparing to Vietnam
Textile and fabric	<ol style="list-style-type: none"> <li>1. Lack of working labors</li> <li>2. Cost of working labors getting higher</li> <li>3. Lack of value adding development</li> </ol>
Latex and Rubber products	Lack of management on research and development for products transforming and value adding

**Source** Somchai Sienglai (n.d.)

From the table above, it shows that Thailand can produce high quality products but still lack of readiness to the world market and recently, rubber products are in this situation. The current situation of rubber product in Thailand is lack of management on research and development and how to manage with value adding to rubber products in Thailand.

#### **1.1.4 Trends of Future Rubber Investment in Thailand**

Kasikorn Research Center predicted 7 businesses in 2013 that seemed likely to have good opportunity and receive the factors that help motivating to be outstanding and grow up well in the year of 2013. There are Auto industry, Information technology communication business, Satellite and cable TV business, Private hospital business, and Rubber industry (Rubber Research Institute of Thailand, 2013)

Rubber business in Thailand became more popular after the Chinese economic recovered. Moreover, the currency in Japan also became weaker. However, Indonesia who is the large producing country of rubber products had predicted that there is possibility that rubber product will decrease by 8.9%. Therefore, if Thailand, Indonesia, and Malaysia help maintaining the stability of rubber, it can help holding rubber price in good condition.

On the other hand, there are related businesses that can take the advantages from this trend as well. Those businesses are, for example, rubber processing plant, Logistics and transportation business.

Although the demand for rubber consumption has been growing steady for years and many resources have explained the need of natural rubber products, The Quarterly Report of International Rubber Study Group 2013 have shown that the trend of rubber investment might have changed as well; especially during the past few months. The trend has been slightly decreasing. This information is supported by Teerawut On-Dam, Innovation and Business Research Center, Hat Yai University.

Teerawut explained that the total demand is getting decelerate. The World Bank has deducted the GDP's Growth from 2.4% to 2.2% including the economic deceleration of China. The International Money Fund (IMF) also published the expected GDP's Growth of China from 8.0% to 7.7% in the first quarter of the year of 2014 (ASTV Manager Online, 2013).

The investment trend of rubber business in Chiang Rai Province seems likely to go to which direction? All the current situations and previous statistics will be used to analyze to see the trend of rubber investment in Chiang Rai Province in the future. Therefore, this paper will explain rubber supply chain in Chiang Rai Province and the trends of its investment. (Rubber Research Institute of Thailand, 2013).

## 1.2 Research Objectives

This research paper is a study of supply chain management of rubber plantations emphasizing the Northern region of Thailand, particularly in Chiang Rai Province. The study aims to understand the models of rubber supply chain, production size, including how to manage all the activities on rubber supply chain processes.

The sub-objectives can be divided as

1.2.1 To study supply chain in rubber plantation the current situation of the market business in Chiang Rai Province

1.2.2 To study the advantages of rubber cultivation in Chiang Rai Province

## 1.3 Research Questions

To truly understand the objectives of this study, research questions were developed for each objective

1.3.1 Which part of rubber supply chain that has the problems the most?

1.3.2 What are strength, weakness, opportunity and threat of rubber cultivation in Chiang Rai Province?

1.3.3 How does the trend of rubber business in Chiang Rai seem like?

## **1.4 Scope of Study**

This study focuses on rubber plantations in Northern Thailand particularly in Chiang Rai Province. This study also aims to understand the flow of supply chain management system; problems occurred and the opportunities found in rubber business in Chiang Rai Province.

Target group

Farmers and Middlemen of rubber plantations in Chiang Rai Province

Officers or people in charge of rubber development from the The Office of Rubber Replanting Aid Fund Chiang Rai

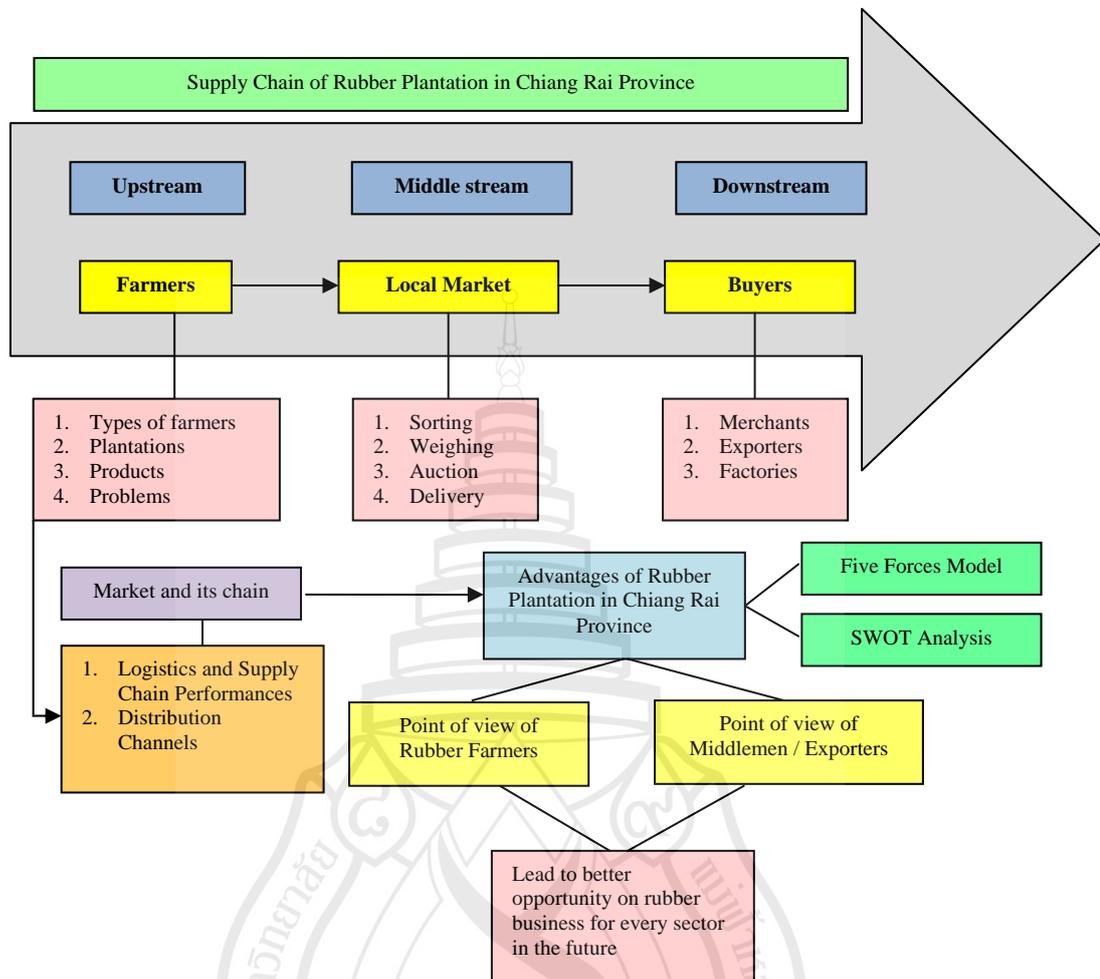
## **1.5 Expected Benefits**

1.5.1 People who would like to invest on rubber business can truly understand how the current situation of rubber business in Chiang Rai is like.

1.5.2 Researchers or students who work on the project related to supply chain of rubber product may use this paper for their further study.

## **1.6 Conceptual Framework**

The goals of this research paper are to study, analyze and find the possibility to develop the investment in rubber business along the chain; First tier, Second tier and Last tier. The conceptual frameworks of this study are shown as figure 1.3



**Figure 1.3** Conceptual Framework

## 1.7 Thesis Structure

This thesis paper consists of the five chapters describing below;

### Chapter 1 Introduction

Chapter 1 provides the preliminary information concerned with rubber plantations and general information about rubber industries and its market around the world. The brief information about current situation of rubber plantation in Chiang Rai Province, and the government policies also provided in this chapter.

## **Chapter 2 Literature Review**

In this chapter, there are several research studies related to rubber plantation and its economy including the study of supply chain management in different region of Thailand. Moreover, related study concerned with Five Forces Model and SWOT Analysis will be explained in this chapter.

## **Chapter 3 Methodology**

In this chapter, it consists of methodologies used in the research paper, research procedures which includes population and sample, research tools, methods of data collection, questionnaire design and data analysis.

## **Chapter 4 Empirical Result**

This chapter provides the results of study regarding to each objective. Moreover, supply chain analysis and Five Forces Model will be analyzed to show the problems and the trends of rubber investment including SWOT analysis which aims to show strength, weakness, opportunity, and threat found in rubber business.

## **Chapter 5 Conclusion and Discussion**

This chapter discusses the Supply Chain Analysis, Five Forces Model and SWOT Analysis by analyzing the current situations and problems occurred in rubber business. The summary of research, limitations of the research and suggestions for future research will be in this final chapter.

## **CHAPTER 2**

### **LITERATURE REVIEW**

In this chapter, there are several research studies related to rubber plantation and its economy including the study of supply chain. The contents of this chapter consist of the list below.

1. Supply Chain Management
2. Rubber in International Markets
3. Rubber Industry in Thailand
4. Five Forces Model
5. SWOT Internal and External Analysis

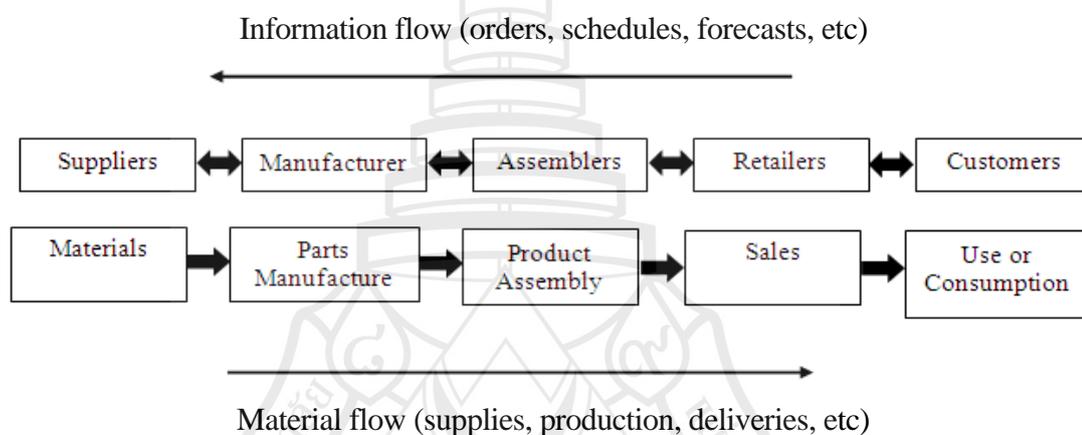
#### **2.1 Supply Chain Management**

A supply chain consists of all parties involved in fulfilling a customer request. Not only includes the manufacturers and suppliers, a supply chain also includes transporters, warehouses, retailers and customers themselves (Chopra, Sunil & Peter Meindl, 2004).

Consider a customer walking into a store to purchase one product. The supply chain begins with the customers and their need of that product. The next stage of this supply chain is the store that the customer visits. The store stocks and its inventory are also considered in supply chain processes.

A typical supply chain involves several stages which are customers, retailers, wholesalers/ distributors, manufacturers, and component/ raw materials suppliers. Moreover, supply chain can be defined as networks of the organizations which involved linkages of different processes and activities that produce value in the form of products and services in the hands of the ultimate customers. (Chopra et al., 2004)

A supply chain management can be viewed entirely as in Figure 2.1 rather than only next part or level. It aims to increase transparency and alignment of the supply chain's co-ordination and configuration, regardless of functional or corporate boundaries. The basic idea of supply chain management is to recognize the interdependency in the supply chain, and thereby improve its configuration and control based on such factors as integration of business processes. (Cooper & Ellram, 1993, cited in Ruben Vrijhoef & Lauri Koskela, 1999).



**Sources** Cooper & Ellram (1993)

**Figure 2.1** Generic Configuration of a Supply Chain in Manufacturing

Talking about Supply Chain, Supply Chain Management always comes along together. What is Supply Chain Management? Supply Chain Management is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. The three main flows of the supply chain are the product flow, the information flow and the finances flow. Supply Chain Management also involves coordinating and integrating these three flows both within and among companies. (Ivy Wigmore, 2013)

Moreover, there is a literature explaining supply chain management as the chain linking each element of the manufacturing and supply process from raw materials through

to the end user, encompassing several organizational boundaries. According to this broad definition, supply chain management encompasses the entire value chain and addresses materials and supply management from the extraction of raw materials to its end of useful life. (Scott & Westbrook, 1991; New & Payne, 1995, cited in Tan, 2001)

In the same paper, Baatz, 1995, cited in Tan, 2001) had further expanded supply chain management to include recycling or reuse. Supply chain management focuses on how firms utilize their suppliers of processes, technology and capability to enhance competitive advantage (Farley, 1997, cited in Tan, 2001) and the coordination of the manufacturing, logistics, and materials management functions within an organization (Lee & Billington, 1992, cited in Tan, 2001). When all strategic organizations in the value chain and integrate and act as a single unified entity, performance is enhanced throughout the system of suppliers.

According to Ruben Vrijhoef and Lauri Koskela (1999), they had explained the roles of supply chain management by giving the example of construction business. There are four major roles of supply chain in construction to be recognized. The main goal is to reduce costs and duration of site activities.

### **2.1.1 Supply Chain Analysis/Business Analytics**

Supply Chain, starting with unprocessed raw materials and ending with the final customer using the finished goods, the supply chain links many companies together. Moreover, the material and informational interchanges in the logistical process stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers and customers are links in the supply chain.

Supply Chain Analysis is the management of all activities and the relationship between the organizations. It is also the process of evaluating each stage of a business that is delivering a product to customers. All kinds of activities including material flows and finished goods are concerned in the analysis. It is connected and linked as the chain which referred to the production process along the chain until it reaches customers' hands. Supply Chain Analysis focuses on communication, information analysis, and how to apply it to reality in order to increase the value to the products and gain the competitive advantages in the long term relationship.

### 2.1.2 The Benefits of Supply Chain Analysis

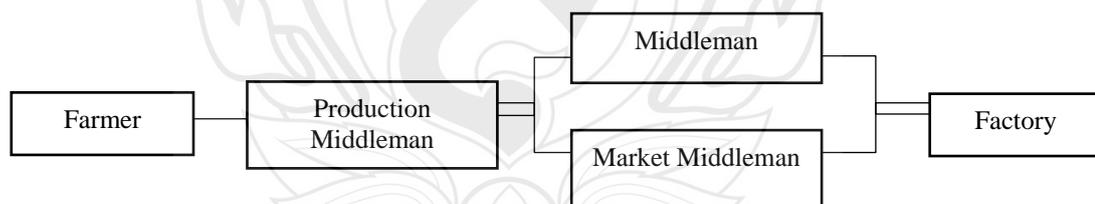
The analysis requires an evaluation of each step, from the time the business purchases the raw materials from suppliers up until the time the business delivers the products to the customers. The purpose of the analysis is to determine which stages of the process can be shortened or made better (wise GEEK, n.d.).

There are recent economic impacts such as rising fuel costs, the global recession, supplier bases that have shrunk or moved off-shore, as well as increased competition from low-cost outsourcers. All of these challenges potentially create waste in supply chain. That is where data analytics comes in (Paul Myerson, 2013).

Data analytics is the science of examining raw data to help draw conclusions about information. It is used in many industries to allow companies and organization to make better business decisions and in the sciences to verify or disprove existing models or theories. In the past few years, people have been hearing more and more about the uses of data analytics in the supply chain and logistics function.

With the supply chain methodology in general, it could be applied with any typed of business in order to decrease the problems occurred. Before getting started in rubber business, we need to know the basic flow of rubber supply chain in Thailand.

The figure below shows the rubber supply chain in simply way

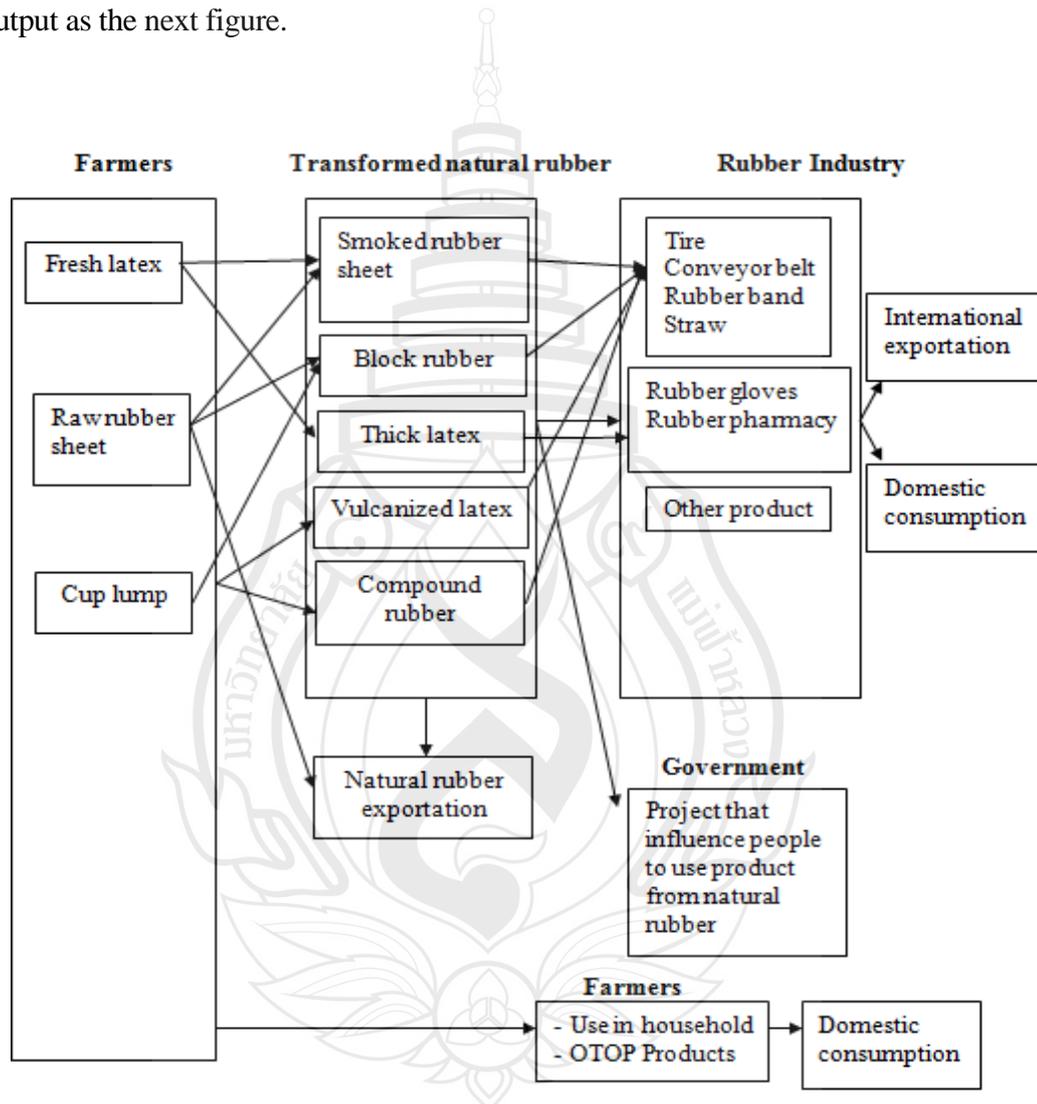


**Sources** Duangpun Kritchanchai Singkarin & Tuanjai Somboonwiwat (2009)

**Figure 2.2** Rubber Supply Chain in Thailand

In fact, that is a simple supply chain flow that Duangpun Kritchanchai Singkarin and Tuanjai Somboonwiwat have written in their book to describe the flow of rubber

supply chain. It simply starts at Farmers who produce rubber considered as the first tier and sell it to the market or the middleman who is the second tier followed by the Factory which is the third tier who gets the products from the market. However, the next figure is the also supply chain of rubber production written by Tuanjai Somboonwiwat and Krissana Chanklai, It shows the relationship of the players in the chain from input to output as the next figure.



Source Tuanjai Somboonwiwat & Krissana Chanklai (2009)

**Figure 2.3** Supply Chain of Rubber Products in Thailand

### **2.1.3 Supply Chain of Rubber Industry in Northern Thailand**

Prior traditional rubber cultivation of Thailand in the south and the east has gradually migrated to the new areas in the northeast and the northern region. A reason for the farmer is possibly adapting to new source of revenue since there is a challenge to grow other crops. Rubber plantations are productive in the South of Thailand. However, new plantation was concentrated in some suitable the North and Northeast. The hetaerae was still small comprising of 3.69 and 16.79 respectively, whilst a high rate of expansion for new planting in both areas. (Arak Chantuma, 2012)

Prayoon Tosanguan (2008) described the study of his secondary data and developed the supply chain and value chain system of rubber products. He mentioned that in the northern region of Thailand, well management has not been yet conducted. However, the study and results of the other regions in terms of production and uses of industrial rubber products have been found. This included the upstream, midstream and downstream processes concerned with the life cycle of production and the uses of rubber products by gathering data and information in Logistics and supply chain management, design and decisions making system for export are necessities. Moreover, the study of the potential of latex, rubber product innovation, value added and production maintenances are also mentioned. Although the northern and north eastern of Thailand are new areas for rubber plantation, they have capability to produce large amount of latex for the rubber market.

Wirachchaya Chanpuypetch & Duangpun Kritchanai, (2008, cited in Prayoon Tosanguan, 2008) they had studied the design support system for making decision in order to select the destination markets for export natural rubber from Thailand by using the Fuzzy Analytic technique (Fuzzy Analytic Hierarchy Process: FAHP). It is a tool that helps selecting the transportation systems for rubber exportation. There are four main factors to take into consideration including the transportation, economics, port and border trade, and environmental factor in order to support the entrepreneurs to select the proper one for their business.

This descriptive research is aimed for the development of supply chain and value chain of rubber industry and rubber products in Northern Thailand. The Northern rubber farmers and manufacturers throughout the whole supply chain on the sustainable manner. Northern Thailand became new areas for rubber planting. It is also in the early stage of

upstream and midstream supply chain developments. In addition, Northern Thailand is expected to be the future location to promote the strategies of raising rubber industry and rubber products standards widely.

Since rubber cultivation is confined to the humid tropical zones, the temperature for rubber should be about 20-30 C. It requires minimum annual rainfall of 1,250 mm/year. In northern Thailand it rains about 120-150 days/ year which considered good for rubber plantation.

Kanapot Pakhamwattanasakul, the head of rubber farmers in Mae Pao sub-district has explained his experience about the previous work on agricultural field. He is originally from Mae Pao sub-district, Paya Meng Rai district, Chiang Rai Province. 40 years ago, local farmers and villagers did grow crops and had animal farms for commercial purpose. At the beginning, the result came out well but later on, the problems started happening. Those problems are concerned with fluctuation in price and problems of soil damaging. Most of young people no longer worked on the farm. They moved to different towns to be working labors. Fortunately, Kanapot did not change his mind; he preferred to be with his family and own the longan farm until the year of 1997 when Thai economy was facing the crisis. Those working labors had to turn back to their hometown and back to the farm life again.

Actually in the year of 1989, some people already have started planting rubber trees and during the year of 1997, rubber farmers produced very fruitful latex. Kanapot could see that point and started paying attention to rubber plantations since then. Therefore, once the government announced the policy of increasing the rubber cultivating area in 2004, Kanapot and other farmers have decided to join the program and tried to make it work out eventually.

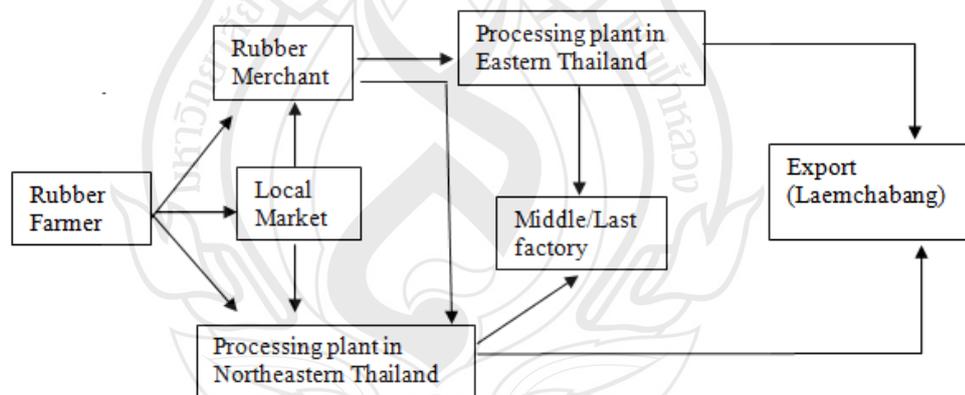
There were around 220 farmers participated in the program supported by the government in the total area of about 2,000-3,000 Rai. At the beginning of doing rubber plantations, Kanapot and other farmers were worried about the result. They were afraid that they would not succeed in the business and some other problems such as wild fire, some pests and many others. Eventually, they have the academic staffs who train them how to prevent from those problems. Kanapot also mentioned that recently rubber plantations are well grown and have 40-45 cm of circumference which is considered good. Other rubber farmers also appreciated with this policy and have been preparing for

new knowledge toward the maintenance and how to get the latex fruitfully (Siriporn and Sirilak Crop Integration Business C.P. Group, 2009).

#### 2.1.4 Supply Chain of Rubber Industry in Northeastern Thailand

The Office of Agricultural Economics 3 (2007) had studied the logistics and supply chain of cassava and sugar cane in Northeastern Thailand particularly in Udon thani, Nongkhai, Nongbualamphu, Loei, Sakonnakorn, and Mukdahan provinces.

The study also found that rubber supply chain stated from latex, raw rubber, cup lump, and crumb rubber as raw materials in rubber industry. The rubber products are for export and transport via Bangkok and Laemchabang Port. Following the success of the First Thai-Lao Friendship Bridge, the Second Thai-Lao Friendship Bridge links Northeastern Thailand with Central Laos to boost economic and trade activities. With this bridge, the products will be transported to Vietnam, China, and Japan afterward. With this bridge and better logistics management, the transportation costs can be trimmed



**Source** Duangpun Kritchanai Singkarin & Tuanjai Somboonwiwat (2009)

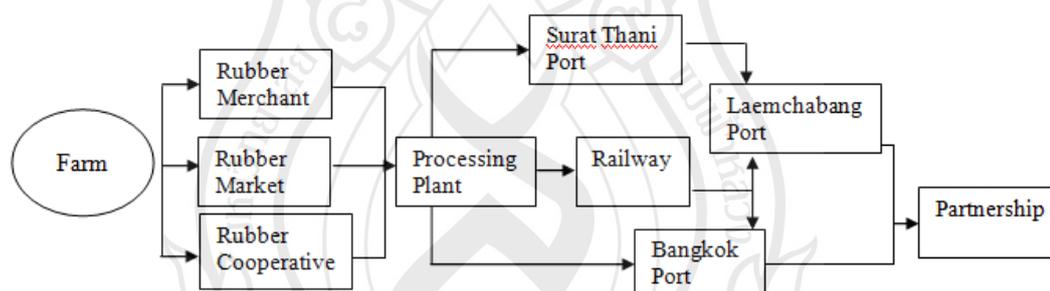
**Figure 2.4** Supply Chain of Rubber Plantations in Northeastern Thailand

### 2.1.5 Supply Chain of Rubber Industry in Southern Thailand

Rubber plantation and their products are important for the country particularly for export and employment.

Prachasanti Thaiyasuit et al. (2007, cited in Prayoon Tosanguan, 2008) they had studied the methodologies and proper condition to produce biodiesel fuel from rubber seed oil. Moreover, the results of the study of Reksowardojo et al. (n.d.) indicated that Rubber Seed biodiesel can be used as a partial substitute for diesel fuel. A 5 % blend of RSB with diesel fuel can be used to fuel DI diesel engines providing comparable performance, reduced emissions, wear reduction of engine components and neutral effect on lubricating oil.

Duangpun Kritchanhai Singkarin and Tuanjai Somboonwiwat (2009) explained the supply chain and Logistics of rubber plantation in the northern south Thailand in the figures below

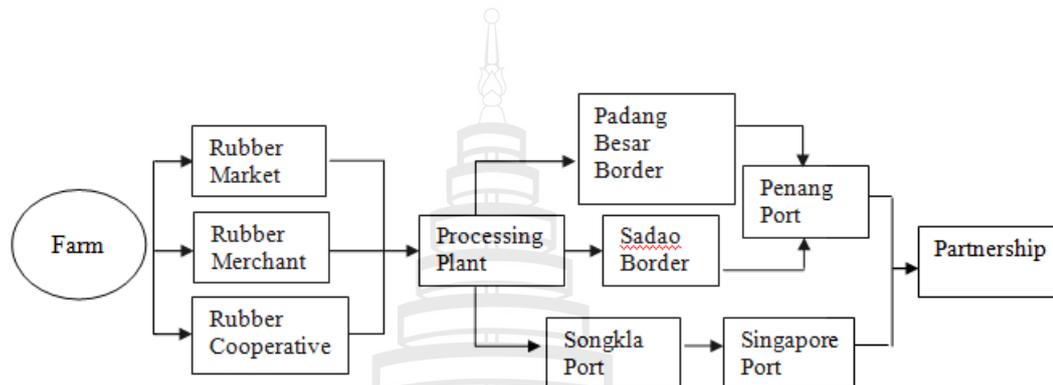


**Source** Duangpun Kritchanhai Singkarin & Tuanjai Somboonwiwat (2009)

**Figure 2.5** Logistics and Supply Chain of Rubber Plantations in Northern South Thailand

Most of rubber productions are being exported via ports and border trade areas. The ports which commonly used are Laemchabang Port, Bangkok Port and Songkla Port. The border trade areas are Padang Besar, and Sadao.

In Northern South Thailand: Rubber farmer sell latex to rubber merchant, rubber cooperative or rubber market. After that, rubber will be sent to the processing plant to make it to rib smoked sheet and block rubber before transfer to Laemchabang Port or Bangkok Port by trucks, rail, or liner. Rubbers will be packed in the containers and transported to the ports in China afterward.



**Source** Duangpun Kritchanchai Singkarin & Tuanjai Somboonwiwat (2009)

**Figure 2.6** Logistics and Supply Chain of Rubber Plantation in Southern South Thailand

In Southern south Thailand: Rubber farmer sell latex to rubber merchant, rubber cooperative or rubber market. After that, rubber will be sent to the processing same as the Northern south part. However, the rubber will be shipped to different ports by trucks and semi-trailer trucks and rails. Rubber productions will then be shipped to Songkhla Port in the large containers and then to Singapore Port.

Southern Thailand is the most suitable location to grow rubber trees because of its environment and geography. Rainfall, humidity, temperature, and wind are in good condition. In addition, local people from the south have been cultivating rubber trees for a long period of time. Therefore, they have experiences in planting rubber trees.

Most of rubber farmers in the south are small manufacture and lack of effective management. Moreover, the equipment to perform with limited cost which may affect the cost of production and quality productivity are not yet stable. Therefore, small

manufacture should modify the rubber to produce more integrated farming by growing other plants together to reduce the risks of one type of the output.

Dried rubber products from rubber farmers are collected for sell to the middlemen or cooperative central rubber market and after that, it will be sold to the factory or exporter. (Thailand's central rubber market, the key is to Hat Yai, Songkhla, Surat Thani, Nakhon Si Thammarat, Pattani, Yala, Narathiwat, Trang, Phuket and Bangkok. Hat Yai is central rubber market as trading in the south. It also serves to stabilize the price of rubber).

However, most of the rubber industry in the South is the processing of raw materials, primarily for export is the basic rubber sheets, rubber and latex with a transit pass. "Songkhla Deep-Sea Port" is important port in the export of rubber and latex products in Southern Thailand to many countries, Particularly to China. To produce tires and also Europe, the USA, Japan, etc., Rubber is a business that help increasing income for farmers (Thailand Kasikorn Research Center, 2013).

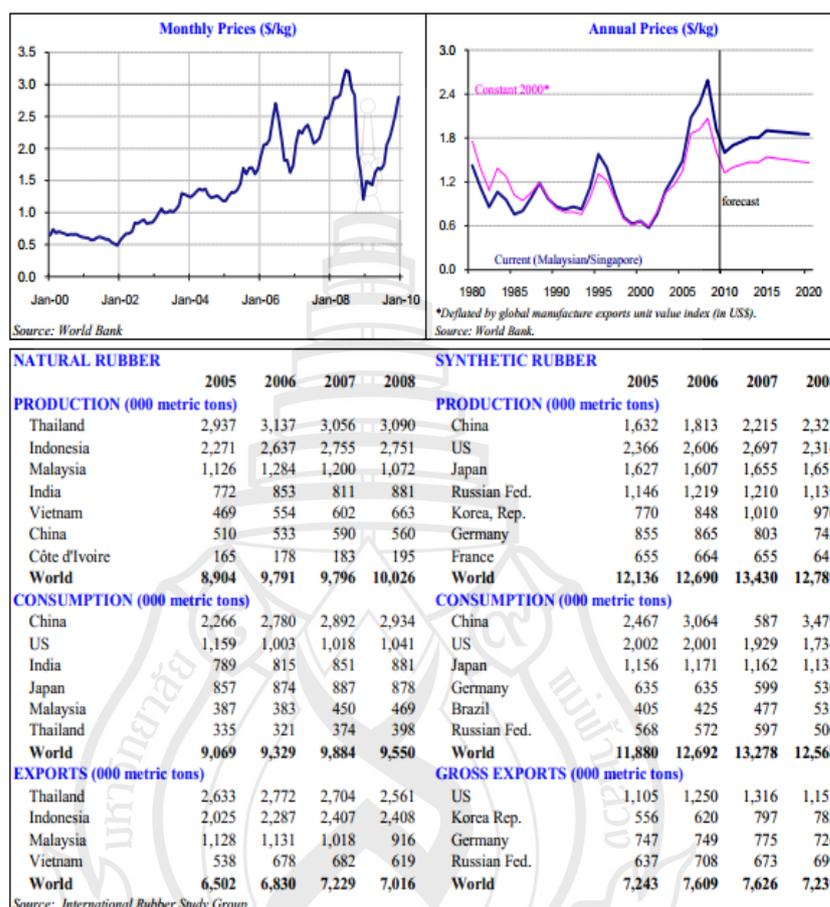
## **2.2 Rubber in International Markets**

### **2.2.1 Thai Rubber and the World Consumption**

Thailand is known as the top country that produced natural rubber plants to the world market due to the world demand which increases continuously every year, particularly automobile industries in The USA, Japan, EU, and China. Besides, rubber plants are considered important as one of the main export products from Thailand since the year of 1991 (Duangpun Kritchanchai and Tuanjai Somboonwiwat, 2009). Although China is the production lines of the world tires, the target markets of China are European Countries and the USA. They are facing the financial crisis which might affect the products made from China. It also decreased the demand of rubber in China as well as rubber market in Thailand.

On the other hand, the world oil price seemed likely to increase which considered as one of the main factors that influences the demand of natural rubber. This is because crude oil is an important raw material to produce Synthetic rubber which can be a

supplementary product of Natural rubber. This is another factor that has an impact on the total demand of Synthetic rubber products consumption nowadays.



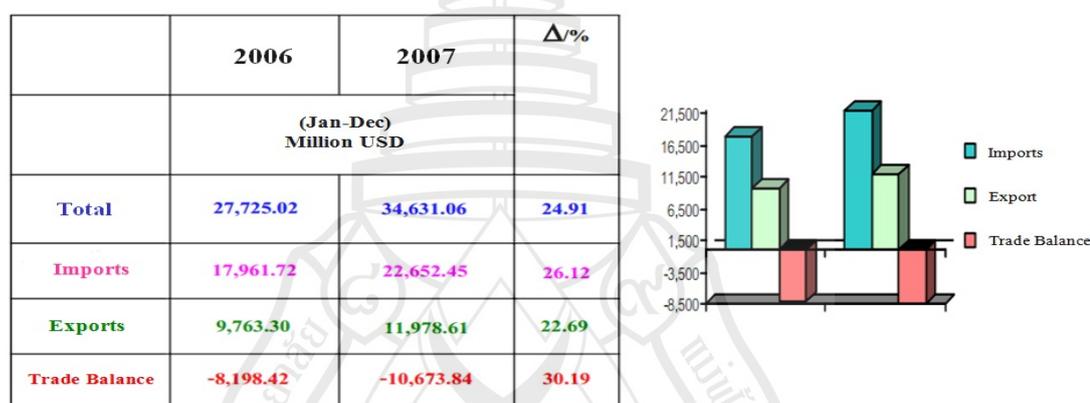
Source Development Prospects Group, The World Bank (2009)

Figure 2.7 World Rubber Productions, Consumptions, and Exports in 2005-2008

## 2.2.2 Opportunity of Thai Rubber Business in ASEAN+ China

### 2.2.2.1 Opportunity of Thai Rubber Business in China

The major importers of Thai rubber are China, Malaysia and Japan. These three importers import about 65 percent of Thai rubber export value (Ukessays.com, n.d.). The feat of becoming the globe's largest producer of shoes and a major exporter of tires by China may largely be attributed to its large pool of cheap labor and particularly to the availability of imports to fill the gap in the production chain. China is by far the world's biggest market for natural rubber, accounting for the most global usage in 2005-2008.



**Resource** Office of Commercial Affairs (n.d.) cited in Lakchai (n.d.)

**Figure 2.8** Imports, Exports and Trade Balance to People's Republic of China

China needs to import rubber raw materials which have been very crucial to ensure the survival of the rubber products industry. Slackening growth in demand in China has had a major impact on the global balance for natural rubber.

China market, the largest market of all Thai rubber export product which takes 35% of market. In 2009 starting from January to November, China imported rubber from Thailand valued \$1.2 billion which decreased by 31.85% from \$1.8 billion in same period of 2008. (Development Prospects Group, The World Bank, 2012)

China's State Reserve Bureau has started buying rubber from domestic farms, with planned a purchase of 50,000 tons in mid-April 2009, as the government hoped to lift prices and protect farmers. The amount was in line with a plan announced by the Chinese government earlier this year to purchase 65,000 tons for state reserves for the month of April 2009 to stabilize prices and protect the farmers. China, which imports about half of what it consumes, is forecast to use 5.9 million tons of rubber in 2009, up 7.3 percent from 2008, when demand rose 8.9 percent, Fan Rende, president of the China Rubber Industry Association said (Ukessays.com, n.d.).

Anatta Chaichompoo (2006) cited in Sureerat Kaewngam et al. (n.d.) had studied the processes of the logistics activities of rubber products for export to People's Republic of China. The study was about the current situation of transformed rubber and logistics system including the guidance toward to logistics development. The types of rubber in his study were smoked rubber sheet (HS 4001.210.309) and blocked rubber (HS 4001.292.107). The result of the study by Anatta Chaichompoo about the rubber supply chain consisted of rubber farmers, rubber merchants, transforming factory, exporter, transporters, custom house and border trading processes.

#### 2.2.2.2 Opportunity of Thai Rubber Business in Laos PDR

Laos PDR is experiencing a rapid expansion of rubber cultivation. Industry experts predicted that the current estimates of rubber planted will grow and the current boom in rubber is being fueled by a demand from rubber market which is China. Moreover, the government of Lao PDR has been promoting rubber and other cash crops as alternatives to shift the cultivation. Concurrent with this, the next five year National Economic and Social Development Plan emphasizes the shift from subsistence agriculture toward more market-based commodity production.

On the other hand, it has been found that rubber farmers in Lao PDR are adapting quickly to the market signals and are learning from their initial engagements with concessions or contract farming arrangements. Besides, some farmers have already started to grow their second and third plots by themselves while having the first contract with the company.

Research showed the results both positive and negative sides from study on the socio-economic and environmental impacts from rubber planting project in Bachieng

and Laognam districts southern part of Laos (National Agriculture and Forestry Research Institute, 2009).

#### Positive Impacts

1. Company improves local infrastructure such as hospitals, roads, schools
2. There is more job opportunities and chance for employment in the first two years
3. Farmers and communities can inter-crop rubber plantations in the first two years The companies usually devolve management to local people allowing them to generate income

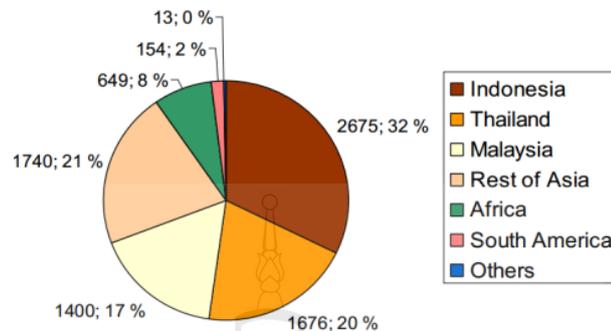
#### Negative Impacts

1. Loss of community land for upland rice and for gardens
2. Area for agriculture production is decreased
3. There are diminishing Non-Timber Forest Products available
4. Health problems associated with pesticide use
5. Increasing conflict and competition over land

### **2.3 Rubber Industry in Thailand**

Thailand is one of the world's most important rubber production bases. Recently, Thailand has covered the natural rubber plantation area of 18.7 million Rai (2.992 million hectares), which full-grown areas of 13.81 million Rai (2.2096 million hectares). In 2013, the annual rubber output was expected to reach 3.86 million tonnes. About 13% of rubber plantation is domestically consumed and 83% is exported in the form of primary processing products, generating income of over 600 billion Thai Baht per year from the exports (The Thai Rubber Association, 2013).

**Rubber plantation area, million ha and percentage of world total in 2004**



Source Laura Rantala (2006)

**Figure 2.9** Rubber Plantation in the World and Percentages of the Total Planted Areas

According to the figure above, the majority area of rubber plantations are in Indonesia which accounts for 32% of the total area of rubber plantations around the world followed by Thailand which accounts for 20% and Malaysia which accounts for 17% of the total area of rubber plantations around the world.

Moreover, Laura Rantala had also study about the areas of rubber plantations in the three most producing countries which are Indonesia, Thailand, and Malaysia.

**Table 2.1** Rubber Plantations and the Average Production

Country	1985 Area	Prod.	1990 Area	Prod.	1995 Area	Prod.	2000 Area	Prod.	2005 Area	Prod.
Indonesia	1692	624	1865	684	2261	678	2400	671	2675	796
Thailand	1411	548	1400	1013	1496	1378	1524	1560	1680	1798
Malaysia	1535	957	1645	800	1475	738	1300	714	1400	839

**Note.** Rubber plantation area in 1000 hectares and the average production of natural rubber in kilograms per hectare per year (kg -1 ha -1a -1) between years 1985-2005 in Indonesia, Malaysia and Thailand

**Source** Laura Rantala (2006)

Nowadays, rubber plantations have expanded their cultivating areas to Northern provinces to increase the production of natural rubber to support the needs of the global market. This is because labors and land cost in Northern region are lower than Southern region.

Government agencies supporting rubber planting in Thailand are the Rubber Research Institute of Thailand and the Office of the Rubber Replanting Aid Fund. The Research Institute of Thailand works under the Department of Agriculture (Ministry of Agriculture and Cooperatives), and its responsibilities include rubber development plans, research, technology transfer and control of natural rubber production, trade, exports and imports. The Office of the Rubber Replanting Aid Fund is also attached to the Ministry of Agriculture and Cooperatives and it is a non-profit enterprise carrying out governmental policies. The Office of the Rubber Replanting Aid Fund's objective is to work with rubber farmers on rubber production, processing and marketing through providing improved varieties of rubber seedlings, aiding in the establishment of both new plantations and replanting and providing technology and guidance (Chaninthornsongkhla, 2005, cited in Laura Rantala, 2006)

Uthai Sonhraksub, President Federation of Thai Rubber Association mentioned that currently, rubber has been increasingly popular in many sectors; the farmers have more popularity in planting rubber plantations. They have found that the climate is quite humid in Northern area which is very suitable for planting rubber trees. Once rubber plantations are planted in appropriate location and climate, they can produce latex fruitfully. Particularly in Chiang Rai and Phayao provinces; these two provinces have such abundance to grow rubber trees. In addition, Chiang Rai is a province which has its boarder to Laos, Myanmar, and very close to China.

According to the data from Rubber Research Institute of Agricultural Research Development, rubber production in Thailand can be divided into five types which are Rubber smoked sheets, Block rubber, Cup lump rubber, Dry rubber and Latex.

These rubbers are used in the manufacture of finished products of vehicle tire including rubber bicycle tire, motorcycle tire, rubber gloves, condoms, rubber bands and many others.

### **2.3.1 Study of the Market and Rubber Prices**

These are the studies related to the market situation and the price of rubber in order to know the market, rubber manufacturers and consumers which are important factors by gathering secondary data from various sources, both international and domestic sources. Then statistical data and descriptive data are analyzed by researchers to start studying the situation in previous studies.

Nantika Thipayagul. (1988) had studied the market situation and price of rubber and explained that production sizes and automotive tires trading in International market are likely to expand more. Besides, Thailand should open new export markets instead of only regular export market since some of the regular markets started to decline. Market should be expanding to the countries in the Middle East such as Kuwait, Saudi Arabia, and United Arab Emirates. Singapore market is interesting as well as markets in Africa. The value of exportation as expected to be increased since the price and quality were able to compete with other competitors. For example,

2.3.1.1 Rubber band: rubber band is one of the top exporting products because both international and domestic demand remain strong especially the demand of the international market is still at high level. However, there are still problems that should

be solved. Regarding to the quality, it should be carefully checked before the products are being exported.

2.3.1.2 Products made of Latex seemed likely to have good future. Rubber productions such as rubber gloves, condoms and medical gloves are some of the example products that the domestic demand is high but the manufacturing capability within the country yet still limited. There is domestic production to be substituted some imported products but mostly these kind of products are still required from another countries. If domestic products can develop their manufacturing techniques and improve the quality, there are high possibilities that number of exportation growth shall be increased. This is because numerous countries in the world became more sensible and focus on population growth seriously.

Patcharin Srivarin (2007) and researching group studied the market and prices in 2007. They have explained that the demand for natural rubber in the world during the last decade, the average growth rate was about 4.1 %, the production growth was at the average of 4.5 %, the demand for synthetic rubber were at 2.8 % The production volume grew at an average rate of 2.3 % Some leading countries such as Indonesia, Vietnam, Thailand and India are those countries with a high growth rate of production volume. They have been increasing production efficiency and productivity per unit. Indonesia is a large country with great potential. At the same time, Thailand, Malaysia, India and China have their potential moderately. However, Thailand and Indonesia have high potential in rubber cultivation expanding, while Thailand's rubber processing plant capacity are currently in used only 70 % of full production volumes. The researchers believed that if they increase raw materials and do more plantations, the production will be increased as well. The demand of natural rubber will continue expanding. However, the production volume still covers its demand due to the expansion of rubber cultivation. Therefore, volume management, production control and natural rubber exportation need to be treated seriously.

The price of natural rubber is going to decline as well as other agricultural products once there are over supplied. It can be seen from Laos, Vietnam and China. However, the Federation of Thai Rubber Association (2012) confirmed that the demand of natural rubber in the world market is still strong and stable. The demand is more than rubber supply. They have been supporting rubber farmers in Northern Thailand to plant

rubber plantations together with some other plants to earn more revenue for the family and community. Moreover, rubber productions have been promoting by pushing them to negotiable prices worldwide to gain more benefits.

In the year of 2012, due to the economic crisis in the European Union (EU) and the United State of America (USA), it severely affected rubber demand consumption for many countries. This is because rubber productions are important for India, Vietnam, and Brazil where the automotive industry continued to grow including the expanding of ASEAN markets (The Office of Industrial Economics, 2012).

### **2.3.2 Rubber Farmers**

The flow of rubber plantation started from rubber farmer. There are three possibilities of how the farmer would sell the rubber.

2.3.2.1 Rubber farmer sell the rubber through the local rubber market

2.3.2.2 Rubber famer sell the rubber to rubber merchant

2.3.2.3 Rubber farmer sell the rubber to the processing factory

To calculate the cost for farmers, all the fixed costs and variable costs are needed to take into consideration. The fixes costs are land renting, equipment maintenances, interest for equipment inventing, and many others. Whereas the variable costs are on labor cost, material, and interest of investment.

Peeradech Thong-ampai (2011) has also claimed that the processes of buying and sell rubbers are various. Famers sell rubbers to local market and then the market sells to the factory. Next, there are four main stages in all activities and is commonly used in nowadays business. It starts from Farmers sell the rubbers to local market and then to the middleman or rubber merchants. After that, the rubber will be sent to the factory. Moreover, rubber farmers sell rubber to the merchants and the merchants sell the products to the factory. Lastly, rubber farmers directly sell the rubber to the factory.

All of these four processes, Peeradech Thongampai found that the cost of transportation of the fourth one is only 0.51 Baht and the farmers gained the profits the most. The first one, the person who is able to make high profits is the factory. Here it come the question, why rubber farmers do not choose the fourth one to sell their products. The answer is most of the farmers do not understand the cooperative system which is one of the most important factors in trading. Most of them prefer to sell rubber product to

middleman or rubber merchants because of its conveniences but they do not know that they have lost half of their profits.

### **2.3.3 Problems of Rubber Farmers**

Although there are numbers of demand on rubber production, the market and prices of rubber are still suffering from the problems listing below

2.3.3.1 Lack of marketing plan management appropriately in advance - Particularly in target buyers that have the ability in producing good quality rubber

2.3.3.2 Customer Types are inappropriate. This is because most of the middlemen who purchase rubber product are irregular and unsystematic.

2.3.3.3 Types and grades of rubber production have no certainty. Some middlemen take the advantages to increase the price

2.3.3.4 The determined selling price of different types of rubber is not accurate. Some people use the price of smoked sheet rubber to determine the price of rubber types

2.3.3.5 To gain an advance payments from the customers about 8-17 million Thai Baht for the first year. The rubber stock cannot be recovered once they have been incurred which is known as sunk cost.

2.3.3.6 The officers sometimes need to take the reserve money because of the postponement of the billing causes by customers

2.3.3.7 Several cycle problems within the organization

2.3.3.8 Weakness of market structure issue

2.3.3.9 Lack of rubber privatization chemicals development, rubber semi-finished and rubber finished goods (Boonart Krissanasap & Somporn Krishnasub, 1996).

### **2.3.4 Rubber Merchants**

There are four categories of the rubber flow among the rubber merchants along the supply chain system.

2.3.4.1 Rubber merchants purchase rubber from the farmers and sell it to manufactory in Northeastern Thailand

2.3.4.2 Rubber merchants purchase rubber from the farmers and sell it to manufactory in Eastern Thailand.

2.3.4.3 Rubber merchants purchase the rubber through the local market and sell it to the processing manufactory in Northeastern Thailand

2.3.4.4 Rubber merchants purchase the rubber through the local market and sell it to the processing manufactory in Eastern Thailand

### **2.3.5 Study of Production Situation**

Thailand is now the world's largest rubber producer. The rubber production is between 3.7 and 3.8 million tonnes a year. Out of this volume, 3.2 million tonnes are exported, while only 500,000 tonnes are consumed domestically. Therefore, the oversupply has led to falling prices. Deputy Prime Minister and Minister of Agriculture and Cooperatives, Yukol Limlamthong said that although the three countries are among the largest rubber-producing countries, rubber prices are not set by them, but by other countries, such as Singapore. He said that rubber producers in ASEAN, such as Thailand, Indonesia, Malaysia, Laos, Cambodia, and Vietnam, must hold talks on the rubber issue (The Government Public Relations Department, 2013)

Thailand aims to expand the cultivated area continuously supported by both government policy and the cultivation of personal interest. The government has encouraged more farmers to produce more rubber plantation by increasing its price and persuade them to invest in rubber plantation. Moreover, rubber farmers and investors will get promoted especially in the new cultivated area. To increase the rubber productions, the three factors below needed take into consideration

2.3.5.1 Species and types of rubber

2.3.5.2 Suitability area

2.3.5.3 Plantation management

The rubber plantation cannot be grown in all areas. Therefore, before investing rubber plantation, we have to see what the topography is like, need any kind of improvement or any technology to support or not. Besides, the most important thing is it worth doing the investment or not (Rubber Research Institute of Thailand, 2009).

In 2011, the three major rubber producing countries are Thailand, Indonesia, and Malaysia. Rubber productions are widely used in automotive industry including the medical products. However, during the past decade, rubber business became slow down

due to the economic crisis in EU and many countries (The Office of Industrial Economics, 2012).

Somboon Jaroenjiratragul (2012) has done research concerned with rubber production in Thailand in order to know the growth rate of rubber production in Thailand as shown in Table 2.2

**Table 2.2** Growth Rate of Rubber Production in Thailand

Unit: 1000 Tonnes

Year	Natural rubber		Synthesis rubber		Usage percentage (%)	
	Production	Usage	Production	Usage	Natural rubber	Synthesis rubber
1988	5,020	5,020	10,160	9,930	34	66
2000	6,762	7,381	10,818	10,764	41	59
2010	10,291	10,671	14,002	13,751	44	56
<b>Gr*(%/Year) 1988-2010</b>	<b>3.59</b>	<b>3.78</b>	<b>1.76</b>	<b>1.79</b>	-	-

**Note.** The growth rate is a percentage per year from 1988-2010. The author used the equation of Logarithmic Exponential Curve or  $Y = ab^f$

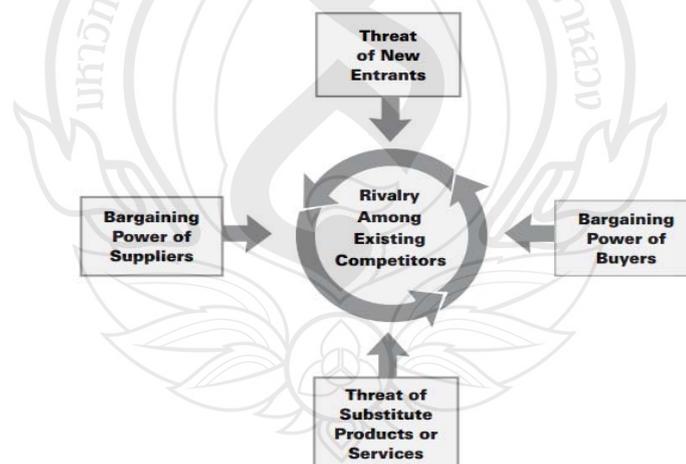
**Source** Somboon Jaroenjiratragul (2012)

## 2.4 Five Forces Model

Five Forces Model by Michael E. Porter is used for analyzing the investment trend with five main factors. It is well known and useful to analyze the market in order to know the surrounded environment that could affect the business. Not only have to win the competitors, but it shows also how to make a long term relationship with customers and other entrepreneurs. Most people believe that Five Force Model is for the large business with high competitions only, but the matter of fact is most SMEs are able to use Five Force Model to strengthen their business as well.

Five Forces Model descriptions:

1. Rivalry among current competitors
2. Bargaining power of suppliers
3. Bargaining power of customers
4. Threat of substitute products or services
5. Threat of new entrance



Source Porter (2008)

**Figure 2.10** The Five Forces that Shape Industry Competition

## 2.5 SWOT Internal and External Analysis

SWOT Analysis is the useful method for assisting the strategic formulation. It is the technique that helps understanding Strengths and Weaknesses of the activities or companies. Moreover, it helps identifying the Opportunities that open to the company and the Threats that the company is facing with.

### 2.5.1 SWOT Analysis descriptions:

- 2.5.1.1 Strength
- 2.5.1.2 Weakness
- 2.5.1.3 Opportunity
- 2.5.1.4 Threat

### 2.5.2 Business SWOT Analysis

SWOT Analysis can help the company compete successfully in the market. It helps achieving the best ways to get the benefits and opportunities.

Albert S Humphrey mentioned in 1960 that SWOT Analysis is as useful now as it was then. It can be used in two ways. One is as a simple icebreaker to remove the formulation of strategy and the other one is in a sophisticated way as a strategy tool for business.

Manktelow & Carlson (n.d.) talked about SWOT Analysis briefly on Mind Tools video. They explained how to use SWOT Analysis and this is the simple explanation to understand SWOT Analysis better.

2.5.2.1 Strengths: The questions being asked

“What advantages do you or your companies already have?”

2.5.2.2 Weaknesses: The questions are

“What can you improve?”

“What to be avoided?”

“How do people from the outside see your weaknesses?”

#### 2.5.2.3 Opportunities: When we ask our organization

“Where is your best opportunity line?”

“What is the interesting trend to be aware of?”

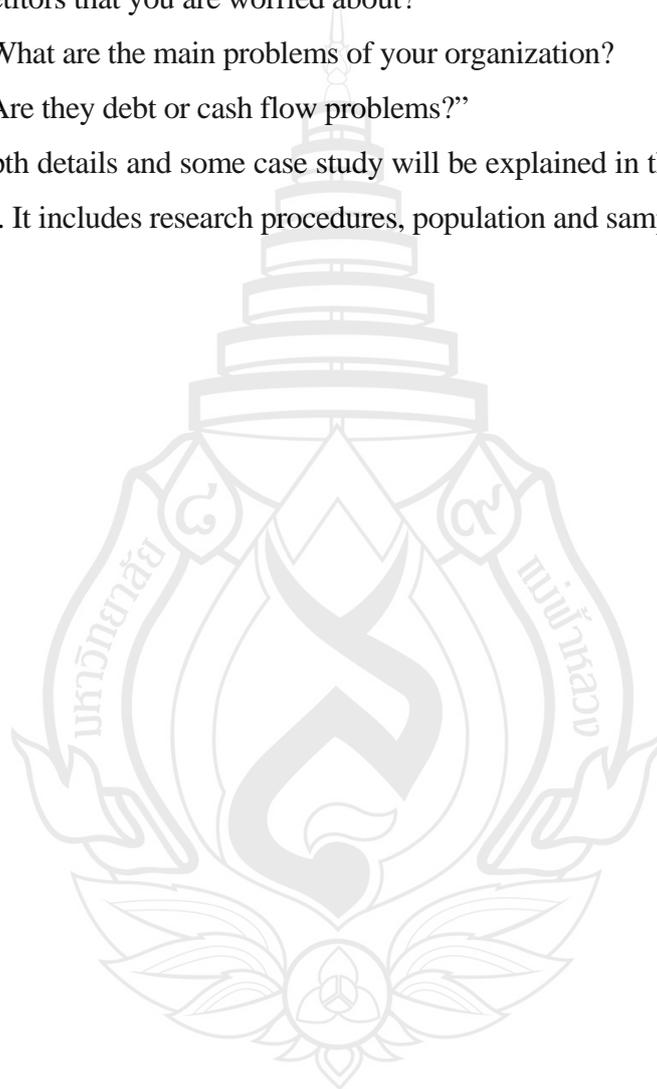
“What opportunities the strengths are opened up for you?”

2.5.2.4 Threats: Talking about Threats, the things to be concerned are “Who are the competitors that you are worried about?”

“What are the main problems of your organization?”

“Are they debt or cash flow problems?”

In-depth details and some case study will be explained in the next part, Chapter 3 Methodology. It includes research procedures, population and sample and research tools.



## **CHAPTER 3**

### **METHODOLOGY**

In this chapter, it consists of methodologies used in the research paper, research procedures which includes population and sample, research tools, methods of data collection, questionnaire design and data analysis. The study focuses on supply chain of rubber plantations in Chiang Rai province.

The study shows the data collection from the interview of the director and the analyst of the Office of Rubber Replanting Aid Fund Chiang Rai including the analyst of the Office of Rubber Replanting Aid Fund Chiang Rai. The overall current situation of rubber business in Chiang Rai Province will be analyzed in this study.

#### **3.1 Research Methodology**

A semi-structured interview is applied in this research paper. Both primary and secondary data are collected to analyze. In other word, it is a descriptive data in qualitative research. The study aims to understand the models of rubber supply chain, production size including how to manage all the activities on rubber supply chain processes and see the trend of investment of rubber business in Northern Thailand, emphasizing in Chiang Rai province.

The qualitative data is from the interviews and questionnaires collected all the director and the analyst of the Office of Rubber Replanting Aid Fund Chiang Rai.

The quantitative data is from the analysis of the statistic data concerned with rubber plantation, rubber-tapping, rubber farmer population, rubber yield and its value in order to see the trend of rubber business in Chiang Rai Province in these past few years and in the future.

In short, the qualitative data is from the interviews meanwhile the quantitative data is from the statistic data collected from the Office of Rubber Replanting Aid Fund Chiang Rai as well.

### **3.1.1 Qualitative Research**

Nouria Brikci and Judith Green (2007) had explained about qualitative research that it is characterized by its aims, which related to understanding some aspects of social life and its methods which generally generate words rather than numbers.

Qualitative research is empirical research where the data are not in the form of numbers (Christina Hughes, n.d.)

Qualitative research is also used for collection of a variety of empirical materials case study, life story, interview, observation, personal experience, culture texts and productions, historical, interactional, and visual texts.

### **3.1.2 Quantitative Research**

Quantitative research, on the other hand explain phenomena through focused collection and concerned with numerical data. Quantitative research also uses largest manageable random to allow generalization of results to larger populations (University of Arkansas Libraries, n.d.)

Hopkins (2008) had explained about the quantitative research aim to determine the relationship between one thing (an independent variable) and another (dependent variable) in a population of research.

Babbie, (2010) also supported that the quantitative methods also emphasize on objective measurements and numerical analysis of data collected through polls, questionnaires or surveys. Moreover, the research focuses on gathering numerical data and generalizing it across groups of people.

This paper consists of quantitative research in the part of the previous statistics data collected from the Office of Rubber Replanting Aid Fund Chiang Rai.

This paper also uses Supply Chain Analysis that affects to the management and logistics activities to analyze and complete research study. The author explained the advantages of rubber plantations in Chiang Rai Province which may lead to the better opportunity for rubber investment in the future by using the statistic data from The office

of Rubber Replanting Aid Fund during the last 3 years since the year of 2011 until 2013 and studied supply chain management including logistics activities. Moreover, when the problems in rubber business in Chiang Rai Province are found, the further research paper may use the information to study and make it as the basic guideline in the future. Once we know the problems occurred in rubber plantation in Chiang Rai Province, we will be able to know and understand rubber business better. The future farmers make use this paper to make a decision in the future whether it is worth doing rubber business in Northern Thailand particularly in Chiang Rai Province or not. If they believe that it is fruitful to do so, how they will manage to work on rubber plantations in the future.

## **3.2 Research Procedures**

### **3.2.1 Method of Data Collection**

#### **3.2.1.1 Primary data**

1. Interviews of the plan and policy analyst from the Office of Rubber Replanting Aid Fund who is involved in rubber supply chain in Chiang Rai Province
2. Statistic data from The Office of Rubber Replanting Aid Fund Chiang Rai. The data is used for quantitative study

#### **3.2.1.2 Secondary data**

Secondary data is collected from white papers, articles and journals. Sources of information are reliability supply chain management and logistics activities of the rubber products, and several related research paper.

### **3.2.2 Population and Sample**

Population of this study consisted of rubber farmers and middlemen in Chiang Rai Province

### **3.2.3 Research Tools**

This research uses the interviews to collect data. The five forces model by Michael E. Porter is used for explaining the current situation of rubber business in Chiang

Rai Province. Moreover, the SWOT analysis is being used for analyzing strengths, weakness, opportunity, and threats of rubber business.

In this research, the following tools are used to complete the study;

3.2.3.1 Five Forces Model

3.2.3.2 SWOT Analysis

### **3.3 Data Analysis**

#### **3.3.1 Analysis of Qualitative Data**

This paper uses information collected from the interview of the Office of Rubber Replanting Aid Fund Chiang Rai to create rubber supply chain chart. Moreover, Five Force Model and SWOT Analysis will be used for analyzing the current situation of rubber market including strength, weakness, opportunity, and threat of rubber business in Chiang Rai Province.

The author uses data collected from interviews to complete the study of supply chain management by applying the Five Forces Model to analyze the trend of rubber investment and use SWOT analysis to analyze the opportunities and threats found in rubber business in Chiang Rai Province.

Five Forces Model is used for studying the current situation of rubber business in Chiang Rai Province and its competitors while SWOT Analysis is used for study its strength, weakness, opportunity, and threat of rubber business Chiang Rai Province.

Moreover, the details of logistics activities of rubber business in Chiang Rai Province will be explained in this paper as well as the point of views of both rubber farmers and the middlemen after they do rubber plantations in Chiang Rai Province.

#### **3.3.2 Analysis of Quantitative Data**

The data from the interviews will be transcribed to provide the key informants in the study toward supply chain management. The data in this questionnaire aims to understand the supply chain management problem.

Supply Chain analysis is being used for describing all activities and the relationship between farmers and the markets. It is also the process of evaluating each

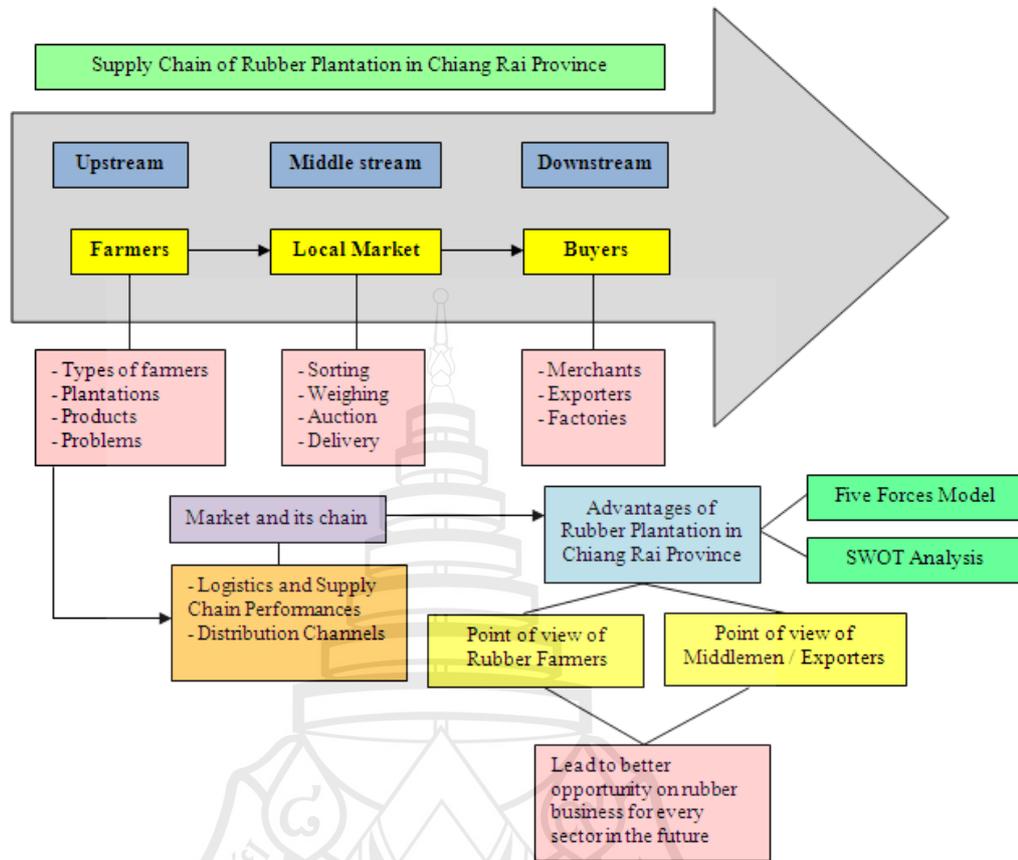
stage of a business that is delivering the products to customers. All kinds of activities including material flow are concerned in the analysis. It is connected and linked as the chain which referred to the production process along the chain until it reaches customers' hands. Supply Chain Analysis focuses on communication, information analysis, and how to apply it to reality in order to increase the value to the products and gain the competitive advantages in the long term relationship.

Besides, the entire previous statistic data conducted from the Office of Rubber Replanting Aid Fund Chiang Rai will be analyzed for the trends of rubber investment in Chiang Rai Province.

In this part, the author has collected the data and presented in demographic graphs to illustrate the numbers of rubber plantations, rubber-tapping zone, farmer population, rubber yield and its prices.

On the other hand, the conceptual framework of this study represents the overall supply chain of rubber plantation in Chiang Rai Province recently. In the upstream part, the author studied about the types of farmers including their products and problems. For the middle stream part, the processes doing at the local market will be explained which includes sorting, weighting, doing auction, delivering product to customers. Lastly, the downstream part, this part concerned with the buyers which are private merchants, rubber exporters, and factory.

The logistics activities and distribution channels will be shown in the study. The point of views of rubber farmers and rubber middlemen will be described in this part in order to understand them better and why they are facing the problems and how they can cope with such the situations and it will lead to better opportunity for rubber business in the future eventually.



**Figure: 3.1** Conceptual Framework

Next Chapter is Empirical results. It shows the interview data and basic guidance from researchers and author. The supply chain analysis will be analyzed to show the problems in rubber business.

## **CHAPTER 4**

### **EMPIRICAL RESULTS**

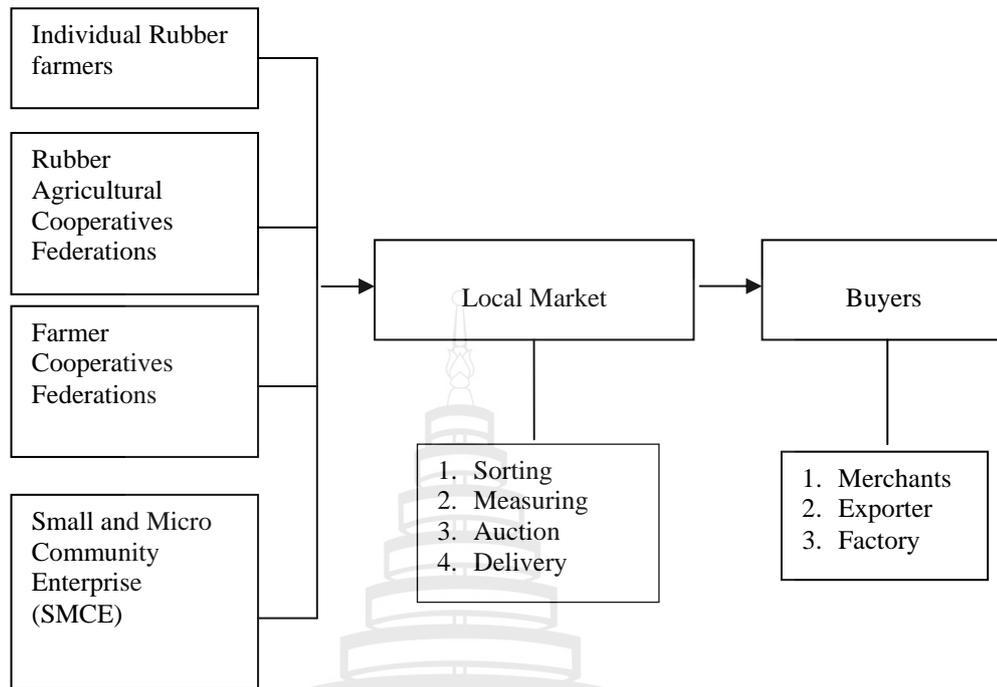
The data collection concerned with the general information and statistic data of rubber business in Chiang Rai Province by director and the analyst of the Office of Rubber Replanting Aid Fund in June 2014.

Both primary and secondary data were collected to analyze. In other word, it is a descriptive data in qualitative and quantitative research. The study aims to understand the models of rubber supply chain, including how to manage all the activities on rubber supply chain processes and also focuses on supply chain of rubber business in Chiang Rai Province.

#### **4.1 Data Collection from the Office of Rubber Replanting Aid Fund Supply Chain Analysis**

Supply chain of rubber plantation consists of many players such as rubber farmers, middleman, cooperatives, rubber markets and processing factory.

In terms of manufacturing process, it starts with raw materials(latex and rubber cup lump) and then the output from rubber farmers are sent to the processing factory through a middleman or rubber cooperative market for processing into rubber products such as concentrated latex, rubber bale, and ribbed smoked sheets and export to partner countries.



**Figure 4.1** The Structure of Rubber Supply Chain in Chiang Rai Thailand

Figure 4.1 demonstrated the three main players in rubber supply chain in Chiang Rai Province which are Farmers, Local Market, and Buyers. This paper will mainly focus on rubber farmers and the local markets in Chiang Rai Province.

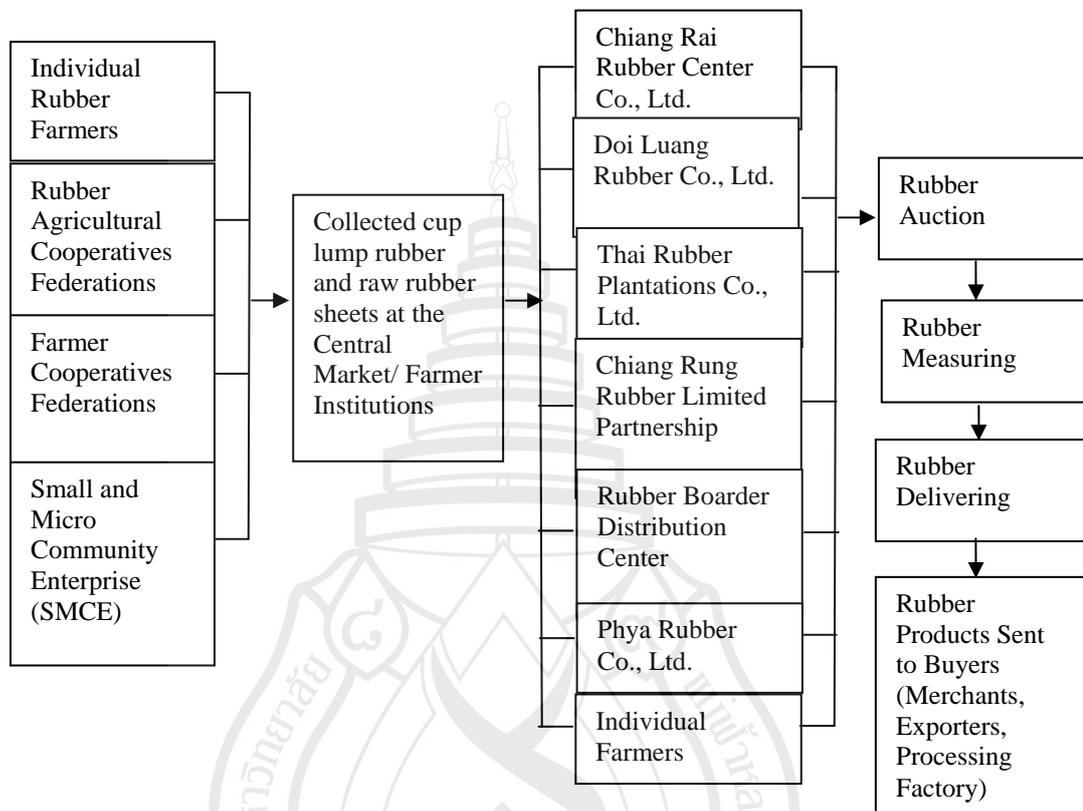
#### 4.1.1 General Information

The first part, upstream part: In Chiang Rai Province, the individual farmers form the group together to sell the rubber products to the market. Nowadays there are around 20 groups of rubber farmers in local market and each group has their own leader. There are several groups of rubber farmer institutions and cooperative federations in Chiang Rai Province. Each group consists of various individual rubber farmers.

According to the interview of Mr. Udomphong Phongdej from the Mae Salong River Group of Rubber Farmers in Mae Chan district, he mentioned that the group is new comparing to other cooperative federations in Chiang Rai Province.

Recently, there are over 130 memberships in this group but the actual number that ready for the rubber-tapping is only around 30 farmers.

Rubber farmers supply chain in Chiang Rai Province can be seen in details as the figure below



**Figure 4.2** Rubber Supply Chain in Chiang Rai Province

From Figure 4.2 Rubber Supply Chain in Chiang Rai Province, it shows the details of rubber supply chain particularly in the part of rubber farmers and the local market until it reached the end buyers.

#### 4.1.2 Farmers Institutions in Chiang Rai Province

There are four main groups of rubber farmers in Chiang Rai Province which are Individual rubber farmers, Rubber Agricultural Cooperatives Federations, Farmer Cooperatives Federations, and Small and Micro Community Enterprise (SMCE). These groups of farmers start forming the group together and collect rubber products at their central market.

After that the middlemen will do the auction, negotiation or bargaining the prices. With that, the rubber products needed to be selected and measured weight before delivering to the next players which are rubber merchants, exporters, or processing factory.

In details, every 15 tonnes of rubber productions collected by rubber merchants or buyers will be transferred by trucks to the processing factory in Northeastern and Southern Thailand. If rubber products are over 15 tonnes, the caravan trucks will be used instead of normal trucks. The caravan trucks are able to transport around 30 tonnes in a row.

In order to export rubber products to Southern China, there are two routes which are by bulk ships and by trailer trucks. The bulk ships are being transported at Chiang Saen Port with the capability of 350 tonnes/ trip and around 25-30 tonnes/ trip by trailer truck at Chiang Khong border (Thatphong Wongphum, 2014).

Remark: All details concerned with rubber farmers and contact information are shown in Appendix A

#### **4.1.3 Private Rubber Merchants in Chiang Rai Province**

There are nine rubber merchants from private sector with the two major purchasing center points in Wiang Chiang Rung and Chiang Khong districts. Those purchasing center points of rubber products in Chiang Rai Province run as the local auction market.

Recently, the Office of Rubber Replanting Aid Fund become more important and takes roles in rubber plantations supporting to increase the quality of rubber products and train local farmers in Chiang Rai Province. This is because Chiang Rai is new for rubber plantations. The majority of local farmers still lack of knowledge in doing rubber plantations fruitfully. In addition, rubber market in Chiang Rai Province is not large comparing to other markets in Southern or Eastern Thailand.

The main products from Chiang Rai Province are in the form of cup lump rubber which accounts for 90% and another 10% is in the form of raw rubber sheet. Moreover, the Office of Rubber Replanting Aid Fund has established the provincial central auction markets covered districts in Chiang Rai Province and promoted the groups of rubber farmer to form the cooperatives federations in order to reduce the gap among each

individual farmer and make it centralized. Once there are the common central markets, the management system became easier to control, particularly in marketing management and product value adding. The product in Chiang Rai Province is being transported to processing factory before export to Southern China as Crepe rubber.

The content mentioned earlier is related to the roles and responsibilities of each player in rubber supply chain in Chiang Rai Province. The following tables show the rubber plantations and rubber-tapping zone in Chiang Rai Province in the past few years starting from 2011 to 2013.

Remark: All details concerned with private rubber merchants in Chiang Rai Province and contact information are shown in Appendix A

**Table 4.1** Rubber Plantations in Chiang Rai Province in 2011

No.	Districts in Chiang Rai Province	Rubber Plantations (Rai)	Rubber -Tapping Zone (Rai)
1	Thoeng	42,930	18,830
2	Chiang Khong	38,560	25,580
3	Doi Luang	35,150	18,770
4	Wiang Chiang Rung	29,576	13,466
5	Chiang Sean	25,590	9,870
6	Phya Mengrai	25,790	10,530
7	Wiang Kaen	24,580	11,130
8	Mueang Chiang Rai	20,490	8,490
9	Wiang Chai	16,062	4,952
10	Mae Chan	14,970	5,890
11	Mae Suai	8,570	3,570
12	Wiang Pa Pao	8,520	3,260
13	Phan	6,400	3,670
14	Mae Fah Luang	6,972	4,574
15	Mae Lao	4,610	2,500

**Table 4.1** (continued)

No.	Districts in Chiang Rai		Rubber Plantations	Rubber -Tapping
	Province		(Rai)	Zone (Rai)
16	Khun Tan		3,140	810
17	Pa Daet		2,530	1,000
18	Mae Sai		538	120
<b>Total</b>			<b>314,978</b>	<b>147,012</b>

**Source** Thatphong Wongphum (2014)

In the year of 2011, this table shows the amount of rubber plantations in Chiang Rai Province, arranging from the greatest amount to the least amount of rubber plantations. The total amount of rubber plantations in Chiang Rai Province is 314,978 Rai but the total amount of rubber tapping-zone is only 147,012 Rai

**Table 4.2** Rubber Plantations in Chiang Rai Province in 2012

No.	Districts in		Rubber Plantations	Rubber - Tapping
	Chiang Rai Province		(Rai)	Zone (Rai)
1	Thoeng		46,978	34,038
2	Chiang Khong		45,596	25,735
3	Doi Luang		38,603	24,223
4	Wiang Chiang Rung		31,292	18,843
5	Chiang Sean		29,420	14,533
6	Phaya Mengrai		28,315	14,774
7	Wiang Kaen		25,614	15,378
8	Mueang Chiang Rai		22,687	11,750
9	Wiang Chai		21,443	8,538

**Table 4.2** (continued)

No.	Districts in Chiang Rai Province	Rubber Plantations (Rai)	Rubber - Tapping Zone (Rai)
10	Mae Chan	16,257	8,704
11	Mae Fah Luang	10,972	5,457
12	Mae Suai	9,633	5,010
13	Wiang Pa Pao	9,361	4,904
14	Phan	8,122	4,929
15	Mae Lao	5,106	2,942
16	Khun Tan	3,296	1,746
17	Pa Daet	2,748	1,376
18	Mae Sai	538	420
	<b>Total</b>	<b>355,981</b>	<b>202,903</b>

**Source** Thatphong Wongphum (2014)

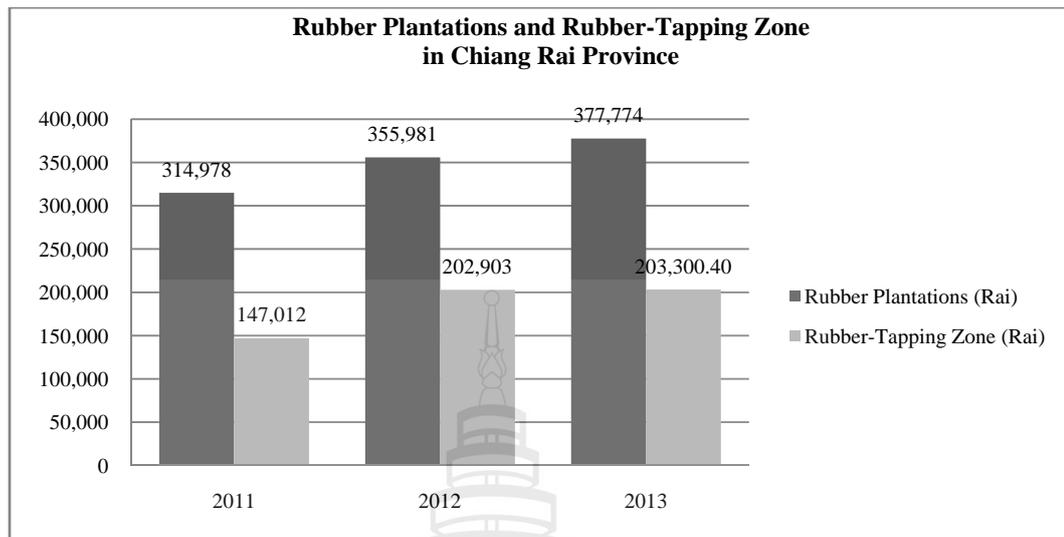
In the year of 2012, the total amount of rubber plantations and rubber-tapping zone increased rapidly within a year for 41,003 Rai and the rubber-tapping zone has increased for 55,891 Rai. Therefore, the total amount of rubber plantations expanded up to 355,981 Rai and rubber-tapping zone increased to 202,903 Rai.

**Table 4.3** Rubber Plantations in Chiang Rai Province in 2013

No.	Districts in Chiang Rai Province	Rubber Plantations (Rai)	Rubber -Tapping Zone (Rai)
1	Chiang Khong	63,596	34,038.5
2	Thoeng	46,978	25,734.5
3	Doi Luang	43,603	24,223.5
4	Wiang Chiang Rung	34,292	18,843.5
5	Chiang Sean	29,420	14,532.5
6	Phaya Mengrai	28,008	14,773.5
7	Wiang Kaen	27,614	15,378.0
8	Mueang Chiang Rai	22,687	11,750.0
9	Wiang Chai	17,443	8,538.0
10	Mae Chan	16,257	8,704.0
11	Mae Suai	9,633	5,010.0
12	Wiang Pa Pao	9,361	4,904.5
13	Phan	9,122	4,929.0
14	Mae Fah Luang	6,972	5,457.0
15	Mae Lao	5,006	2,942.0
16	Khun Tan	4,496	1,746.0
17	Pa Daet	2,748	1,376.0
18	Mae Sai	538	419.9
	<b>Total</b>	<b>377,774</b>	<b>203,300.40</b>

Source Thatphong Wongphum (2014)

In the year of 2013, the amount of rubber plantations and rubber-tapping zone are continuously increasing. The total amount of rubber plantations in Chiang Rai Province is 377,774 Rai and the total amount of rubber-tapping zone is 203,300.40 Rai.



**Figure 4.3** Comparison between Rubber Plantations and Rubber-Tapping Zone in Chiang Rai Province in 2011-2013

From the chart above, it represents numbers of the total rubber plantations and rubber-tapping zone in Chiang Rai Province started in 2011 until 2013. The number of rubber plantations and rubber-tapping zone in Chiang Rai Province seemed likely to continuously increase every year even though the number of rubber-tapping zone in the year of 2013 is not that much higher than the one in 2012. This is because rubber trees need some period of time to grow and produce latex.

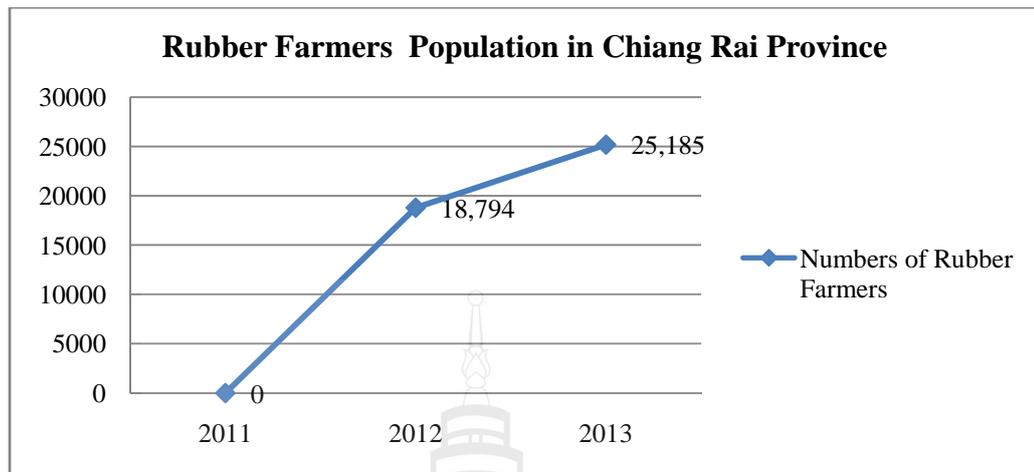
Next part shows numbers of rubber farmers and rubber products in Chiang Rai province in the last three years.

**Table 4.4** Rubber Farmer Population in Chiang Rai Province in 2011-2013

No.	Districts in Chiang Rai Province	2011	2012	2013
1	Chiang Khong	N/A	3,019	4,240
2	Thoeng	N/A	2,719	3,132
3	Doi Luang	N/A	1,741	2,907
4	Wiang Chiang Rung	N/A	1,136	2,286
5	Chiang Sean	N/A	1,069	1,961
6	Phaya Mengrai	N/A	1,696	1,867
7	Wiang Kaen	N/A	1,508	1,841
8	Mueang Chiang Rai	N/A	1,328	1,512
9	Wiang Chai	N/A	1,024	1,163
10	Mae Chan	N/A	864	1,084
11	Mae Suai	N/A	573	642
12	Wiang Pa Pao	N/A	594	624
13	Phan	N/A	507	608
14	Mae Fah Luang	N/A	306	465
15	Mae Lao	N/A	272	334
16	Khun Tan	N/A	264	300
17	Pa Daet	N/A	138	183
18	Mae Sai	N/A	36	36
<b>Total</b>		N/A	<b>18,794</b>	<b>25,185</b>

**Source** Thatphong Wongphum (2014)

From Table 4.6, it shows that there are over 3,000 rubber farmers in Chiang Khong district in 2012 and it went up to 4,240 farmers in 2013. As well as in the other districts in Chiang Rai Province, numbers of rubber farmers seemed likely to increase continuously every year as well.



**Figure 4.4** Rubber Farmers Population in Chiang Rai Province

To make it simpler, this graph shows the growth of the population of rubber farmers in Chiang Rai Province from 2011 to 2013. It is taken from Thatphong Wongphum (2014). In recent years, the total growth went up in 2012-2013 and rubber farmer population has been gradually growing. Due to the Thai government requirement to be a leading country of natural rubber producing and exporting, the policies have made to promote and enhance the ability to compete with others in the world market in the future. Therefore, we can say that the growth of the rubber farmer population is based on government policies.

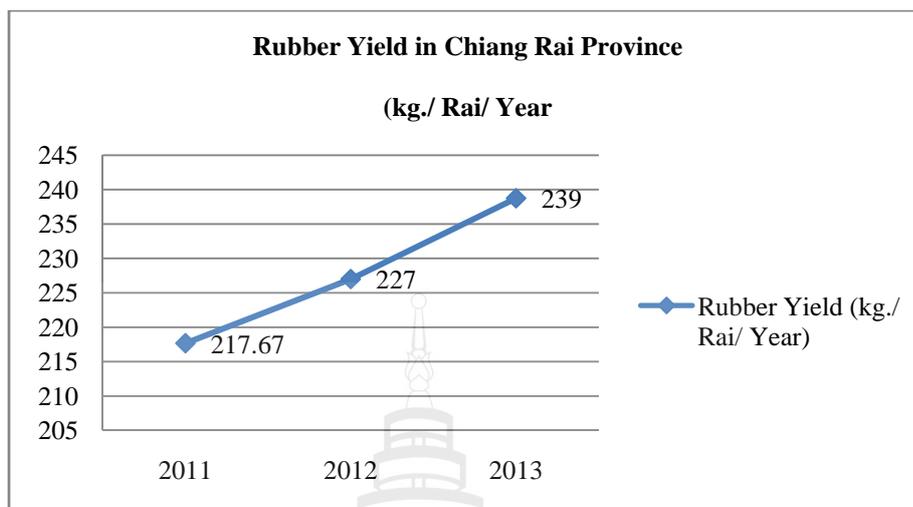
The next part is rubber yield produced in Chiang Rai Province, its volume and value from 2011-2013.

**Table 4.5** Rubber Yield in Chiang Rai Province in 2011-2013

No.	Districts in Chiang Rai Province	Rubber Yield	Rubber Yield	Rubber Yield
		(kg./Rai/Year) 2011	(kg./Rai/Year) 2012	(kg./Rai/Year) 2013
1	Mae Lao	203	213	293.40
2	Mueang Chiang Rai	226	236	285.54
3	Wiang Kaen	258	268	268.46
4	Wiang Pa Pao	218	228	268.04
5	Phya Mengrai	225	235	264.55
6	Pa Daet	233	243	243.20
7	Mae Chan	226	236	236.43
8	Phan	225	235	234.61
9	Mae Suai	224	234	233.76
10	Thoeng	223	233	232.82
11	Khun Tan	223	233	232.66
12	Wiang Chai	217	227	227.26
13	Mae Sai	217	227	226.67
14	Chiang Khong	214	224	224.34
15	Doi Luang	214	224	224.28
16	Chiang Sean	201	211	211.14
17	Mae Fah Luang	189	199	198.56
18	Wiang Chiang Rung	182	192	191.81
<b>Production Average</b>		<b>217.67</b>	<b>227.00</b>	<b>238.75</b>

**Source** Thatphong Wongphum (2014)

This table demonstrates the amount of rubber yield in Chiang Rai Province, arranging from the greatest amount to the least amount of rubber plantations in the year of 2011-2013.



**Figure 4.5** Average of Rubber Yield in Chiang Rai Province in 2011-2013

From Figure 4.5, it can be clearly seen that rubber yield in Chiang Rai Province is gradually increasing since the year of 2011 so far. The production average in 2011 is 217.67 kg./ Rai/ Year and went up to 227 kg./ Rai / Year. Currently it is at 238.75 kg. / Rai / Year in 2013. Therefore, it is predictable that rubber yield in 2014 will be in higher number.

The next table shows rubber yield volume in tonnes in 2011-2013.

**Table 4.6** Rubber Yield Volume in Chiang Rai Province in 2011-2013

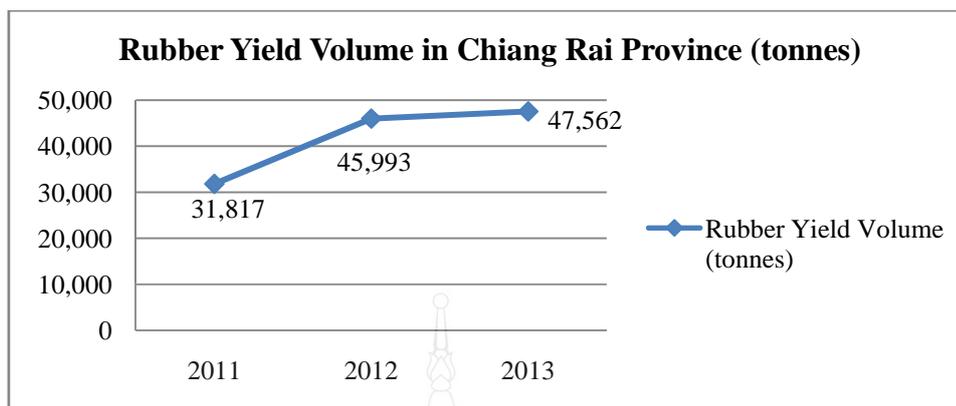
No.	Districts in Chiang Rai Province	Rubber Yield	Rubber Yield	Rubber Yield
		(tonnes) 2011	(tonnes) 2012	(tonnes) 2013
1	Chiang Khong	5,474	7,625	7,636.00
2	Thoeng	4,199	5,996	5,991.50
3	Doi Luang	4,017	5,426	5,432.84
4	Wiang Kaen	2,871	4,121	4,131.19
5	Phya Mengrai	2,369	3,472	3,908.32

**Table 4.6** (continued)

No.	Districts in Chiang Rai Province	Rubber Yield	Rubber Yield	Rubber Yield
		(tonnes) 2011	(tonnes) 2012	(tonnes) 2013
6	Wiang Chiang Rung	2,451	3,618	3,614.37
7	Chiang Sean	1,984	3,066	3,294.08
8	Mueang Chiang Rai	1,919	2,773	3,355.09
9	Mae Chan	1,331	2,054	2,057.88
10	Wiang Chai	1,074	1,938	1,940.34
11	Wiang Pa Pao	711	1,118	1,314.60
12	Phan	826	1,158	1,156.39
13	Mae Fah Luang	864	1,086	1,083.54
14	Mae Suai	780	1,079	1,171.13
15	Mae Lao	507	627	863.18
16	Khun Tan	181	407	406.22
17	Pa Daet	233	334	334.6
18	Mae Sai	26	95	95.17
<b>Total Production</b>		<b>31,817</b>	<b>45,993</b>	<b>47,786.44</b>

Source Thatphong Wongphum (2014)

This table represents the amount of rubber yield in Chiang Rai Province, arranging from the greatest amount to the least amount of rubber yield in 2011-2013. The amount of rubber yield in this table is from the calculation of rubber-tapping zone times rubber yield (kg./Rai/Year)



**Figure 4.6** Rubber Yield Volume in Chiang Rai Province in 2011-2013

According to the chart above, it shows that the volume of rubber yield in Chiang Rai Province seemed likely to rise gradually every year. In the year of 2011, the volume of rubber yield was about 31,817 tonnes. In 2012, it was 45,993 tonnes and lastly, the rubber yield volume was 47,786 tonnes in the year of 2013.

This number also reflected the current situation of rubber market which can be predicted that in the year of 2014, rubber yield volume will be increasing as well as the total rubber plantations.

**Table 4.7** Rubber Yield Value in Chiang Rai Province in 2011-2013

No.	Districts in Chiang Rai Province	Rubber Value	Rubber Value	Rubber Value
		(Million Baht)	(Million Baht)	(Million Baht)
		2011	2012	2013
1	Chiang Khong	191.59	266.87	267.26
2	Thoeng	146.96	209.86	209.72
3	Doi Luang	140.59	189.91	190.14
4	Wiang Kaen	100.48	144.23	144.59
5	PhyaMengrai	82.91	121.52	136.79
6	Wiang Chiang Rung	85.78	126.63	126.5

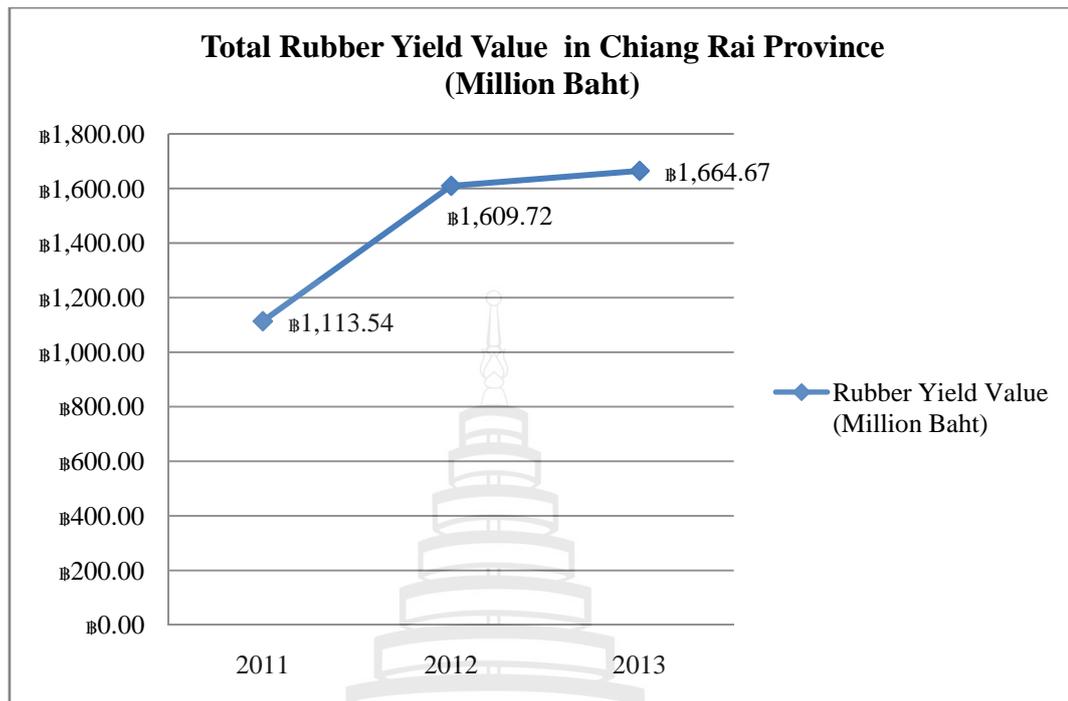
**Table 4.7** (continued)

No.	Districts in Chiang Rai Province	Rubber Value	Rubber Value	Rubber Value
		(Million Baht)	(Million Baht)	(Million Baht)
		2011	2012	2013
7	Chiang Sean	69.44	107.31	115.29
8	Mueang Chiang Rai	67.16	97.05	117.42
9	Mae Chan	46.58	71.89	72.02
10	Wiang Chai	37.59	67.83	67.91
11	Wiang Pa Pao	24.88	39.13	46.01
12	Phan	28.91	40.53	40.47
13	Mae Fah Luang	30.24	38.01	37.92
14	Mae Suai	27.3	37.76	40.99
15	Mae Lao	17.74	21.94	30.21
16	Khun Tan	6.33	14.24	14.22
17	Pa Daet	8.15	11.69	11.71
18	Mae Sai	0.91	3.32	3.33
<b>Total Price</b>		<b>1,113.54</b>	<b>1,609.72</b>	<b>1,664.67</b>

**Source** Thatphong Wongphum (2014)

This table shows the number of rubber price in Chiang Rai Province, arranging from the greatest price to the least price in 2011-2013. The result of rubber value (price) in this table is from the calculation of rubber yield (tonnes) times 35 which is the annual average price of cup lump rubber.

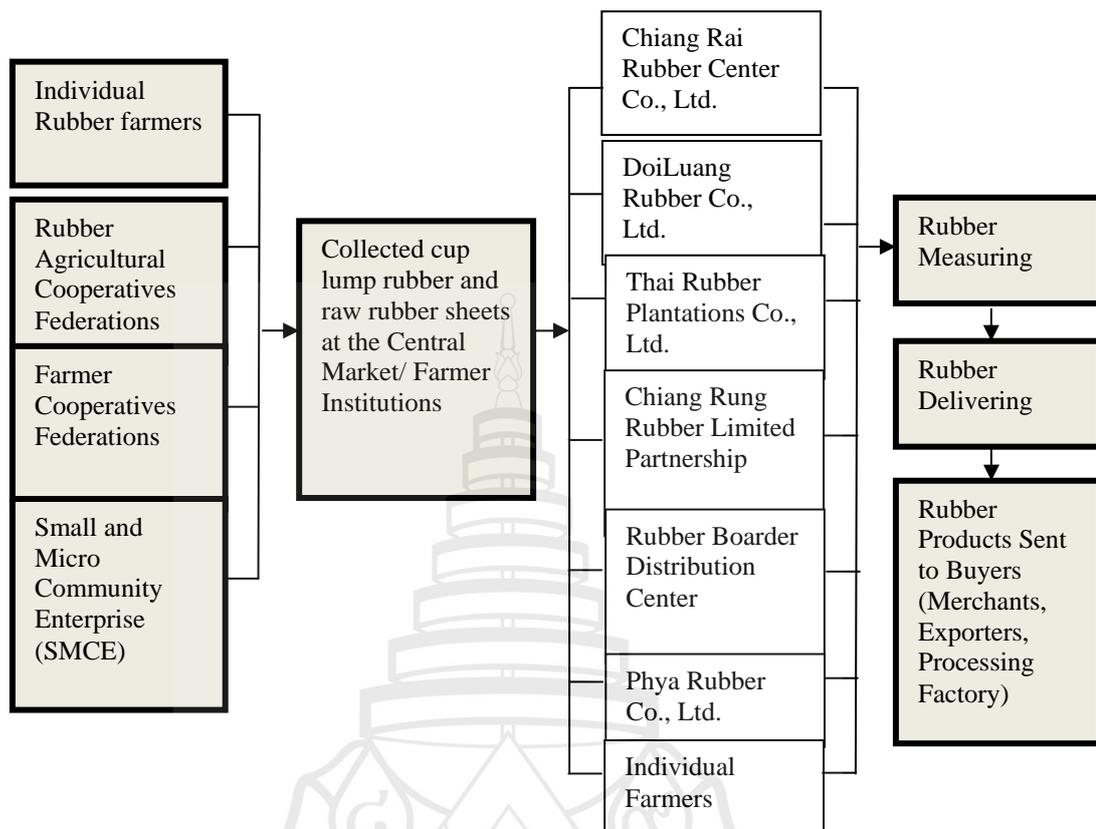
Remark: Cup lump rubber annual average price is 35 Baht/ kg. or 35,000 Baht/ 1 tonnes



**Figure 4.7** Rubber Yield Value (Million Baht) in Chiang Rai Province in 2011-2013

The chart above shows the value of rubber yield in Chiang Rai Province from 2011-2013. The total price of rubber yield in 2011 is about 1,113.54 Million Baht and it grows up to 1,609.72 Million Baht in 2012. In the year of 2013, the value of rubber yield in Chiang Rai Province is 1,664.67 Million Baht.

The next part will explain the problems occurred in Rubber Supply Chain in Chiang Rai Province mainly focuses on the first and the second tiers which are rubber farmers and the central markets.



**Figure 4.8** Highlight Problem Spots of Rubber Supply Chain in Chiang Rai Province

From Figure 4.3, the Office of Rubber Replanting Aid Fund mentioned about the problems occurred in rubber business the most in the parts of farmers and the markets. In facts, working on rubber business in Chiang Rai is not that complex but the difficulty is concerned with all the management system and how to cope with all the problems that may occur. On the other hand, there are also problems that happened and need to be solved by the persons in charge of its responsibility.

#### 4.1.4 Problems Found in Rubber Markets in Chiang Rai Province

Although there was a support by the government to promote rubber farmers and enhance the power in negotiation, rubber farmers are still faced with the problems caused by the middlemen. The middlemen have set the price which not related to the market situations. The bidders always determine the price and push the cost burden to the sellers. They also have high return expectation of cup lump rubber and rubber sheet selling prices

collected from the farmers and the processing factory. Besides, the quality of cup lump rubber is low. The middlemen, therefore, take this opportunity to set their own price and determine their own standard of rubber products. The other problem found is about the management system of the rubber farmer institutions which lead to the conflict within the organization. The group members lack to access marketing knowledge. Therefore, some individual farmers are attempting to split up and build their own individual groups around the areas where rubber plantations are. The current problem of the farmers is they lack of power to negotiate and receive the news about rubber markets and its prices.

The main problems are divided into two parts regarding to rubber markets

#### 4.1.4.1 Domestic rubber markets

1. Local rubber farmers lack of power to negotiate in the market and do not receive the rights from selling rubber products. This is because the majority farmers are individuals and do not have important roles in the market. Moreover, the poverty of the local rubber farmers caused this problem. The farmers therefore need to sell the products just to live in good conditions.

2. There are several levels of rubber merchants in the market. Each level has its own management and marketing cost which provide the low prices of rubber products for local rubber farmers.

#### 4.1.4.2 International rubber markets and exportations

1. Thailand's exports of rubber by countries of destination are still narrowed. Although Thailand export rubber products world widely, the main target markets are only China, Japan, USA, Malaysia, and the South Korea.

2. Rubber exporters holding high costs and the exportation processes are complex. They do not have enough conveniences in doing exportations widely.

3. Thailand does not have the outstanding roles of leading the rubber prices in the world market. This is because there is no international standard central rubber market. Therefore, rubber prices in the world central market seem likely to have an impact on domestic rubber prices which is not related to the realistic market in Thailand.

Although the problems occurred in rubber business, the solutions to solve the problems are also found. The problems concerned with the product quality need to take into consideration as well. In order to produce rubber material, we need the qualified rubber. It also costs more to produce because of time wasting and energy spending to

clean the dirt that come with the rubber. Standard Cup lump rubber needed to be clean, clear, no adulterating, odorless and colored.

Rubber supply chain lack of rubber cluster integration and no connection provided for each player in the structure. Each player of upstream, middle stream and downstream take its own responsibility.

Moreover, they lack of innovation and research in developing rubber plantation and how to get benefits from natural rubber and use them wisely in business field.

The problems mentioned above could be solved by the policies of the government. Every player in rubber supply chain including rubber farmers, rubber merchants, exporters and investors should help cooperating to achieve the goal.

## 4.2 Logistics Activity and Details of Rubber Business

In some part of Chiang Rai Province, for example in Chiang Khong District, farmers use motorcycle, pickup truck, auto mobile, and truck for rubber transportation at purchasing point or bid point. Afterwards, buyers will use 4, 6 or 10 wheel trucks to transport the rubber which depend on the quantity of rubber.

The processes of rubber supply chain activities are listed in the table below:

**Table 4.8** Processes of Rubber Supply Chain

Activity	Details
Land preparation	<p>Each authority has its own way of preparing the land to grow rubber trees. In case, it is the old plantations that have other plants, all the plants need to be removed and have only the stump of rubber trees for 50-60 cm remained.</p> <p>Each rubber tree requires the space for not less than about 20 square meters and each row should have around 2.5 meters space for rubber to grow best. (Wanchai Rattanawong, 2013)</p>

**Table 4.8** (continued)

<b>Activity</b>	<b>Details</b>
	<p>Things to take into consideration in this period is</p> <ol style="list-style-type: none"> <li>1. Rubber tapping should be done half of the rubber tree every two days (for some species only)</li> <li>2. Rubber tapping should be done half of the rubber tree every other day (for every specie of rubber)</li> <li>3. Rubber tapping should be done half of the rubber tree every two days with the concentrated chemical product of 2.5% (for the rubber that produce low production at the beginning e.g. GT.1.,PR 107 and Tier 1)</li> </ol> <p>For rubber-tapping after the first 3 years;</p> <ol style="list-style-type: none"> <li>1. Rubber tapping should be done half of the rubber tree every two days (for some species that its bark get dry easily )</li> <li>2. Rubber tapping should be done half of the rubber tree every other day (for some species and for some areas that has rubber tapping days less than 200 days)</li> <li>3. Rubber tapping should be done half of the rubber tree every two days together with 2.5% of the chemical product (for some species and the limitation of using this chemical product is 2-3 times a year) (Wanchai Rattanawong, 2013)</li> </ol>
Harvesting	<p>In northern Thailand, rubber famers do not need to get the latex at the middle of the night like in Southern Thailand because the weather in Northern Thailand is cooler. Rubber farmers can get latex at dawn.</p>
Individual selling	<p>Rubber farmers sells the product by themselves</p>
Middlemen contacting	<p>Rubber farmers have the contact with middlemen or rubber merchants to do the purchasing and negotiate the price</p>

**Table 4.8** (continued)

<b>Activity</b>	<b>Details</b>
Sorting/Grading	Natural rubber was collected from the small holders in various forms and separated into specific grades based on a visual inspection. One of which is called unsmoked sheet. Once these sheets went to the factory and sent through the smoking process, the smoked sheets were then compressed into various sized bales. These grades are still best for certain applications and are now available in a smaller packed similar to TSR type packaging.
Packaging	<p>Packing in 205kgs new steel drum, Flexi bag, Bulk, Tanker Ribbed Smoked Sheet 1no. (RSS1)</p> <p>Packing in 35kgs/bale, 111.11kgs/bale</p> <p>Packaging: Loose bale, Shrink Wrap and Wooden Crate Ribbed Smoked Sheet no. 3 (RSS3)</p> <p>Packing in 35kgs/bale, 111.11kgs/bale</p> <p>Packaging: Loose bale, Shrink Wrap and Wooden Crate</p> <p>Standard Thai Rubber (Block Rubber)</p> <ol style="list-style-type: none"> <li>1. STR 5</li> <li>2. STR General Purpose (GP)</li> <li>3. Carbon Compound Rubber</li> <li>4. SBR 1502 Compound Rubber</li> </ol> <p>Packing in 33.33kgs/bale and 35kgs/bale</p> <p>Packaging: Loose bale, Shrink Wrap and Wooden Crate</p>
Preparing for transference	<p>Things to take into consideration while preparing for transference</p> <ol style="list-style-type: none"> <li>1. Before having the rubber crates in the container, it is necessary to have the container cleaned otherwise the dust or some dirt may get contaminated with rubber products</li> <li>2. Temperature controlled is important in order to keep the color undeformed</li> </ol>

**Table 4.8** (continued)

Activity	Details
Transferring/ Transportation	<p>3. The thickness of rubber sheets is required to be consistency and packaging controlled are necessary</p> <p>4. The humidity in rubber sheet should not be over 5% because it can be the cause of fungus.</p> <p>Private rubber merchants and exporters have their own routes to export rubber product to other countries depends on the countries of destination. Besides, type of transportation also depends upon the types of rubber product.</p>

**Source** Thatphong Wongphum (2014)

#### Summary of Logistics Activities

Numbers of rubber trees in Chiang Rai Province are being planted by rubber farmers. There are several things to take into consideration such as land preparation, rubber-tapping and harvesting processes. Rubber farmers will sell the rubber at the local market where the middlemen or merchants come and negotiate the price. After that, it come the process of sorting, packing and delivering to the next destination which can be processing factory and exporters.

#### **4.2.1 Name lists of Exporters and Details of Rubber Transportation**

##### 4.2.1.1 Chiang Rai Inter Trade Import Export Partnership

440 Moo 3, Wiang sub-district, Chiang Saen district, Chiang Rai Province export Crepe rubber, Block rubber, RSS3 and Raw rubber sheet to China via the cargo ship passing Chiang Saen border and via the truck passing Chiang Khong border.

##### 4.2.1.2 Wangswiss International Partnership

export RSS3, Cup lump rubber to Lao PDR via the truck passing Chiang Khong border.

##### 4.2.1.3 Fo Yi Partnership

export rubber to China via the cargo ship passing Chiang Saen border.

##### 4.2.1.4 Amphalee Imports and Exports Partnership

873 Moo 3 Wiang sub-district, Chiang Saen district, Chiang Rai Province export RSS3 to China via cargo ship passing Chiang Saen border.

##### 4.2.1.5 Wornsroy Pholsomboon Partnership

300 Moo 2 Wiang sub-district, Chiang Saen district, Chiang Rai Province export Cup lump rubber to Lao PDR via truck passing Chiang Khong border.

##### 4.2.1.6 Lao Zhong Cheng Xin

export Cup lump rubber to Lao PDR via truck passing Chiang Khong border.

##### 4.2.1.7 Lan Chang 88 Shop

export Crepe rubber to Lao PDR via truck passing Chiang Khong border.

##### 4.2.1.8 Rubber Farm Product

export crepe rubber and RSS3 to China via the cargo ship passing Chiang Saen border.

##### 4.2.1.9 Thai-Isan Rubber Company

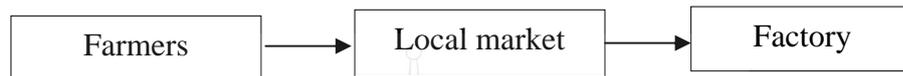
119 Moo 7 Yasothon Province (KhunKunchorn)

export RSS3 to China via cargo ship passing Chiang Saen border. Tel.045-

582-777

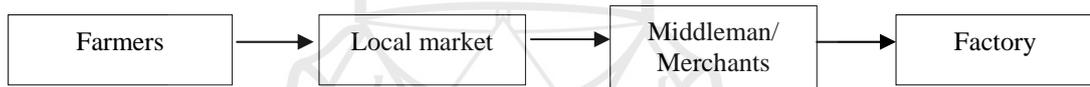
#### 4.2.2 Rubber Supply Chain Categories

Peeradech Thongapai (2011) has also claimed that the processes of buying and sell rubbers are various and the author have summarized as in the figures below



**Figure 4.9** Rubber Supply Chain (Type 1)

Famers sell rubbers to local market and then the market sells to the factory.



**Figure 4.10** Rubber Supply Chain (Type 2)

There are 4 main stages in all activities and is commonly used in nowadays business. It starts from Farmers sell the rubbers to local market and then to the middleman or rubber merchants. After that, the rubber will be sent to the factory.



**Figure 4.11** Rubber Supply Chain (Type 3)

Rubber farmers sell rubber to the merchants and the merchants sell them to the factory



**Figure 4.12** Rubber Supply Chain (Type 4)

Lastly, rubber farmers directly sell the rubber to the factory.

### 4.3 Five Force Model

Rubber Plantation in Chiang Khong District, Chiang Rai Province

#### 4.3.1 Rivalry Among Current Competitors:

According to the interview from rubber farmers in Huai So sub-district and Sri Donchai sub-district, we found that the majority of rubber farmers sell rubber products by setting the group price and they have middle market to collect rubber products. Rubber plantation in Chiang Rai Province or Northern Thailand is not yet familiar to local farmers; therefore, the competition is not that high comparing to rubber markets in Southern Thailand.

However, numbers of farmers became to consider more about rubber business after the announcement of the government. The Thai government is willing to promote rubber cultivating areas in Northern Thailand, particularly in Chiang Rai Province because they know that there are many factors that suit for rubber plantations in this region.

However, Ministry of Agriculture and Forestry seems likely to promote rubber plantation and present a growing body of knowledge regarding rubber development for Lao PDR. This is because of the demand in China seems likely increasing continuously but Lao PDR yet cannot grow rubber trees as much as Thailand. Thus, rubber farmers in

Thailand still have not received much effect from Laos PDR because they still believe in their capability in producing rubber.

In terms of purchasing rubber product such as Cup lump rubber and RSS in Northern Thailand, the middlemen will do the auction at the central points where the institutions of rubber farmers are ready by working every 10-15 days to reduce the cost of transportation and build up power to negotiate in the market. Rubber farmers will form the group and select the committees to work in charge of talking control the place, equipment, and the processes of rubber purchasing in Chiang Rai Province. Particularly rubber quality checking, details of the amount of rubber need to be informed to the bidders in order to make decision and offer the prices.

However, the bidders are the persons who determine the buying prices. The ways of purchasing rubber can be divided into two ways: Firstly, Farmer Institution will pay with reserve money to rubber farmers immediately after knowing the auction price. Secondly, Bidders will pay with cash directly to rubber farmers.

Moreover, bidders are also responsible for all transportation costs and other managerial cost in Farmer Institution for 0.35-0.50 Baht/ kg. depends on the contract or mutual agreement to pay the dividend back to the member.

Therefore, the period of closing the rubber-tapping will be the most expensive time of rubber production because of the low supply and high demand which mostly held in February-March of every year.

#### **4.3.2 Bargaining Power of Suppliers**

Rubber latex and rubber products are mostly produced from the same sources. Therefore, most suppliers seemed lively have more power because there are factories produced rubber of products and rubber markets are limited. Not every village in Chiang Rai Province runs rubber business. However, it is possible to lower their power in several ways. Rubber farmers and sellers need to negotiate the prices by gathering together.

In the case of rubber farmers in Northern Thailand, rubber farmers need to purchase order of fertilizer and other agricultural tools for huge amounts. Moreover, they need to negotiate with suppliers to get the discount and good prices.

Other benefit gained is the group formed may become privileged customers of the suppliers. Customers will have more power to negotiate with the suppliers in order to reduce the price.

#### **4.3.3 Bargaining power of customers**

From “Bargaining power of suppliers”, the buyers can get cheaper price and the suppliers seem likely to have less power in negotiation but the selling price in the market will be all about the same or slightly different and they cannot bargain too much. They need to agree with the price. For other profits, it should not affect the price that both sides have agreed.

Recently, many organizations are working for rubber business and putting efforts to manage the situation when shortage and surplus of rubber in the market by doing activities listed below:

4.3.3.1 Promote and encourage people to use rubber and also the projects of the government such as Rubber City and Rubber Road. Reduce raw material exports and its stock in the world market.

4.3.3.2 5 Years Policy on Agricultural Land Reform in Thailand (2013-2017) including Smart Farmer, High-quality of Agricultural Product (Food) Policy, Agricultural products and its economical border management (Zoning), and the policy that covers the AEC (ASEAN Economic Community) The latest policy aims to push the potential of agricultural products border, promote and centralize the seed and agricultural machines as the main producer. This can raise the income for over 2.2 million household which accounts for 20% per year.

#### **4.3.4 Threat of Substitute Products or Service**

Rubber plantation is specific product which is considered uncommonly found in normal market. Only some parts of Thailand can grow rubber trees not every province. Besides, substitute items of rubber cannot be easily found in the market as well. In order to lower the power of substitute products, the products need to be unique and not easy to make on their own. Rubber product is not something to be substituted.

Therefore threat of substitute products or service is not the main problem for rubber business nowadays. According to the interview by The Office of Rubber Replanting Aid Fund, reported that there is no supplementary for rubber or rubber latex.

#### **4.3.5 Threat of new entrants**

Rubber business seemed likely to have good opportunity because the demand within the country and international are still high. Therefore, this business is quite interesting and it is difficult to defend from new investors or new entrants. The majority of rubber farmers in Northern Thailand are from the Southern Thailand and some of them have background in doing rubber business.

However, the problem found recently is not about treats of new entrants but labor management. It is quite difficult to get qualified labors to work in rubber industry. On the other hand, the new entrants need to enroll the group in order to promote their business together with others by letting others know they are also doing rubber business. Otherwise, the opportunities to sell the products are lower than those who are gathering together. This is because the brand created is stable enough.

According to the information from Rubber Research Institute, Department of Agriculture (n.d.): quoted in Thatphong Wongphum (2014), they reported that the world rubber yield in 2011 were at 11.30 Million Tonnes and will be rising up to 13.77 Million Tonnes in 2015. The overall production from Thailand are in good condition since 2007-2011 and in the year of 2007, Thailand could produce 3,056,005 Tonnes and rose up to 3,569,033 Tonnes in 2011 which accounts for 16.8%. Thailand can produce the most STR (Standard Thai Rubber) in the world followed by RSS (Ribbed Smoked Sheet) and the concentrated latex.

The report also showed that the potential of Thailand and the other main countries to produce rubber is continuously rising up to 80% of the total world rubber. The main countries which produce rubber to the world market are Thailand, Indonesia, Malaysia, India, and Vietnam. Only the production from Thailand already accounts for 30% of the world production.

However, the last 5 years, Vietnam has been working hard to become the rubber exporter. Their production ratio also increased sharply by 7.0% Moreover, Cambodia is another country that became more noticeable.

## **4.4 Problems of Rubber Farmers in Supply Chain System Analysis**

### **4.4.1 Government**

The problem that government may play the role to make it better is concerning with the incorporation of farmers. The main problem is in Northern Thailand particularly in Chiang Rai province, it is lack of transforming factory in some particular areas. There are only places where to purchase cub lump rubber and it is easier to make cup lump rubber and preferred by numbers of farmers. However, cup lump rubbers gain less profits comparing to other kind of products of rubber plantations. The researchers suggested that the government should solve this problem by help promoting the rubber transforming policy in local districts or provinces and keep promoting productions in industry sector. Overall, the government sector should look after from upstream to downstream.

### **4.4.2 Economics**

In economics term, the problems found in rubber business included the price being cut off by middlemen and if rubber farmers in Chiang Rai province wish for good price which is higher than what they normally earn, they need to sell rubber plantation in Phayao province which is about a hundred kilometer away. Sometimes the transportation cost does not worth the selling prices. The researchers suggest that if farmers would like to be more convenience to sell the products in local area, prices should be based on merchants. However, if the farmers wish for a fair price, they need to have strongly integration among the farmers and collect a large amount of rubber to sell at the middle market.

### **4.4.3 Externality**

From 5-9 may 2014, rubber price was slightly shifted by 59.83-61.62 Baht per Kg. because of the world economic and social issues. Oil prices, International currency, stock of rubber products in China, Japan, and Thailand are external reasons cause the change and threat in rubber business.

#### **4.4.4 Structure and Competitive Market**

The problem of setting rubber plantation schedule from the beginning until harvesting period is from the lack of knowledge of farmers. The output is also supposed to be predicted in advance before launching to the market otherwise it will be considered as an unorganized system.

On the other hand, the problem of rubber species is mostly used wrong rubber species. This is because the farmers do not know what kind of breeds the best and most suitable for planting under the guidance of the public section or professionals with knowledge of the rubber plantation.

#### **4.4.5 Domestic Production Factor**

Problem of transportation is up to 50% of all problems including warehouses problem such as inventory, expenditure, problem of packaging of the rubber during transportation, problem of the route toward buyers, problem of transportation and problem of choosing appropriate vehicles to transport. Therefore, transportation is the biggest problem because the farmers do not plan to build a warehouse to store the products. They sell the cup lump rubber within 10 days at a time and do not have the products stocked in case of bargaining in the future. Moreover, the distance of transportation is quite far and difficult to harvest. The problem is also from the farmers that they have not used appropriate vehicles for transportation.

The main problems occurred in rubber supply chain have mentioned above and the author will use SWOT analysis to analyze strength, weakness, opportunity, and threat in doing rubber business in Northern Thailand.

## 4.5 SWOT Analysis

“SWOT Analysis toward rubber supply chain and investment in Chiang Rai Province” in the point of view of the Office of Rubber Replanting Aid Fund

**Table 4.9** Strength of Rubber Business in Chiang Rai Province

No.	Strength (S)
1	Chiang Rai Province is located in good location where it is connected to GMS (Greater Mekong Sub-region) countries which is a great place to do exports on rubber product and other agricultural products.
2	Chiang Rai Province has the most rubber plantations in Northern Thailand and its productions are in the amount that enough for domestic demand.
3	Although there is no large processing factory in Chiang Rai Province, there are several entrepreneurs and investors willing to set up the processing factory in Chiang Rai Province in the future.
4	The community of rubber farmers in Chiang Rai Province is strong. Therefore, it is not that difficult to form the team and gather together to develop for better future.
5	The Office of Rubber Replanting Aid Fund was established to help promoting rubber plantations and train local farmers to do plantation properly with knowledgeable teams. They also train the farmers about marketing and enrich high quality rubber as well.
6	Rubber plantation can be grown together with other economic plants

**Source** Thatphong Wongphum (2014)

**Table 4.10** Weakness of Rubber Business in Chiang Rai Province

No.	Weakness (W)
1	Promoting knowledge and training farmers are not yet covered all the rubber farmers in Chiang Rai Province
2	Some of the rubber farmer institutions are not strong enough in some points
3	Time spending for receiving up-to-date information and injustice price beat by the middlemen
4	Lack of knowledge to sharpening and transforming rubber and market still requires for good leaders
5	Lack of the same standard management
6	Lack of statistical information such as actual numbers of rubber plantations, rubber-tapping zone, the amount of rubber yield in Chiang Rai Province and in some other provinces including exports and the numbers of groups in Chiang Rai Province
7	The direction of the policy is not yet clear which has an impact on provincial rubber marketing
8	Information technology management is not yet stable and reliable. It is not fully working well.
9	Most of rubber farmers are small holders and they are carrying high production costs and faced with problems about the productions
10	Some rubber farmers do get the rubber latex wrongly which affects the rubber latex eventually
11	No standard criteria to determine the price and the quality of Cup lump rubber

Source Thatphong Wongphum (2014)

**Table 4.11** Opportunity of Rubber Business in Chiang Rai Province

<b>No.</b>	<b>Opportunity (O)</b>
1	Local office always help promoting the projects related to rubber plantations and encouraging local farmers to work more effectively
2	Chiang Rai is located in good location and nice atmosphere which suitable for growing rubber trees.
3	Rubber trees have good potential to increase people's quality of lives
4	The world population is increasing causes the rubber demand consumption to increase. When the world oil price increases, the rubber price seems likely to increase as well.
5	The corporations of rubber producing countries create the power in negotiation the price and fight over the stability in the world market
6	The varying atmosphere and disasters of other countries causes the price of rubber to be higher
7	Rubber seedlings supported by the office of the rubber replanting aid fund
8	AEC Market in 2015
9	Markets in China, The USA and EU still requires products from Thailand
10	Other support from government sector

**Source** Thatphong Wongphum (2014)

**Table 4.12** Threat of Rubber Business in Chiang Rai Province

No.	Threat (T)
1	The main rubber products are in the form of raw material and processing rubber sheets. The market for Thailand and Chiang Rai is International markets or mostly exports. Therefore, it takes high risk in price and many opportunities lost
2	Rubber in Thailand involves with both public and private sector which is not flexible to cope with both sides.
3	The trend of rubber plantations seems likely to go further to some other countries such as Indonesia, Laos, Vietnam, and Cambodia rapidly. This is because rubber trees can be grown in any countries that have similar atmosphere as Thailand. Those countries will become Thailand's competitors in the future.
4	Transportation system and taxes need to be agreed from both side in terms of exportation

**Source** Thatphong Wongphum (2014)

To summarize SWOT Analysis shortly, the strength of rubber business in Chiang Rai Province is Chiang Rai Province is located in good location where it is connected to GMS countries which is a great place to do exports on rubber product and other agricultural products. It also has the most rubber plantations in Northern Thailand. However, there are still numbers of weakness of rubber as well; they are lack of knowledge to sharpening and transforming rubber and also lack of statistical information such as actual numbers of rubber plantations, rubber-tapping zone. On the other hand, rubber business in Chiang Rai Province seems likely to have various opportunities which are AEC Market, markets in China, the USA and EU and there is also other support from government sector. But there are some threats as well which are related to the relationship

between the public and private sector in Thailand. It is not flexible to cope with both sides.

Lastly, the trend of rubber business in Chiang Rai Province seems likely to go well. One of the main reasons is from the policy of local government and the Office of Rubber Replanting Aid Fund that are working to promote rubber products in local areas which also give useful knowledge for local rubber farmers. The numbers of rubber plantations, rubber-tapping zone, rubber farmers, rubber yield volume and rubber yield value are increasing gradually but continuously every year. This year 2014, rubber business in Chiang Rai Province still have a steady trend.

However, the fluctuation can also happen at any time. Keeping in touch with rubber news and the current economic situation can also help in updating the market in the future.

There are several factors concerned with rubber price which have impacts on bargaining power of suppliers.

1. Demand of rubber depends on the world economic condition particularly for those whom are the main target markets such as China, Japan, EU, and the USA. Once the economy in China faced with problems in 2013, it had an impact on rubber demand as well.

2. Supply of rubber products depends on the weather atmosphere and technology. In the year of 2013, the world rubber yield has increased up by 5.5% regarding to rubber plantations extension in rubber producing countries.

3. The Tokyo Commodity Exchange (TOCOM) is another factor that influences rubber prices in the real market including rubber market in Thailand.

4. The world oil price also has an impact on rubber price. According to the previous information about the price, the world oil price and rubber price are always related to each other except in 2010 and 2011 that rubber price seemed likely to be more fluctuated than the oil price because of the varying atmosphere and the disaster called Tsunami in Japan.

5. The factor such as the huge flood in Thailand also caused the production chain stumble and affected the world rubber demand. Moreover, currency exchange, rubber stock, population increasing, government policy, including the political situation always have the impacts on rubber price.

Data Collection Part One demonstrated the structure of rubber supply chain including general information concerned with rubber farmers, private rubber merchants, and statistic data about rubber plantations, rubber-tapping zone, and population of rubber farmers, rubber yield and its value in 2011-2013. It showed that in each year, numbers of rubber plantations are increasing as well as rubber products and farmers. Moreover, the problems in rubber supply chain also mentioned.

On the other hand, Data Collection Part Two collected from rubber farmers in Huai Si and Sri Donchai Sub-districts demonstrated the current information of rubber farmers in those two sub-districts. Moreover, the information about Logistics activities and details of rubber business were analyzed. Besides, the name lists of rubber exporters in Chiang Rai Province were also mentioned. Furthermore, there was supply chain categories summarized shortly as well. After that, the Five Force Model and SWOT Analysis were used for analyzing the current situation of rubber business in Chiang Rai Province.

According to the information received for this study, there is no such a reliable source or statistic data of rubber produced only in Chiang Rai Province for exports. There are number of rubber products being export from Thailand to international market such as China, EU, USA, Japan and Laos. Moreover, in 2014, the number of rubber populations seemed likely to rise due to the policy of the government and local organization to promote rubber planting in Chiang Rai Province regarding to the statistic data of rubber population from 2011-2013 from the Office of Rubber Replanting Aid Fund.

On the other hand, the price of cup lump rubber in Chiang Rai Province is fluctuated. In some years, it raised up to 65 Baht per kg. and it could fall until 20 baht per k as well. The Office of Rubber Replanting Aid Fund in Chiang Rai Province agreed the price of 35 Baht per kg. for this study.

According to the previous study and the interview of rubber farmers in Chiang Rai Province by telephone, in the past, farmers in Chiang Rai Province have been doing agricultural work for example, working in rice field and some agricultural products such as corn, cassava, and peas.

Recently, rubber farmers in Chiang Rai Province paid attention to rubber plantations more because of high demand in each year and it could develop living styles of local farmers continuously. Besides, doing rubber plantations also create more income

for the family of the farmers. Therefore, numbers of farmers seemed appreciated with rubber plantations in Chiang Rai Province.

In the point of view of the farmers in Chiang Rai Province, they believe that they have enough capability to produce rubber product to the market but they also need to do it correctly and they are working hard to reduce all unnecessary cost. Rubber farmers need qualified model to lead them to do rubber plantations. The opportunity of farmers is also the projects provided by the government. Moreover, the threat is how to work on it effectively and keep the rubber product on the list for international markets.

Besides, the point of view of the middlemen represented the details of rubber products in Chiang Rai Province that they also purchase for different kind of agricultural products which is not only rubber product. Those products are fruit and vegetables.

Nowadays, the situation of rubber market in Chiang Rai Province is still positive in the world market. The producers need to control the quality of the product in order to keep the customers in touch with their products.

The strength of rubber products in Chiang Rai Province toward the middlemen or the exporter is some of them required for better quality of rubber products to ensure the international market that the product from Chiang Rai and Thailand is qualified. The weakness is still related with the prices and how to get ready with the new entrances like some producing countries such as Vietnam and Cambodia.

In conclusion of the result of this study, the audience will receive information of different part in rubber supply chain including rubber farmers and the middlemen from the Office of Rubber Replanting Aid Fund as the center of all players in rubber supply chain in Chiang Rai Province in 2014.

## **CHAPTER 5**

### **CONCLUSION AND DISCUSSION**

This chapter discusses about supply chain management of rubber plantations in Chiang Rai Province by using Five Force Model and SWOT analysis model. The information is based on the primary data from interviews and questionnaires. The author focuses on factors that have the impact on supply chain management of rubber business in Chiang Rai Province which included the problems of harvesting, transportation, distribution, and price.

According to the sub objectives mentioned in Chapter 1, here in Chapter 5 will be the conclusion of all the study following by each objective.

1. To study supply chain in rubber plantation and the current situation of the market business in Chiang Rai Province
2. To study the advantages of rubber cultivation in Chiang Rai Province

#### **5.1 An Analysis of Five Forces Model**

##### **5.1.1 Rivalry Among Current Competitors:**

Rubber plantation in Chiang Rai Province or in Northern Thailand is not yet familiar to local farmers; therefore, the competition is not that high comparing to rubber markets in Southern Thailand.

##### **5.1.2 Bargaining Power of Suppliers**

Rubber farmers and merchants need to negotiate to negotiate with each other to get good prices the both side agree. Other benefit gained is the group formed may become privileged customers of the suppliers. Customers will have more power to negotiate with the suppliers in order to reduce the price.

### **5.1.3 Bargaining Power of Customers**

The buyers can get cheaper price and the suppliers will have less power in negotiation but the selling price in the market will be all about the same or slightly different and they cannot bargain too much. They need to agree with the price. For other profits, it should not affect the price that both sides have agreed.

### **5.1.4 Threat of Substitute Products or Service**

Threat of substitute products of rubber is not the main problem for rubber business. The Office of Rubber Replanting Aid Fund strongly agreed that there is no supplementary for rubber or rubber latex.

### **5.1.5 Threat of New Entrants**

The last 5 years, Vietnam has been working hard to become the rubber exporter. Their production ratio also increased sharply by 7.0% Moreover, Cambodia is another country that became more noticeable but Thailand is still the number one in rubber producing country.

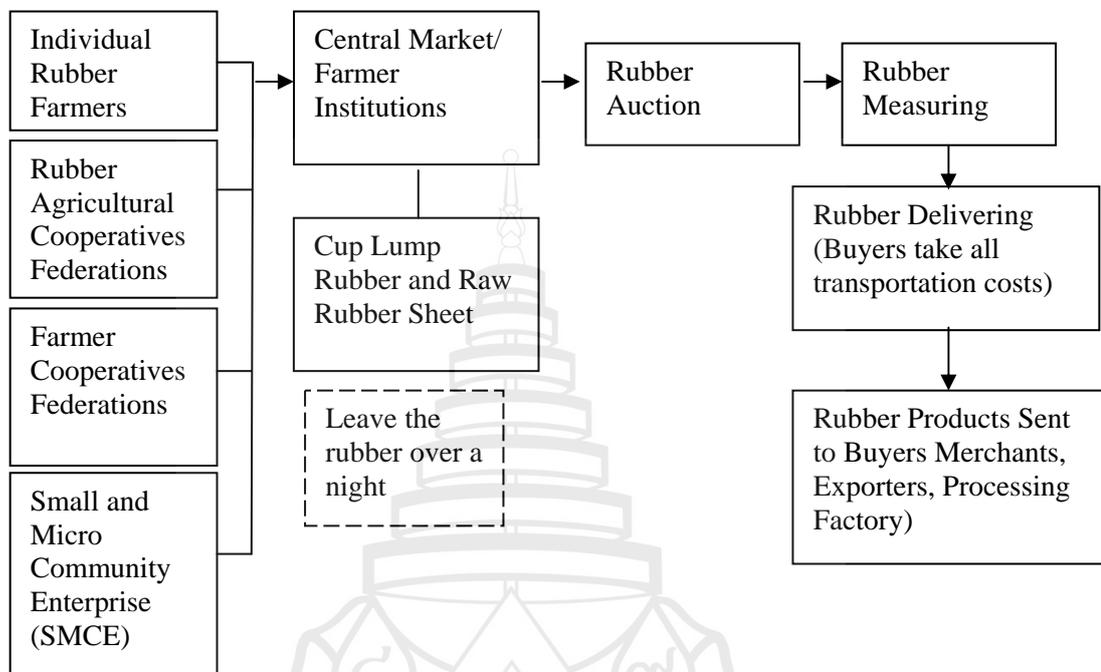
In short, Five Force Model in this study demonstrated the current situation of rubber business in Chiang Rai Province which included the current competitors. If we compare rubber in Chiang Rai Province within Thailand, the competitors will be rubber from Southern and Northeastern Thailand. However, if we compare rubber of Chiang Rai with some other countries in ASEAN or among our neighboring countries, the competitor will be Vietnam, Cambodia, and Lao PDR.

In terms of bargaining power of suppliers and customers, farmers need to understand the market so that they will not get exploited by the middlemen. Currently, the government sector and related organizations are encouraging local farmers and people to study more about rubber plantations particularly how to do rubber plantations in their local areas. Therefore, rubber business may have good opportunity in many ways in the future even though there is no other product which can replace rubber nowadays. That is not the major problems since Thailand still can produce large amount of rubber product every year.

## 5.2 An Analysis of SWOT

SWOT Analysis in this study demonstrates the current conditions of rubber business. The interview represented that nowadays; rubber in Chiang Rai Province has the strength in location and has good weather for planting rubber trees. Besides, the local farmers are quite interested in doing plantations so they are quite active in gathering or forming groups together. Furthermore, there are many investors that would like to invest in rubber business in Chiang Rai Province because of the conditions of the location, farmers, and products. However, there are numbers of its weakness from the interview as well. Those weaknesses are the readiness of rubber farmer institution and knowledge towards rubber plantations in Chiang Rai Province. Some of rubber plantations in Chiang Rai Province are lack of same standard management and lack of knowledge to sharpening and transforming rubber and market still requires for good leaders. There is, on the hand, not enough statistical information such as actual numbers of rubber plantations, rubber-tapping zone, the amount of rubber yield in Chiang Rai Province and in some other provinces including exports and the numbers of groups in Chiang Rai Province. Moreover, most of rubber farmers are small holders and they are carrying high production costs. Next is about the opportunity found in rubber business in Chiang Rai Province. To discuss shortly, Thailand and the neighboring countries are counting down toward ASEAN Community in 2015. ASEAN Citizen and investors are discussing a lot about the AEC or ASEAN Economic Community 2015 that will promote economy in ASEAN countries. Thailand, of course, will get the benefit from exporting rubber and do more market in ASEAN Countries. Not only ASEAN market, the market in EU, USA, Japan and China are still opening for rubber from Thailand. Lastly, the threat of rubber business and investment in Chiang Rai Province will be concluded. The trend of rubber plantations seems likely to go further to some other countries such as Indonesia, Laos, Vietnam, and Cambodia rapidly. This is because rubber trees can be grown in any countries that have similar atmosphere as Thailand. Together with AEC 2015, there will be issues regarding to taxation and transportation system in ASEAN Countries which need to be agreed from both side in terms of exportation.

### 5.3 Supply Chain of Rubber Business in Chiang Rai Province

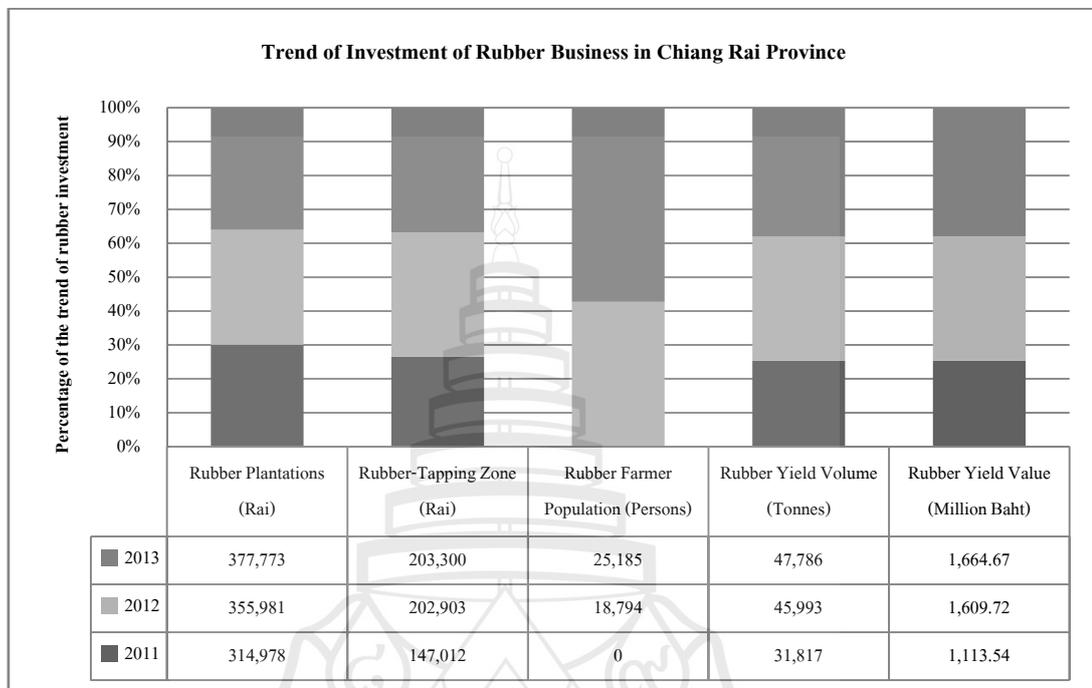


**Figure 5.1** Rubber Supply Chain in Chiang Rai Province

The four main groups of rubber farmers in Chiang Rai Province are Individual rubber farmers, Rubber Agricultural Cooperatives Federations, Farmer Cooperatives Federations, and Small and Micro Community Enterprise. These groups of farmers start forming the group together and collect rubber products at their central market.

The main products are cup lump rubber and raw rubber sheet. The rubber will be left over a night at the central market and after that the middlemen will do the auction, negotiation or bargaining the prices. With that, the rubber products needed to be selected and measured weight before delivering to the next players which are rubber merchants, exporters, or processing factory. In this process, rubber buyers will take the responsibility of all transportation cost.

## 5.4 Trend of Investment of Rubber Business in Chiang Rai Province



**Figure 5.2** Trend of Investment of Rubber Business in Chiang Rai Province

Figure 5.2 represents the summary of statistic data related to rubber business in Chiang Rai Province during the period of 2011-2013. It demonstrated the numbers of rubber plantations, rubber-tapping zone, rubber farmer population, rubber yield value and rubber yield volume. These numbers are increasing gradually every year and seemed likely to increase this year and the next coming years as well.

## **5.5 Discussion of the Model and Suggestions**

### Guidance toward Rubber Industry Development

#### **5.5.1 For Industrial Sector**

5.5.1.1 Establish new data base that is reliable with details of production and quality in order to get ready for supplying rubber to the market.

5.5.1.2 Promote rubber development in Thailand including system management and rubber maintenance with reasonable costs.

5.5.1.3 Promote the industry to use Thai rubber as raw material including taxation management

5.5.1.4 Develop deep-sea port to be more effective. Nowadays, huge amount of rubber products are being exported via cargo ship. The majority of rubber products are exported to China from Laemchabang Port. If the port in Chiang Rai Province is able to export rubber products directly to China, the transportation cost will be saved for rubber farmers and exporters in Northern Thailand.

5.5.1.5 Promote cooperation among private sectors within the country in order to reduce the problems concerned with price cutting

#### **5.5.2 For Government Sector in Trading**

5.5.2.1 Promote mutual understanding among ASEAN Partnerships to have the common purposes in trading, particularly rubber supply management

5.5.2.2 Encourage Free Trade Area Agreement with China

5.5.2.3 Promote International trading between Thailand and China because China has more qualified personnel working in rubber field. For example, rubber engineers

## **5.6 Limitations of the Research**

Most of research paper has some certain point of limitation and which might have an impact on the outcome of the paper to change slightly. In this research paper, the first limitation was the details of the information. The author focused only Chiang Rai Province because it is simpler to collect data. Unfortunately, The Office of Rubber Replanting Aid Fund could provide the statistics data from 2011-2013 only. For the last five years data, the author needed to contact the Office of Agricultural Economy in Bangkok. However, the Office of Agricultural Economy could not provide information of each district in Chiang Rai Province. They could provide the information of the whole Chiang Rai Province and Thailand only.

Secondly, the data collected from the Office of Rubber Replanting Aid Fund were not completely accurate because they admitted that they are also lack of the actual statistics data.

However, although particular limitations were identified, these limitations did not affect main study of this research. It could have been better to have more statistics data to see the trend of rubber plantations in Chiang Rai Province clearly.

## **5.7 Recommendations for Further Research**

This research paper provided some previous statistics data of rubber plantations in Chiang Rai Province from 2011-2013. The trends of rubber business in Chiang Rai Province seem likely to rise up gradually. However, many threats and opportunities were also found. The further research may go through its opportunities and discuss how different between before and after AEC 2015. Will there be any more differences in rubber industry, particularly in Chiang Rai Province or will the statistics data be shown more details from 2013?

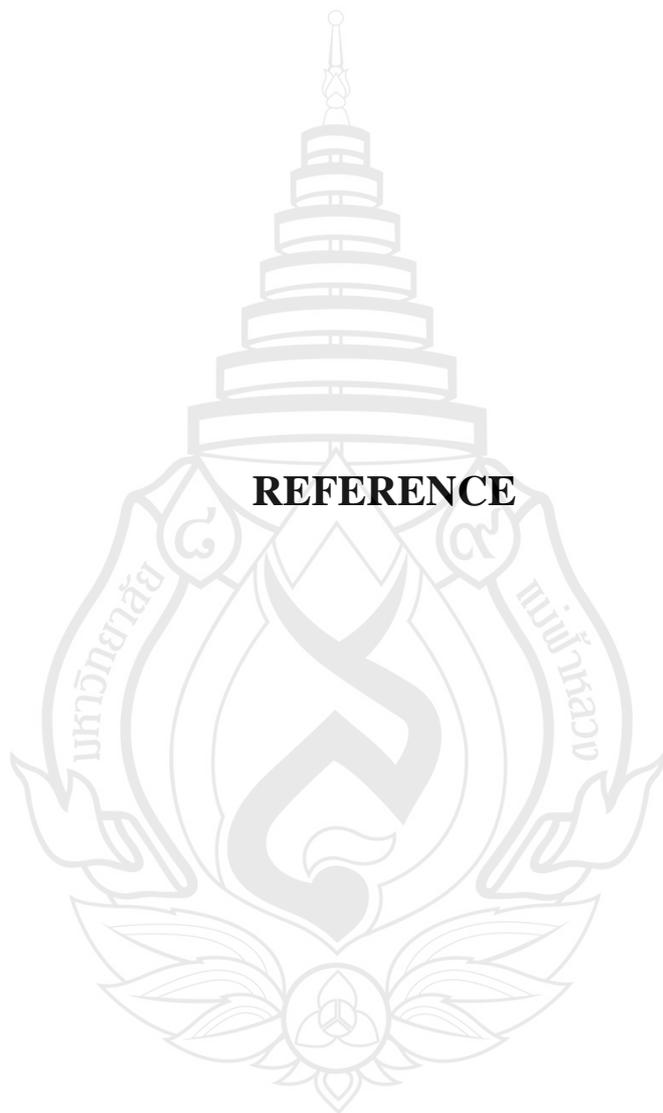
## 5.8 Conclusion

Firstly, from the study of rubber supply chain, the parts where the problems found the most are at the farmers and the middlemen part. This is because in a certain point, the problem concerned with price and rubber market does not have well management yet. Rubber farmers in Chiang Rai Province do not receive fair prices and lack of marketing knowledge toward rubber business.

Secondly, the strength of rubber business in Chiang Rai Province is Chiang Rai Province is located in good location where it is connected to GMS countries which is a great place to do exports on rubber product and other agricultural products. It also has the most rubber plantations in Northern Thailand. However, there are still numbers of weakness of rubber as well; they are lack of knowledge to sharpening and transforming rubber and also lack of statistical information such as actual numbers of rubber plantations, rubber-tapping zone. On the other hand, rubber business in Chiang Rai Province seems likely to have various opportunities which are AEC Market, markets in China, the USA and EU and there is also other support from government sector. But there are some threats as well which are related to the relationship between the public and private sector in Thailand. It is not flexible to cope with both sides.

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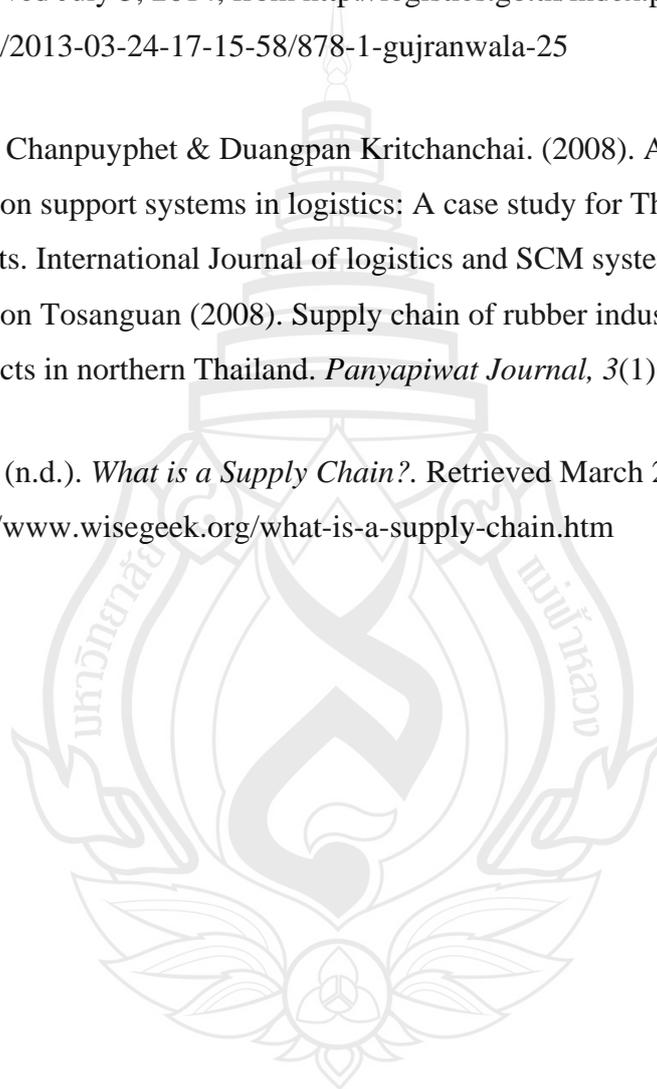
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**APPENDICES**



## APPENDIX A

### SURVEY

**A1** Letter of ask for permission for the survey questionnaire (Thai)

เรื่อง ขอกความอนุเคราะห์เก็บข้อมูลแบบสอบถามเพื่อการวิจัย

เรียน ผู้อำนวยการสำนักงานกองทุนสงเคราะห์การทำสวนยางจังหวัดเชียงราย

เนื่องด้วย นางสาวสุทธินิ แจ่มนิยม นักศึกษาระดับปริญญาโท สาขาวิชาการจัดการ โลจิสติกส์และซัพพลายเชน สำนักวิชาการจัดการ มหาวิทยาลัยแม่ฟ้าหลวง ได้รับอนุมัติให้ทำวิทยานิพนธ์เรื่อง “การจัดการโซ่อุปทานสวนยางพาราในจังหวัดเชียงราย (SUPPLY CHAIN MANAGEMENT IN RUBBER PLANTION IN CHIANG RAI PROVINCE)” โดยมีวัตถุประสงค์ในการศึกษาถึงโซ่อุปทานยางพาราในจังหวัด เชียงราย โดยมีท่านอาจารย์ ดร.สุเทพ นิ่มสาย เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์

ในการนี้ นักศึกษามีความจำเป็นที่จะต้องทำการเก็บรวบรวมข้อมูลเพื่อใช้ในการศึกษาวิจัย จึงใคร่ขอกความอนุเคราะห์ท่าน ในการให้สัมภาษณ์ข้อมูลที่เกี่ยวข้องกับการทำสวนยางพาราในจังหวัด เชียงราย

จึงเรียนมาเพื่อโปรดพิจารณาและ ขอขอบพระคุณเป็นอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(ดร.สุเทพ นิ่มสาย)

ประธานกรรมการบริหารหลักสูตรบริหารธุรกิจมหาบัณฑิต  
สาขาการจัดการ โลจิสติกส์และซัพพลายเชน

## A2 Questionnaire (Thai)



## MAE FAH LUANG UNIVERSITY

แบบสำรวจเรื่องการจัดการโซ่อุปทานและแนวโน้มการลงทุนธุรกิจยางพาราในจังหวัดเชียงราย

วัตถุประสงค์แบบสำรวจนี้ จัดทำขึ้นเพื่อใช้ในการรวบรวมข้อมูลสำหรับงานวิจัยภายใต้หัวข้องานวิจัย “การจัดการโซ่อุปทานสวนยางพาราในจังหวัดเชียงราย (SUPPLY CHAIN MANAGEMENT IN RUBBER PLANTION IN CHIANG RAI PROVINCE)” โดยมีวัตถุประสงค์ในการศึกษาถึงโซ่อุปทานยางพาราในจังหวัด เชียงราย โดยมีวัตถุประสงค์ในการศึกษาถึงโซ่อุปทานยางพาราในจังหวัด เชียงราย

ข้าพเจ้าขอขอบพระคุณยิ่งที่ท่านได้สละเวลาให้ข้อมูล ที่เป็นประโยชน์ต่องานวิจัยและจะเป็นประโยชน์อย่างมากต่อการพัฒนาระบบโซ่อุปทานยางพาราในจังหวัดเชียงรายในอนาคต

การสำรวจข้อมูลในครั้งนี้เป็นส่วนหนึ่งของการทำโครงการวิจัยชั้นปีสุดท้ายของนิสิตระดับมหาบัณฑิต สาขาการจัดการ โลจิสติกส์และซัพพลายเชน สำนักวิชาการจัดการ มหาวิทยาลัยแม่ฟ้าหลวง โดยแบบสำรวจในครั้งนี้แบ่งออกเป็น ๓ ส่วน ดังต่อไปนี้

### ส่วนที่ ๑ ข้อมูลทั่วไป

#### ๑.๑ สถานการณ์ปัจจุบันของตลาดยางพาราในจังหวัดเชียงราย

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#### ๑.๒ การส่งเสริมการปลูกยางพาราในจังหวัดเชียงราย

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๑.๓ นโยบายของรัฐบาลเพื่อสนับสนุนการปลูกยางพาราและนโยบายด้านการตลาด

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๑.๔ ปัญหาที่พบมากในตลาดยางพาราจังหวัดเชียงราย

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๑.๕ ตลาดยางพาราและคุณภาพของยางพาราในจังหวัดเชียงราย

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ส่วนที่ ๒ ข้อมูลสำหรับการประยุกต์ใช้ Five Force Model

๒.๑ การต่อรองราคา กระทำที่ใด ช่วงใด มีการตกลงกันอย่างไร

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๒.๒ ช่วงใดที่ราคายางมีการปรับตัวสูงที่สุด เนื่องจากปัจจัยใดบ้าง

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๒.๓ หากยางพาราขาดตลาด สามารถมีสินค้าอื่นใดมาทดแทนได้หรือไม่ อย่างไร

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๒.๔ แนวทางการแก้ปัญหาหากเกิดปัญหาทางพาราขาดตลาดหรือยางสั้นตลาด

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๒.๕ คู่แข่งทางธุรกิจที่ปลูกยางพาราแข่งกับจังหวัดเชียงราย (ทั้งในและต่างประเทศ)

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ส่วนที่ ๓ ข้อมูลสำหรับการประยุกต์ใช้ SWOT Analysis

### 4.3 SWOT Analysis

#### Strength of Rubber Business in Chiang Rai Province

No.	Strength (S)
1.	
2.	
3.	
4.	
5.	

#### Weakness of Rubber Business in Chiang Rai Province

No.	Weakness (W)
1.	
2.	
3.	
4.	
5.	

### Opportunity of Rubber Business in Chiang Rai Province

No.	Opportunity (O)
1.	
2.	
3.	
4.	
5.	

### Threat of Rubber Business in Chiang Rai Province

No.	Threat (T)
1.	
2.	
3.	
4.	
5.	

ส่วนที่ ๔ ข้อมูลตัวเลขยางพารา

๔.๑ ยางพาราที่มีการส่งออกไปยังประเทศจีนและลาว เป็นยางพาราจากจังหวัดเชียงรายกี่เปอร์เซ็นต์?

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๔.๒ ในปี พ.ศ. 2557 จำนวนเกษตรกรชาวสวนยางพาราเพิ่มขึ้นหรือไม่? อย่างไร?

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๔.๓ ราคาขาก่อนด้วยเฉลี่ยทั้งปีอยู่ที่ ๓๕ บาทกิโลกรัม ทำไมจึงเป็นเช่นนั้น มีวิธีการคำนวณอย่างไร?

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ส่วนที่ ๕ ข้อมูลเพื่อการวิเคราะห์ในด้านมุมมองของเกษตรกร

๕.๑ ก่อนหน้าการทำสวนยางพาราในจังหวัดเชียงราย เกษตรกรส่วนมากประกอบอาชีพใดมาก่อน?

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๕.๒ เกษตรกรให้ความสำคัญในการปลูกยางพาราในจังหวัดเชียงรายมากน้อยเพียงใด?

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๕.๓ การปลูกยางพาราในจังหวัดเชียงรายทำให้เกษตรกรมีวิถีชีวิตความเป็นอยู่ที่ดีขึ้นหรือไม่?  
อย่างไร?

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๕.๔ จุดแข็ง จุดอ่อน โอกาส และภัยคุกคาม ในการทำสวนยางพาราในจังหวัดเชียงราย มีอะไรบ้าง?

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ส่วนที่ ๖ ข้อมูลเพื่อการวิเคราะห์ในด้านมุมมองของพ่อค้าคนกลางหรือผู้รับซื้อยางพารา

๖.๑ นอกจากยางพาราแล้ว ยังมีสินค้าเกษตรอื่นใดอีกบ้างที่พ่อค้าคนกลางส่วนมากรับซื้อ?

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๖.๒ ตลาดต่างประเทศมองยางพาราไทย (เชียงราย) ว่าเป็นอย่างไรบ้าง?

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๖.๓ จุดแข็ง จุดอ่อน โอกาส และภัยคุกคาม ในการทำสวนยางพาราในจังหวัดเชียงราย มีอะไรบ้าง?

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## APPENDIX B

### INFORMATIVE AND STATISTIC TABLES

**Table B1** Name list of the Farmers Institutions in Chiang Rai Province

No.	Farmers Institutional List	Address	Name of Community Leader	Contact Number
1	Chiang Rai Agricultural Cooperative Federation Ltd.	457 Moo 4 Mae Chan sub- district Mae Chan district	Mr. Chan Chaicharoen	053-771-3898
2	Wiang Pa Pao Agricultural Rubber Cooperative Federation Ltd.	115 Moo 6 Baan Pong sub-district Wiang Pa Pao district	Mr. Chaloemsak Banchongkarn	081-765-7272
3	Than Nam Sai Farmers Cooperative Federation Ltd.	55 Moo 7 Chokchai sub-district DoiLuang district	Mr. Suwit Maithi	053-173-146
4	DoiLuang Agricultural Rubber Cooperative Federation Ltd	Moo 5 Chokchai sub-district DoiLuang district	Mr. Chaiyan Luangkaew	086-921-6629

**Table B1** (continued)

<b>No.</b>	<b>Farmers Institutional List</b>	<b>Address</b>	<b>Name of Community Leader</b>	<b>Contact Number</b>
5	Chiang Khong Agricultural Cooperative Federation Ltd	288 Moo 16 Sathan sub- district Chiang Khong district	Mr. Somphong Boriboon	053-791-220
6	Wiang Chai Agricultural Cooperative Federation Ltd.	217 Moo 5 Muang Chun sub- district Wiang Chai district	Mr. Bhorrungr ChawHong	053-769-014
7	WiangKaen Agricultural Cooperative Federation Ltd.	91 Moo 1 MuangYai sub- district WiangKaendistrict	Mr. Kasem Nanchai	084-808-5082
8	Phan Rubber Farmers Cooperative Federation Ltd.	209 Moo7 Santisuk sub- district Phan district	Mr. Chairoj Ussawathanyaroj	089-850-4170
9	Baan DoiPui Rubber Farmers SMCE	129 Moo 16 Pa O Don Chai sub- district Mueang Chiang Rai	Mr. Jinda Satnakho	081-386-5782
10	Huai So Kiang Don Kaew SMCE	1 Moo 11 Huai So sub- district Chiang Khong district	Mr. Thanakul Thanawong	085-914-2125

**Table B1** (continued)

<b>No.</b>	<b>Farmers Institutional List</b>	<b>Address</b>	<b>Name of Community Leader</b>	<b>Contact Number</b>
11	Baan Sri Rom Yen SMCE	107 Moo 21 Huai So sub-district Chiang Khong district	Mr. Sakon Surophan	087-270-2305
12	Baan Mae Khao Wang SMCE	111 Moo 2 Sai Khao sub- district Phan district	Mr. Somboon Srima	080-806-4485
13	Baan Sri Wilai SMCE	67 Moo 7 Huai So sub-district Chiang Khong district	Mr. Mon Nutham	089-227-3467
14	Baan RongHaa 4-01	25/1 Moo6 Sri Donchai sub- district Chiang Khong district 75 Moo 3 Mae Ta sub-district	Mr. Sawat Inthep	081-950-6413
15	Mae Tam Taad Kwan SMCE	PhyaMengrai district	Mrs. Sakulna Mangkala	082-180-6329
16	Mae Khao Tom Rubber Farmers SMCE	383 Moo 10 Mae Kao Tom sub- district Mueang Chiang Rai	Mr. Phongphet Thaksinpanich	087-789-8418
17	Baan Rong Hua Faii Rubber Farmers	71/1 Moo 12 Huai So sub-district Chiang Khong district	Mr. Wanlop Panlam	089-953-9421

**Table B1** (continued)

<b>No.</b>	<b>Farmers Institutional List</b>	<b>Address</b>	<b>Name of Community Leader</b>	<b>Contact Number</b>
18	Baan Kirisuwan Rubber Farmers	9 Moo 7 Nong Pa Kor sub- district DoiLuang district	Mr. Thongchai Chamnankit	080-498-6535
19	Baan Charoen Mueang Rubber	92 Moo 14 Charoen Mueang sub-district Phan district	Mr. Wanlop Sriwichai	085-620-2730
20	Mae Salong River Rubber Farmers	241 Moo 5 Pasang sub-district Mae Chan district	Mr. Udomphong Phongdej	087-302-8063

**Source** The Office of Rubber Replanting Aid Fund Chiang Rai (2014)

**Table B2** Private Rubber Merchants in Chiang Rai Province

No.	Name of Institutions	Address	Contact Person	Contact Number
1	Chiang Rai Rubber Center Co., Ltd.	105 Moo10 Mae Loy sub-district Thoeng district	Mrs. Suwapat Puchaichot	081-951-2022
2	DoiLuang Rubber Co., Ltd.	Baan Paa San Pong Noi sub-district DoiLuang district		
3	Thai Rubber Plantations Co., Ltd.	Ban Du sub-district Mueang Chiang Rai	Mae FahLuang International Airport Avenue	
4	Mr. NarongThophisa	85 Moo 20 Mae Kao Tom sub-district Mueang Chiang Rai	*Purchasing Center is at Wiang Chiang Rung district	082-183-0560
5	Chiang Rung Rubber Limited Partnership	Baan Mai MahaWan Dong Maha Wan sub-district Wiang Chiang Rung district		
6	Rubber Border Distribution Center	381/5 Moo 3 Wiang sub-district Chiang Saen district	Mr. Somchai Daenkaewrat	091-041-1696
7	Phya Rubber Co., Ltd.	Mae Pao sub-district PhyaMengrai district	Ms. Pakwalan Rakkbida	081-881-9055
8	Mr. YuPinChue-Mueangphan	Chiang Khong district	* Purchasing Center is at Chiang Khong district	
9	Mr. Amad Pan-Nui	Nong Pa Kor sub-district Wiang Chiang Rung district	* Purchasing Center is at Wiang Chiang Rung district	080-692-5659

Source The Office of Rubber Replanting Aid Fund (2014)

## APPENDIX C

### CONFERENCE PAPER

#### Supply Chain Management of Rubber Plantation in Chiang Rai Province

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The 1<sup>st</sup> International Conference on Creative Management 2014

The objectives of this thesis paper were to study supply chain management of rubber business and the trend of rubber investment in Chiang Rai Province. As Chiang Rai Province has rubber plantations the most in Northern Thailand and Thailand is one of the main rubber producing countries in the world, it is necessary to know rubber supply chain. Although the Thai government required for being a leading country of natural rubber producing and exporting, it still lack of readiness to the world market. Data collections of the study are from primary and secondary sources, analysing by both qualitative and quantitative methods. For qualitative research, Five Forces Model by Michael E. Porter is used for analyzing the current situation of rubber market together with SWOT Analysis that used for analyzing the strength, weakness, opportunity and threat of rubber business. The statistic data concerned with rubber plantations, rubber-tapping zone, rubber yield and its value collected from the Office of Rubber Replanting Aid Fund Chiang Rai in 2011-2013 are used for analyzing the current trend of rubber investment in quantitative research. In fact, there are several factors involving in rubber supply chain in Chiang Rai Province and supply chain activities are also mentioned in this paper. In order to see the problems occurred and develop rubber business in Chiang Rai Province or larger section, the whole supply chain of rubber need to be understood. Lastly, the explanation of rubber supply chain in Chiang Rai Province will be displayed.

## 1. INTRODUCTION

### 1.1 Rubber Market in Chiang Rai Province

According to the Office of Rubber Replanting Aid Fund News, Farmers in Northern and Northeastern Thailand have become paying attention to the rubber plantations recently because the prices of rubber product have been increasing continuously. Rubber business creates job opportunities for working labors over one period of a year. It reduces numbers of immigrants from rural to urban area and also helps strengthen love and understanding among family members.

### 1.2 Government Policies which Support Rubber Business for Better Marketing Strategies

Thai government has announced the policy of enabling the rubber plantation cultivating area to the Northern and North-eastern Thailand with the practical projected called “Rubber Plantation for Income Improvement and Enrich Farmers in New Cultivating Areas” This project had been proposed the rubber cultivating plan during the year of 2004-2006 by enlarging the number of natural rubber cultivating area to 1,000,000 Rai and emphasizing on Northern provinces accounts for 30% and North-eastern provinces about 70%. All together, in the year of 2010, Thailand has the total areas of rubber plantations about 18.32 million Rai (Rubber Research Institute of Thailand, 2013).

### 1.3 Opportunities of Rubber Products from Chiang Rai Province to the World Market

Somchai Sienglai (n.d.), Former Permanent Secretary of Ministry of Culture mentioned that the upcoming opportunity of ASEAN 2015, Thailand has various opportunities for doing exports and imports. He analyzed the readiness of Northern Thailand towards ASEAN 2015 that there are plenty of products from Thailand ready for the international market but still lack of the readiness in many ways.

Sample products with high quality but still lack of readiness to the world market

**Table 1** Products with high quality but lack of readiness to the world market

Products	Details of readiness
Iron and steel products	- High number of raw materials imports - Lack of the upstream products (suppliers)
Jewel and decoration	- High skill labors but lack of raw materials
Rice	- Low production volume comparing to Vietnam
Textile and fabric	- Lack of working labors - Cost of working labors getting higher - Lack of value adding development
Latex and Rubber products	- Lack of management on research and development for products transforming and value adding

Source Somchai Sienglai (n.d.)

From the table above, it shows that Thailand can produce high quality products but still lack of readiness to the world market and recently, rubber products are in this situation. The current situation of rubber product in Thailand is lack of management on research and development and how to manage with value adding to rubber products in Thailand.

#### **1.4 Trends of Future Rubber Investment in Thailand**

Kasikorn Research Center predicted 7 businesses that seemed likely to have good opportunity and receive the factor that help motivating to be outstanding and grow up well in the year of 2013. There are Auto industry, Information technology communication business, Satellite and cable TV business, Private hospital business, and Rubber industry (Prachachat Business (2012): quoted in Rubber Research Institute of Thailand, 2013).

On the other hand, there are related businesses that can take the advantages from this trend as well. Those businesses are, for example, rubber processing plant, Logistics and transportation business. The investment trend of rubber business in Chiang Rai Province seems likely to go to which direction? All the current situations and previous statistics will be used to analyze to see the trend of rubber investment in Chiang Rai Province in the future. Therefore, this paper will explain rubber supply chain in Chiang Rai Province and the trends of its investment. (Prachachat Business (2012): quoted in Rubber Research Institute of Thailand, 2013).

## **2. LITERATURE REVIEW**

The contents of the literature review consist of the list below.

- 2.1 Supply Chain Management
- 2.2 Supply Chain of Rubber Industry in Thailand
- 2.3 Five Forces Model
- 2.4 SWOT Analysis

### **2.1 Supply Chain Management**

A supply chain consists of all parties involved in fulfilling a customer request. Not only includes the manufacturers and suppliers, a supply chain also includes transporters, warehouses, retailers and customers themselves (Chopra, Sunil and Peter Meindl, 2004).

Talking about Supply Chain, Supply Chain Management always comes along together. What is Supply Chain Management? Supply Chain Management is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. The three main flows of the supply chain are the product flow, the information flow and the finances flow. Supply Chain Management also involves coordinating and integrating these three flows both within and among companies. (Ivy Wigmore, 2013).

Therefore, supply chain analysis is the management of all activities and the relationship between the organizations. It is also the process of evaluating each stage of a business that is delivering a product to customers.

## 2.2 Supply Chain of Rubber Industry in Thailand

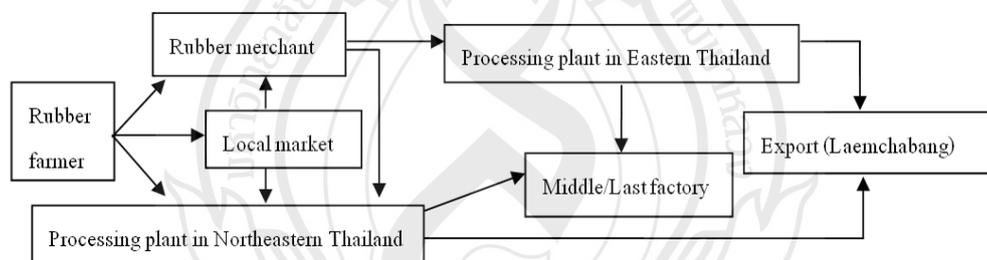
### Rubber Industry in Northern Thailand

Prayoon Tosanguan (2008) described the study of his secondary data and developed the supply chain and value chain system of rubber products. He mentioned that in the northern region of Thailand, well management has not been yet conducted.

Kanapot Pakhamwattanasakul, Head of rubber farmers in Mae Pao Sub-district explained his experience about previous work on agricultural field. At the beginning, the result came out well but later on, the problems occurred. There were fluctuation in price and problems of soil damaging. Most of young people moved to different towns to be working labours. In 1989, around 220 farmers participated in the program supported by the government in the total area of about 2,000-3,000 Rai. Eventually, they have the academic staffs who train them how to prevent from those problems (Siriporn and Sirilak Crop Integration Business C.P. Group, 2009).

### Supply Chain of Rubber Industry in North-eastern Thailand

The office of Agricultural Economics 3 (2007) had studied the logistics and supply chain of cassava and sugar cane in North-eastern Thailand particularly in Udon Thani, Nongkhai, Nongbualamphu, Loei, Sakonnakorn, and Mukdahan Provinces. The study found that rubber supply chain started from latex, raw rubber, cup lump, and crumb rubber as raw materials in rubber industry. The rubber products are for export and transport via Bangkok and Laemchabang Port.

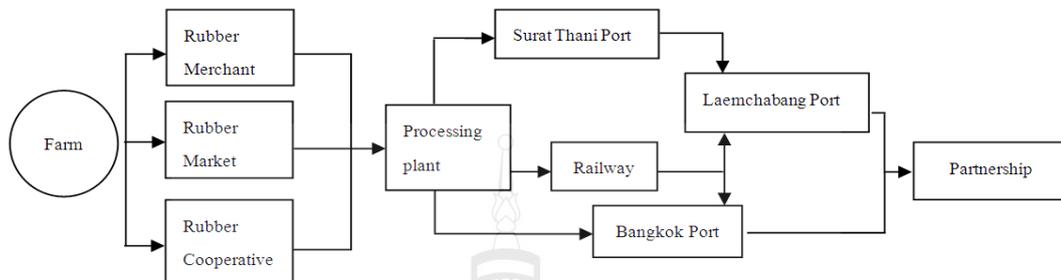


Source Duangpun Kritchanai Singkarin and Tuanjai Somboonwiwat (2009)

Figure 1 Supply Chain of Rubber Plantation in North-eastern Thailand

### Supply Chain of Rubber Industry in Southern Thailand

Duangpun Kritchanchai Singkarin and Tuanjai Somboonwiwat (2009) also defined supply chain of rubber plantations in Southern Thailand as the figure below.



Source Duangpun Kritchanchai Singkarin and Tuanjai Somboonwiwat (2009)

**Figure 2** Logistics and Supply Chain of Rubber Plantation in Northern South Thailand

Most of rubber productions are being exported via ports and border trade areas. The ports which commonly used are Laemchabang Port, Bangkok Port and Songkla Port. The border trade areas are Padang Besar, and Sadao.

In Northern South Thailand: Rubber farmer sells latex to rubber merchant, rubber cooperative or rubber market. After that, rubber will be sent to the processing plant to make it to rib smoked sheet (RSS) and block rubber (TSR) before transfer to Laemchabang Port or Bangkok Port by trucks, rail, or liner. Rubbers will be packed in the containers and transported to the ports in China afterward.

### 2.3 Five Forces Model

Five Forces Model by Michael E. Porter is used for analyzing the investment trend with five main factors. It is well known and useful to analyze the market in order to know the surrounded environment that could affect the business. Not only have to win the competitors, but it shows also how to make a long term relationship with customers and other entrepreneurs. Most people believe that Five Force Model is for the large business with high competitions only, but the matter of fact is most SMEs are able to use Five Force Model to strengthen their business as well.

#### Five Forces Model descriptions:

1. Rivalry among current competitors
2. Bargaining power of suppliers
3. Bargaining power of customers
4. Threat of substitute products or services
5. Threat of new entrance

## **2.4 Business SWOT Analysis**

SWOT Analysis can help the company compete successfully in the market. It helps achieving the best ways to get the benefits and opportunities. Albert S Humphrey mentioned in 1960 that SWOT Analysis is as useful now as it was then. It can be used in two ways. One is as a simple icebreaker to remove the formulation of strategy and the other one is in a sophisticated way as a strategy tool for business.

## **3. METHODOLOGY**

In this part, it consists of methodologies used in the research paper, research procedures which include population and sample, research tools, methods of data collection, and data analysis.

The study shows the data collection from the interview of the director and analyst from the Office of Rubber Replanting Aid Fund in Chiang Rai Province.

### **3.1 Research methodology**

A semi-structured interview is applied in this research paper. Both primary and secondary data are collected to analyze. In other word, it is a descriptive data in qualitative and quantitative research. The qualitative data is from the interviews meanwhile the quantitative data is from the statistic data collected from the Office of Rubber Replanting Aid Fund Chiang Rai as well.

#### **Qualitative Research**

Qualitative research is used for collection of a variety of empirical materials case study, life story, interview, observation, personal experience, culture texts and productions, historical, interactional, and visual texts.

Nouria Brikci and Judith Green (2007) explained about qualitative research that it is characterized by its aims, which related to understanding some aspects of social life and its methods which generally generate words rather than numbers.

Quantitative research, on the other hand explain phenomena through focused collection and concerned with numerical data. Quantitative research also uses largest manageable random to allow generalization of results to larger populations (University of Arkansas Libraries, n.d.)

#### **Quantitative Research**

Hopkins (2008) explained about the quantitative research aim to determine the relationship between one thing (an independent variable) and another (dependent variable) in a population of research.

Babbie, Earl R. (2010) also supported that the quantitative methods also emphasize on objective measurements and numerical analysis of data collected through polls, questionnaires or surveys. Moreover, the research focuses on gathering numerical data and generalizing it across groups of people.

### 3.2 Research Procedures

#### Primary data

1. Interviews of the plan and policy analyst from the Office of Rubber Replanting Aid Fund who is involved in rubber supply chain in Chiang Rai Province. The data is used for qualitative study

2. Statistic data collected from the Office of Rubber Replanting Aid Fund Chiang Rai. The data is used for quantitative study.

#### Secondary data

Secondary data is collected from white papers, articles and journals. Sources of information are reliability supply chain management and logistics activities of the rubber products, and several related research paper.

### 3.3 Data analysis

#### Analysis of qualitative data

This paper uses information collected from the interview of the Office of Rubber Replanting Aid Fund Chiang Rai to create rubber supply chain chart. Moreover, Five Force Model and SWOT Analysis will be used for analyzing the current situation of rubber market including strength, weakness, opportunity, and threat of rubber business in Chiang Rai Province.

#### Analysis of quantitative data

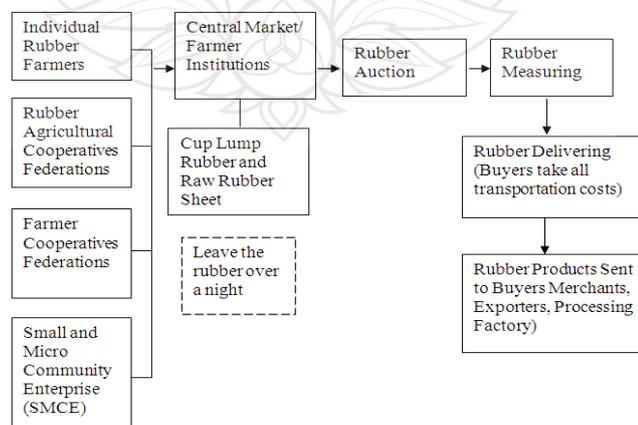
The author described the trend of rubber investment in Chiang Rai Province by using the statistic data from the office of Rubber Replanting Aid Fund Chiang Rai.

## 4. EMPIRICAL RESULTS

### 4.1 Supply Chain Analysis

Supply chain of rubber plantation consists of many players such as rubber farmers, middleman, cooperatives, rubber markets and processing factory.

Rubber farmers supply chain in Chiang Rai Province can be seen in details as the figure below



**Figure 3** Rubber Supply Chain in Chiang Rai Province

From Figure 4.1 Rubber Supply Chain in Chiang Rai Province, it shows the details of rubber supply chain particularly in the part of rubber farmers and the local market until it reached the end buyers. There are four main groups of rubber farmers in Chiang Rai Province which are Individual rubber farmers, Rubber Agricultural Cooperatives Federations, Farmer Cooperatives Federations, and Small and Micro Community Enterprise (SMCE). These groups of farmers start forming the group together and collect rubber products at their central market.

After that the middlemen will do the auction, negotiation or bargaining the prices. With that, the rubber products needed to be selected and measured weight before delivering to the next players which are rubber merchants, exporters, or processing factory.

In terms of manufacturing process, it starts with raw materials (latex and rubber cup lump) and then the output from rubber farmers are sent to the processing factory through a middleman or rubber cooperative market for processing into rubber products such as concentrated latex, rubber bale, and ribbed smoked sheets and export to partner countries.

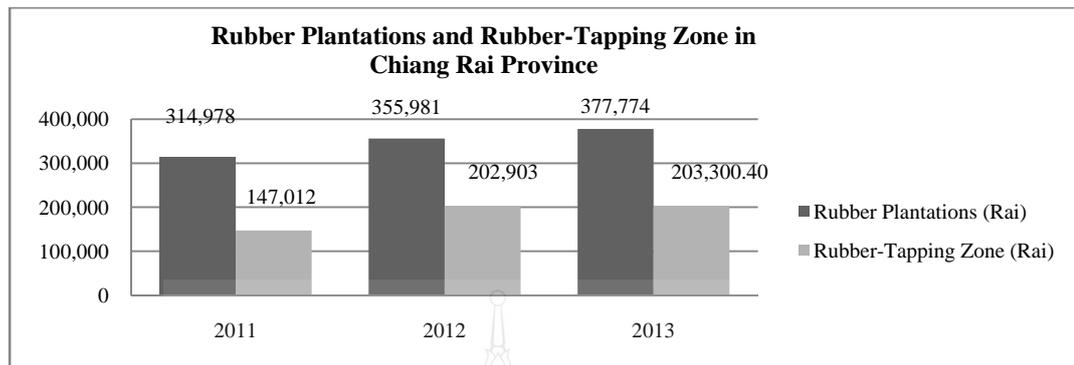
Every 15 tonnes of rubber productions collected by rubber merchants or buyers will be transferred by trucks to the processing factory in North-eastern and Southern Thailand. If rubber products are over 15 tonnes, the caravan trucks will be used instead of normal trucks. The caravan trucks are able to transport around 30 tonnes in a row.

In order to export rubber products to Southern China, there are two routes which are by bulk ships and by trailer trucks. The bulk ships are being transported at Chiang Saen Port with the capability of 350 tonnes/ trip and around 25-30 tonnes/ trip by trailer truck at Chiang Khong border (The Office of Rubber Replanting Aid Fund, 2014).

On the other hand, there are nine rubber merchants from private sector with the two major purchasing centre points in Wiang Chiang Rung and Chiang Khong districts. Those purchasing centre points of rubber products in Chiang Rai Province run as the local auction market.

Recently, the Office of Rubber Replanting Aid Fund become more important and takes roles in rubber plantations supporting to increase the quality of rubber products and train local farmers in Chiang Rai Province. This is because Chiang Rai is new for rubber plantations. The majority of local farmers still lack of knowledge in doing rubber plantations fruitfully. In addition, rubber market in Chiang Rai Province is not large comparing to other markets in Southern or Eastern Thailand.

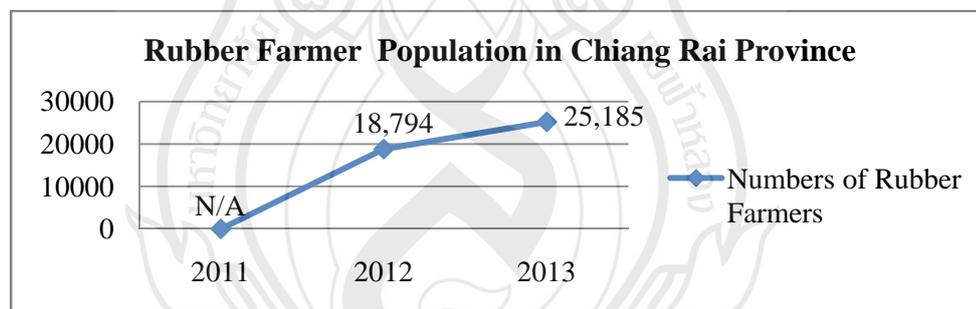
The main products from Chiang Rai Province are in the form of cup lump rubber which accounts for 90% and another 10% is in the form of raw rubber sheet. Moreover, the Office of Rubber Replanting Aid Fund has established the provincial central auction markets covered districts in Chiang Rai Province and promoted the groups of rubber farmer to form the cooperatives federations in order to reduce the gap among each individual farmer and make it centralized. Once there are the common central markets, the management system became easier to control, particularly in marketing management and product value adding. The product in Chiang Rai Province is being transported to processing factory before export to Southern China as Crepe rubber.



**Figure 4** Comparison between Rubber Plantations and Rubber-Tapping Zone in Chiang Rai Province in 2011-2013

The chart above represents numbers of the total rubber plantations and rubber-tapping zone in Chiang Rai Province started in 2011 until 2013. The number of rubber plantations and rubber-tapping zone in Chiang Rai Province seemed likely to continuously increase every year even though the number of rubber-tapping zone in 2013 is not that much higher than the one in 2012. This is because rubber trees need some period of time to grow and produce latex.

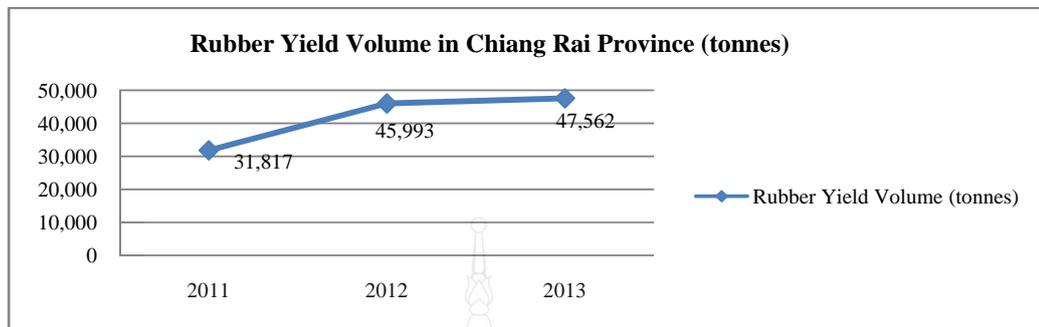
Next part shows numbers of rubber farmers and rubber products in Chiang Rai Province in the last three years.



**Figure 5** Rubber Farmer Population in Chiang Rai Province

To make it simpler, this graph shows the growth of the population of rubber farmers in Chiang Rai Province from 2011 to 2013. It is taken from the Office of Rubber Replanting Aid Fund (2014). In recent years, the total growth went up in 2012-2013 and rubber farmer population has been gradually growing. Due to the Thai government requirement to be a leading country of natural rubber producing and exporting, the policies have made to promote and enhance the ability to compete with others in the world market in the future. Therefore, we can say that the growth of the rubber farmer population is based on government policies.

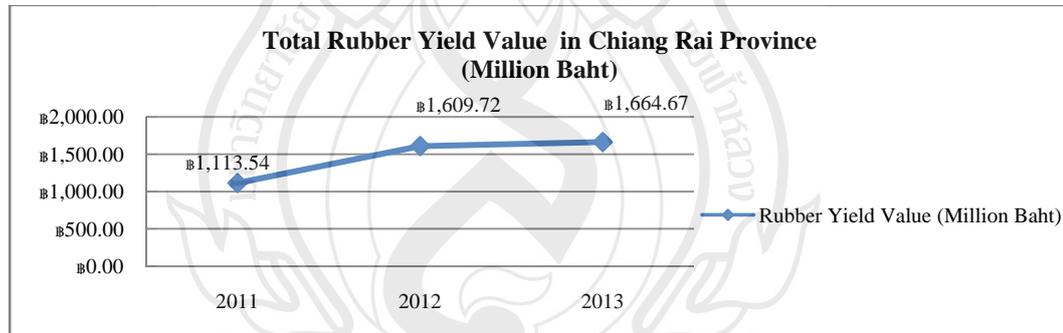
The next table shows rubber yield volume in tonnes in 2011-2013.



**Figure 6** Rubber Yield Volume in Chiang Rai Province in the Year of 2011-2013

According to the chart above, it shows that the volume of rubber yield in Chiang Rai Province seemed likely to rise gradually every year. In the year of 2011, the volume of rubber yield was about 31,817 tonnes. In the year of 2012, it was at 45,993 tonnes and lastly, the rubber yield volume was 47,786 tonnes in the year of 2013.

This number also reflected the current situation of rubber market which can be predicted that in the year of 2014, rubber yield volume will be increasing as well as the total rubber plantations.



**Figure 7** Rubber Yield Value (Million Baht) in Chiang Rai Province in 2011-2013

The chart above shows the value of rubber yield in Chiang Rai Province from 2011-2013. The total price of rubber yield in 2011 is about 1,113.54 Million Baht and it grows up to 1,609.72 Million Baht in 2012. In the year of 2013, the value of rubber yield in Chiang Rai Province is 1,664.67 Million Baht.

The next part will explain the current situation of rubber business in Chiang Rai Province by using Five Force Model of Michael E. Porter

## **An Analysis of Five Force Model**

### **1. Rivalry among current competitors:**

Rubber plantation in Chiang Rai Province or in Northern Thailand is not yet familiar to local farmers; therefore, the competition is not that high comparing to rubber markets in Southern Thailand.

### **2. Bargaining power of suppliers**

Rubber farmers and merchants need to negotiate with each other to get good prices the both side agree. Other benefit gained is the group formed may become privileged customers of the suppliers. Customers will have more power to negotiate with the suppliers in order to reduce the price.

### **3. Bargaining power of customers**

The buyers can get cheaper price and the suppliers seem likely to have less power in negotiation but the selling price in the market will be all about the same or slightly different and they cannot bargain too much. They need to agree with the price. For other profits, it should not affect the price that both sides have agreed.

### **4. Threat of substitute products or service**

Threat of substitute products of rubber is not the main problem for rubber business. The Office of Rubber Replanting Aid Fund strongly agreed that there is no supplementary for rubber or rubber latex.

### **5. Threat of new entrants**

The last 5 years, Vietnam has been working hard to become the rubber exporter. Their production ratio also increased sharply by 7.0% Moreover, Cambodia is another country that became more noticeable but Thailand is still the number one in rubber producing country.

Next part is the SWOT Analysis toward rubber supply chain and investment in Chiang Rai Province

## SWOT Analysis

**Table 2 Strength of Rubber Business in Chiang Rai Province**

No.	Strength (S)
1	Chiang Rai Province is located in good location where it is connected to GMS (Greater Mekong Sub-region) countries which is a great place to do exports on rubber product and other agricultural products.
2	Chiang Rai Province has the most rubber plantations in Northern Thailand and its productions are in the amount that enough for domestic demand.
3	Although there is no large processing factory in Chiang Rai Province, there are several entrepreneurs and investors willing to set up the processing factory in Chiang Rai Province in the future.
4.	The community of rubber farmers in Chiang Rai Province is strong. Therefore, it is not that difficult to form the team and gather together to develop for better future.
5	The Office of Rubber Replanting Aid Fund was established to help promoting rubber plantations and train local farmers to do plantation properly with knowledgeable teams. They also train the farmers about marketing and enrich high quality rubber as well.
6	Rubber plantation can be grown together with other economic plants

**Table 3 Weakness of Rubber Business in Chiang Rai Province**

No.	Weakness (W)
1	Promoting knowledge and training farmers are not yet covered all the rubber farmers in Chiang Rai Province
2	Time spending for receiving up-to-date information and injustice price beat by the middlemen
3	Lack of knowledge to sharpening and transforming rubber and market still requires for good leaders
4	Lack of statistical information such as actual numbers of rubber plantations, rubber-tapping zone, the amount of rubber yield in Chiang Rai Province and in some other provinces including exports and the numbers of groups in Chiang Rai Province
5	The direction of the policy is not yet clear which has an impact on provincial rubber marketing
6	Information technology management is not yet stable and reliable. It is not fully working well.
7	Most of rubber farmers are small holders and they are carrying high production costs and faced with problems about the productions
8.	Some rubber farmers do get the rubber latex wrongly which affects the rubber latex eventually

**Table 4 Opportunity of Rubber Business in Chiang Rai Province**

No.	Opportunity (O)
1	Local office always help promoting the projects related to rubber plantations and encouraging local farmers to work more effectively and rubber seedlings supported by the office of the rubber replanting aid fund
2	Chiang Rai is located in good location and nice atmosphere which suitable for growing rubber trees.
3	The world population is increasing causes the rubber demand consumption to increase. When the world oil price increases, the rubber price seems likely to increase as well.
4	AEC Market in 2015
5	Markets in China, The USA and EU still requires products from Thailand

**Table 5 Threat of Rubber Business in Chiang Rai Province**

No.	Threat (T)
1	The main rubber products are in the form of raw material and processing rubber sheets. The market for Thailand and Chiang Rai is International markets or mostly exports. Therefore, it takes high risk in price and many opportunities lost
2	Rubber in Thailand involves with both public and private sector which is not flexible to cope with both sides.
3	The trend of rubber plantations seems likely to go further to some other countries such as Indonesia, Laos, Vietnam, and Cambodia rapidly. This is because rubber trees can be grown in any countries that have similar atmosphere as Thailand. Those countries will become Thailand's competitors in the future.
4	Transportation system and taxes need to be agree from both side in terms of exportation

As Northern provinces became new area to do rubber plantations and the level of rubber demand is still high, this is very interesting for those who plan to run rubber business in Northern Thailand. Although rubbers farmers in Northern Thailand are confident and willing to work on rubber business, they are still lack of knowledge in management and high technology. Recently, the most important issue for rubber farmers is concerned with education and they might get exploited by others easily.

Rubber plantations seemed likely to have lots of opportunities in the market, especially the market in EU, China, and AEC 2015. However, rubber famers or those who run rubber business should take all the threats listing above into consideration as well. Mostly they are about the price and some problems due to the political issues in Thailand.

Although there was a support by the government to promote rubber farmers and enhance the power in negotiation, rubber farmers are still faced with the problems caused by the middlemen. The middlemen have set the price which not related to the market situations. The bidders always determine the price and push the cost burden to the sellers. They also have high return expectation of cup lump rubber and rubber sheet selling prices collected from the farmers and the processing factory. Besides, the quality of cup lump rubber is low. The middlemen, therefore, take this opportunity to set their own price and determine their own standard of rubber products. The other problem found is about the management system of the rubber farmer institutions which lead to the conflict within the organization. The group members lack to access marketing knowledge. Therefore, some individual farmers are attempting to split up and build their own individual groups around the areas where rubber plantations are. The current problem of the farmers is they lack of power to negotiate and receive the news about rubber markets and its prices.

Rubber business seemed likely to have good opportunity because the demand within the country and international are still high. Therefore, this business is quite interesting and it is difficult to defend from new investors or new entrants.

## **5. CONCLUSION AND DISCUSSION**

### **5.1 Supply Chain of Rubber Business in Chiang Rai Province**

There are four main groups of rubber farmers in Chiang Rai Province which are Individual rubber farmers, Rubber Agricultural Cooperatives Federations, Farmer Cooperatives Federations, and Small and Micro Community Enterprise (SMCE). These groups of farmers start forming the group together and collect rubber products at their central market. After that, the middlemen will do the auction, negotiation or bargaining the prices. With that, the rubber products needed to be selected and measured weight before delivering to the next players which are rubber merchants, exporters, or processing factory.

### **5.2 Trend of Investment of Rubber Business in Thailand**

In short, the trend of rubber investment in Chiang Rai Province seemed likely to have bright future because of the government policies that encourage people to do rubber plantations. The number of rubber plantations, rubber-tapping zone, rubber farmer population, rubber yield volume and value are increasing rapidly in the past few years and it will expand for larger number future in upcoming year.

### **5.3 Limitations of the Research**

Most of research paper has some certain point of limitation and which might have an impact on the outcome of the paper to change slightly. In this research paper, the first limitation was the details of the information. The author focused only Chiang Rai Province because it is simpler to collect data. Unfortunately, The Office of Rubber Replanting Aid Fund could provide the statistics data from 2011-2013 only. For the last five years data, the author needed to contact the Office of Agricultural Economy in Bangkok. However, the Office of Agricultural Economy could not provide information of each district in Chiang Rai Province. They could provide the information of the whole Chiang Rai Province and Thailand only.

Secondly, the data collected from the Office of Rubber Replanting Aid Fund were not completely accurate because they admitted that they are also lack of the actual statistics data.

However, although particular limitations were identified, these limitations did not affect main study of this research. It could have been better to have more statistics data to see the trend of rubber plantations in Chiang Rai Province clearly.

#### 5.4 Recommendations for Further Research

This research paper provided some previous statistics data of rubber plantations in Chiang Rai Province from 2011-2013. The trends of rubber business in Chiang Rai Province seem likely to rise up gradually. However, many threats and opportunities were also found. The further research may go through its opportunities and discuss how different between before and after AEC 2015. Will there be any more differences in rubber industry, particularly in Chiang Rai Province or will the statistics data be shown more details from 2013?

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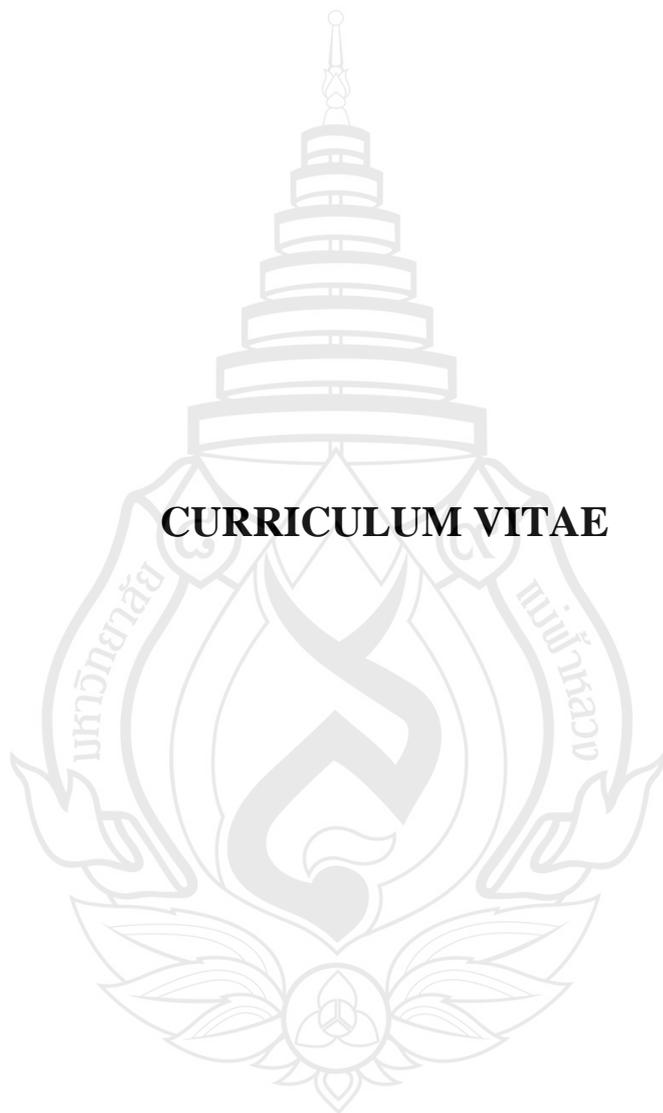
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**CURRICULUM VITAE**

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