Enhancement of the competitiveness of rubber production and marketing in Phitsanulok Province

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Abstract

The objectives of this study attempt to investigate *(1.)* the conditions of rubber production and marketing in Phitsanulok area, *(2.)* the comparison of magnitude on problems and urgent needs in the management among rubber growers, traders and government officials, and *(3.)* alternative guidance to increase production capability and rubber marketing of the production capacity and the rubber marketing. The research was conducted by data survey, interview, questionnaire and focus group on various populations. They were 357 rubber growers, 19 traders and 45 government officials were purposively selected as a sample group. All collecting data were statistically analyzed and synthesized on the production and marketing problems among populations. It was found that there was no significant difference on urgent marketing issues or production issues among the cluster of rubber growers, traders and government officials. However, there was a significant difference at $P \leq 0.05$ on urgently demand to establish the central rubber market in the northern region or Phitsanulok Province.

To increase the capability of production and marketing competitiveness generated strategies, targets, and effective projects; for instance, the central rubber market establishment, cluster enforcement, the knowledge transfer services, embedding people mindset towards environmental and local wisdoms concerns. Therefore, the strategy setting for increasing the competitiveness have to be conducted and followed the directions and purposes under the participatory network of government, private and people to achieve the objectives.

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Introduction

Thailand has been recognized as one of the biggest producer of natural rubber of the world with the production of 3.13 million tons in 2006. The rubber cultivation scattered in every regions of the country. Office of Agricultural Economics reported that Thailand covered rubber plantation area of 14,235,440 rais in 2006 which located in the southern region around 10,959,551 rais, eastern and central region around 1,644,704 rais, north eastern region around 1,443,033 rais, and northern region around 188,152 rais. The total area of harvest was 10,900,960 rais with average yield of 284 kg/rais various in different area depended on land suitability, rubber clone, and farm management. (Nutchanart et.al., 2007)

Somjate et.al., (2003) evaluated the potential of rubber production of Thailand by area suitability index from rubber production model of Rubber Research Institute determining on geographical factor, soil physic and soil chemical then finding the relationship of rubber product and classified the potential level of rubber production as follow.

(1.) The suitable area for rubber cultivation is the area that produces the rubber more than 250 kg/rais/year in the 7^{th} year of cultivation.

(2.) The low potential area is the area that produces the rubber lower than 250 kg/rais/year that can be tipped in the 8^{th} year of cultivation or longer.

The result of rubber production evaluation area of the country found that the potential area for rubber production, produced more than 250 kg/rais/year were 15,082,371 million rais and low potential, produced lower than 250 kg/rais/year were 29,561,300 million rais scattered in the southern, north eastern, eastern and northern regions.

This information indicated that the rubber area expansion mostly in the northern and north eastern regions though there were located in the low potential area. However, most of the reports focus only on land suitability or agricultural factors. To increase the competitive competency in the world market, the farmers should improve their production process and marketing to suit the new area property emphasized to Thai inter-rubber market development with collaboration of government and private sectors for completed research and development by reforming the rubber structure to achieve the target and launched supported rubber strategy together.

The study applied Michael E Porter's theory (Porter, 2000) to analyze the industrial competition using Porter's Five Forces Model consisted of 5 factors as follow.

(1.) Threat of New Entrants

(2.) Competitive Rivalry with an Industry

(3.) Threat of Substitute Product

(4.) Bargaining Power of Customers

(5.) Bargaining Power of Suppliers

These 5 factors will indicated the opportunity of profit gain in the industry so the company should understand the component of each factor to analyze the opportunity and risk among the industry.

Phitsanulok province is suitable area for rubber central market development because the province can be connected to other major rubber import countries such as China, Japan, Malaysia, USA, South Korea, and Europe by the convenient road network to other provinces and other regions (University of Thai Chamber of Commerce, 2005; Wattanachaiyingcharoen, 2006). Study on rubber production and marketing competency of Phitsanulok province, the government should provided the better supporting rubber policy to farmers, traders, and related officers and synchronized with the Indo-China Intersection policy as well as the present economic and social characteristic.

Objectives

(1.) To study on the production and marketing of rubber plantation in Phitsanulok province

(2.) To compare the level of problems and urgent needs for rubber production management and marketing among the farmers, traders, and government officers

(3.) To study on the way to increase the rubber production and market competency in Phitsanulok province

Research Methodology

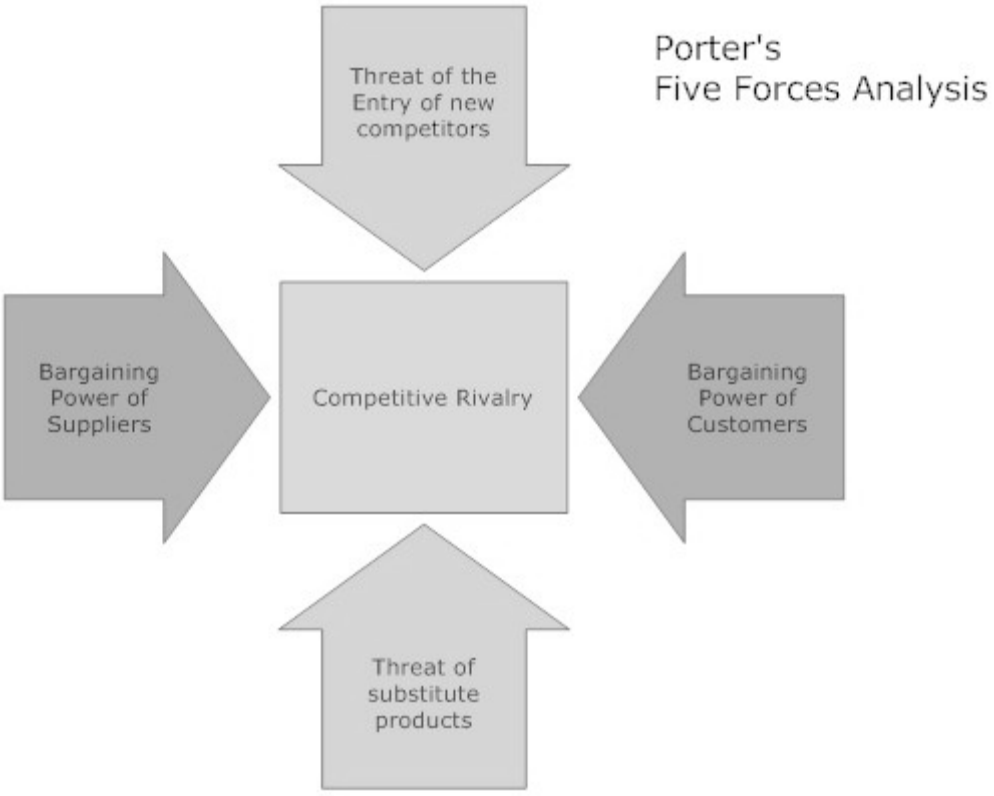
According to the interview of The Rubber Replanting Aid Fund's officer mentioned on the registered rubber farmers, rubber traders and government officers related to rubber affairs in Phitsanulok. The study purposively separated the sampling group and applied Yamane (Yamane, 1970; Prakong, 1995) that should be 357 rubber farmers from 3,393 populations, 19 traders from 19 populations, and 45 government officers from 45 populations.

Data Collection applied with information and data survey, interview, mail survey and telephone survey.

The large numbers of problems were prioritized and its importance were discussed and concluded on production and marketing aspects of each focus group within the cluster. Data Analysis in this study applied with SPSS/PC: Version 11.5 using Check-list, Ranking Questionnaire, Rating Scale, and Pearson-Chi Square.

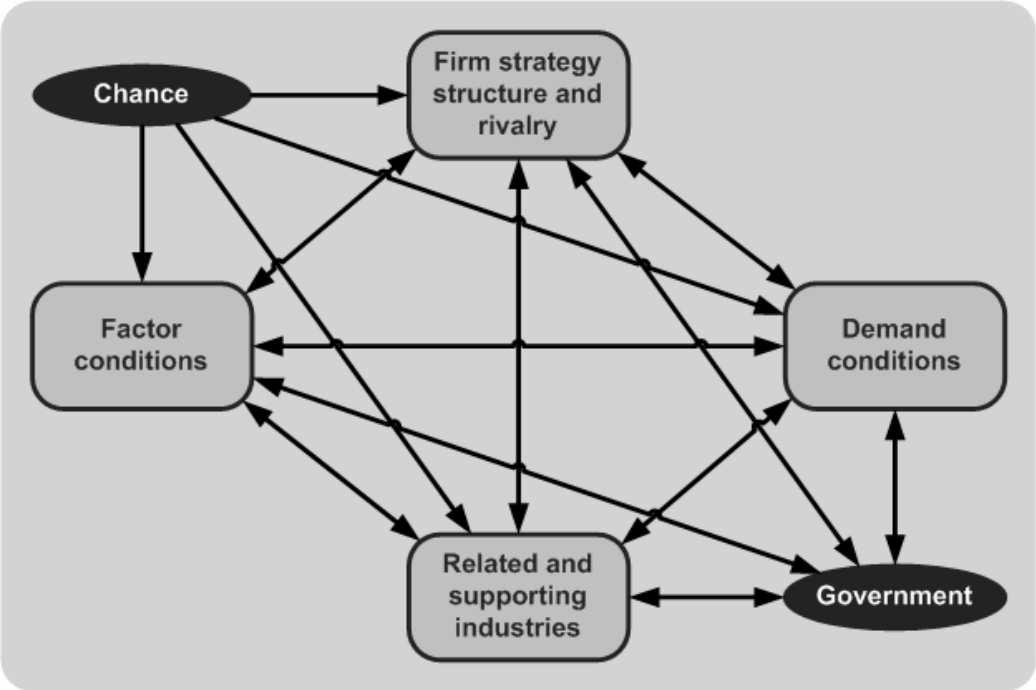
The study also used SWOT, TOWS matrix, Five Forces and Porter's Diamond Models analysis and synthesis the data to reach the conclusion on production, market strategy and policy.

Figure 1 Model of Five Forces Analysis



Adapted from Michael E. Porter, Competitive Strategy, Free Press, 1980.

Figure 2 Model of Porter's Diamond



Results of research study

1. **Analysis comparison on the problem level and urgent need in production and marketing management among the farmers, traders, and government officials**

The hypothesis was the level of serious problem and level of urgent need in production and marketing management among the farmers, traders, and government officers was significantly different.

The comparison focused on these three groups of farmer, trader and government officers. Then only 46 rubber farmers were reselected due to their related to production and marketing, while another 311 rubber farmers were still new planting area without production and marketing activities.

Table 1 Difference level of serious problems in production of rubber farmers, traders, and government officers

Level of serious problems in rubber production	Populations			Total	Statistic (x^2) value from calculation P≤0.05
	Farmers	Traders	Government officers		
Low	6(13.04%)	0(0.00%)	0(0.00%)	6(5.45%)	9.008
Moderate	24(52.17%)	12(63.16%)	29(64.44%)	65(59.09%)	
High	16(34.78%)	7(36.84%)	16(35.56%)	39(35.45%)	
Total	46(100%)	19(100%)	45(100%)	110(100%)	

The results from Table 1 indicated that the level of major problems in production aspect from government officers, traders, and farmers were in moderate level according to 64.44, 63.16, and 52.17 %, respectively.

The results of Chi-square test found that x^2 (Cal $_{0.05,4}$) = 9.008 and x^2 (Tab $_{0.05,4}$) = 9.49 that x^2 was lower than x^2 from the table which indicated that the production problem of the farmers was not significant different. After that, all the problems were re-nominated and prioritized its important.

Table 2 Average and standard deviation of serious problems, level and priority from rubber growers, traders, and government officials in their production

Problems of production	$\overline{x}$	**S.D.**	**Levels of problems**	**Priority (Score)**
Rubber growers:				
1. Land entitles/property rights on rubber plantation	4.52	0.82	Highest	5
2. Source of finance for rubber production	3.54	1.01	High	4
3. Knowledge transfer on rubber production	2.83	0.63	Medium	3
4. Rubber grower group establishment	2.61	0.56	Medium	3
5. Cost reduction in rubber production	2.90	1.25	Medium	3
Total	3.28	0.69	Medium	3
Traders:				
1. Supporting knowledge on rubber production to the rubber growers	4.26	0.37	High	4
2. Marketing contract on future purchase	2.74	1.24	Medium	3
3. Provide the better varieties to the rubber growers	3.21	0.98	Medium	3
4. Provide the production inputs to the rubber growers	3.35	0.61	Medium	3
Total	3.39	0.50	Medium	3
.Government officials:				
1. Launch the training and workshop for rubber growers	3.09	0.55	Medium	3
2. Lack of rubber cultivation survey	2.49	1.33	Medium	3
3. Set up the standard skill and labor cost	2.69	0.85	Medium	3
4. The group empowerment on bargaining through the financial institution	2.91	1.16	Medium	3
5. Sufficiency economy of the rubber growers	3.00	0.85	Medium	3
6. Administrative and group forming by competent	3.27	1.37	Medium	3

Table 2 Average and standard deviation of serious problems level from rubber growers, traders, and government officials in production (continue)

Problems of production	$\overline{x}$	S.D.	Levels of problems	Priority (Score)
knowledge leader				
7. Management in the area with available supporting organization and network	3.18	1.11	Medium	3
8. Provide better rubber seedling and cultivation	3.09	0.79	Medium	3
9. Support the low cost rubber warehouse	3.22	1.49	Medium	3
10. Transfer appropriate technology to the rubber growers	3.62	1.43	High	4
11. Training on appropriate compost application for rubber tree	3.73	1.58	High	4
12. Provide the low interest credit for rubber growers	4.22	0.82	High	4
13. Control the price of fertilizer and herbicide	4.38	1.15	High	4
14. Issue on land entitles for rubber growers	4.67	0.47	Highest	5
15. Assign the responsible organization on land classification for rubber cultivation area	3.02	1.14	Medium	3
16. Suppress the corruption on rubber price intervention	3.69	1.24	High	4
17. Set up the training center and technology transfer center	3.29	0.97	Medium	3
18. Increase the bargaining power of rubber growers	3.20	1.01	Medium	3
Total	3.37	0.45	Medium	3

Table 3 Difference level of serious problems in rubber marketing of farmers, traders, and government officers

Level of Serious problems in rubber marketing	Populations			Total	Statistic (x^2) value from calculation P≤0.05
	Farmers	Traders	Government officers		
Low	5(10.87%)	5(26.32%)	13(28.89%)	23(20.90%)	7.954
Moderate	9(19.57%)	4(21.05%)	4(8.89%)	17(15.45%)	
High	28(60.87%)	10(52.63%)	24(53.33%)	62(56.36%)	
Highest	4(8.70%)	-	4(8.89%)	8(7.27%)	
Total	46(100%)	19(100%)	45(100%)	110(100%)	

The results from Table 3 indicated that the level of major problems in marketing aspect from government officers, traders, and farmers were in the highest levels according to 60.87, 53.33 and 52.63 %, respectively.

The results of Chi-square test found that x^2 (Cal $_{0.05,6}$) = 7.954 and x^2 (Tab $_{0.05,6}$) = 12.59. the x^2 was lower than x^2 from the table which indicated that the marketing problems of the cluster were not significant. All the problems were prioritization on their important as in Table 4.

Table 4 Average and standard deviation of serious problems, level and priority from rubber growers, traders, and government officials in their marketing

Problems of marketing	$\overline{x}$	**S.D.**	**Levels of problems**	**Priority (Score)**
Rubber growers:				
1. Marketing competition of other rubber growers	2.00	1.25	Low	2
2. Empower the bargaining of buying raw material for rubber cultivation	3.91	1.05	High	4
3. Empower the bargaining of selling the rubber to the traders	3.65	1.22	High	4
4. The substitute of rubber product	3.33	0.90	Medium	3
5. The entry of new rubber growers	3.09	1.33	Medium	3
6. Establishment of rubber central market in the northern or north eastern region	4.57	1.26	Highest	5
7. Establishment of the rubber latex and rubber sheet factory	4.33	1.25	High	4
8. Establishment of rubber product manufacturing	4.22	1.23	High	4
Total	3.64	0.65	High	4
Traders:				
1. Establishment of rubber transfer technology center for rubber growers	3.59	1.14	High	4
2. Increase the rubber high price and better standard	2.58	1.53	Medium	3
3. Establishment of the rubber central market without the price intervention of the traders	4.51	0.51	Highest	5
4. Support the public relations on market information and local auction market	3.25	0.85	Medium	3
5. Support the rubber process, export, and products	2.53	1.14	Medium	3

Table 4 Average and standard deviation of serious problems, level and priority from rubber growers, traders, and government officials in their marketing (continue)

Problems of marketing	$\overline{x}$	**S.D.**	**Levels of problems**	**Priority (Score)**
6. Support the establishment of the future market	4.25	0.85	Highest	5
Total	3.45	0.78	Highest	5
Government officials:				
1. Establishment the rubber training and transfer technology centers for rubber growers	3.47	1.24	Medium	3
2. Increase the rubber price with the better standard	2.87	1.59	Medium	3
3. Establishment the rubber central market without the price intervention of the traders	3.49	0.97	High	4
4. Support the public relations on market information and local auction market	3.36	1.52	Medium	3
5. Support the rubber process, export, and products	3.69	1.24	High	4
6. Support the establishment of the future market	3.44	1.43	Medium	3
Total	3.38	0.50	Medium	3

Table 5 Difference level of urgent needs in production management among the farmers, traders, and government officers

Level of urgent needs in production management	Populations			Total	Statistic (x^2) value from calculation P≤0.05
	Farmers	Traders	Government officers		
Low	8(17.39%)	-	5(11.11%)	13(11.82%)	5.687
Moderate	11(23.91%)	8(42.11%)	17(37.78%)	36(32.73%)	
High	27(58.70%)	11(57.89%)	23(51.11%)	61(55.45%)	
Total	46(100%)	19(100%)	45(100%)	110(100%)	

The results from Table 5 indicated that the level of urgent need in production management of farmers, traders, and government officers were in the high level according to 58.70, 57.89 and 51.11 %, respectively.

The results of Chi-square test found that x^2 (Cal $_{0.05,4}$) = 5.687 and x^2 (Tab $_{0.05,4}$) = 9.49 that x^2 was lower than x^2 from the table which indicated that the level of urgent needs in production management were not significant different. All the urgent needs in production were re-classified and prioritized using the focus group (Table 6).

Table 6 Average and standard deviation of urgent needs level from rubber growers, traders, and government officials in production

Problems of production	$\overline{x}$	S.D.	Levels of urgent needs	Priority (Score)
Rubber growers:				
1. Land provision/property rights of rubber growers	4.65	0.33	Highest	5
2. Provide the funding for rubber production	4.50	0.67	Highest	5
3. Increase knowledge on rubber production	2.71	1.12	Medium	3
4. Rubber grower group production establishment	2.53	0.98	Medium	3
5. Cost reduction of rubber production	2.94	1.03	Medium	3
Total	3.47	0.89	Medium	3
Traders:				
1. Support the knowledge transfer on rubber production to the rubber growers	4.26	0.56	Highest	5
2. Marketing contract on future purchase	3.17	1.23	Medium	3
3. Provide the better rubber varieties to the rubber growers	3.33	1.48	Medium	3
4. Provide the production inputs to the rubber growers	3.82	1.05	High	4
Total	3.65	0.57	Medium	3
Government officials:				
1. Launch the training and workshop for rubber growers	3.53	0.81	High	4
2. Lack of rubber cultivation survey	3.49	1.14	High	4
3. Set up the standard skill and labor cost	2.84	0.79	Medium	3
4. The group empowerment on bargaining through the financial institution	2.84	1.40	Medium	3
5. Sufficiency economy of the rubber growers	3.60	1.17	High	4
6. Administrative and group forming by competent knowledge leader	3.60	1.35	High	4
7. Management in the area with available supporting organization and network	3.24	1.22	Medium	3

Table 6 Average and standard deviation of urgent needs level from rubber growers, traders, and government officials in production (continue)

Problems of production	$\overline{x}$	S.D.	Levels of urgent needs	Priority (Score)
8. Provide better rubber seedling and cultivation	3.22	1.10	Medium	3
9. Support the low cost rubber warehouse	3.38	1.46	Medium	3
10. Transfer appropriate technology to the rubber growers	3.73	1.42	High	4
11. Training on appropriate compost for rubber tree	3.00	1.78	Medium	3
12. Provide the low interest credit for rubber growers	4.04	1.04	High	4
13. Control the price of fertilizer and herbicide	4.38	1.33	High	4
14. Issue on land entitles for rubber growers	4.29	1.32	High	4
15. Assign the responsible organization on land classification for rubber cultivation area	3.58	1.01	High	4
16. Suppress the corruption on rubber price intervention	3.69	1.27	High	4
17. Set up the training center and technology transfer center	2.87	1.12	Medium	3
18. Increase the bargaining power of rubber growers	3.20	1.17	Medium	3
Total	3.47	1.22	Medium	3

Table 7 Difference level of urgent needs in marketing management among farmers, traders, and government officers

Level of urgent needs in marketing management	Populations			Total	Statistic (x^2) value from calculation P≤0.05
	Farmers	Traders	Government officers		
Low	-	5(26.32%)	8(17.78%)	13(11.82%)	38.928
Moderate	14(30.43%)	-	13(28.89%)	27(24.55%)	
High	28(60.87%)	4(21.05%)	20(44.44%)	52(47.27%)	
Highest	4(8.70%)	10(52.63%)	4(8.89%)	18(16.36%)	
Total	46(100%)	19(100%)	45(100%)	110(100%)	

The results from Table 7 indicated that the level of urgent needs in marketing management of farmers and government officers were in the high level according to 60.87 and 44.44 %. In contrast, level of urgent need in marketing management of traders was in the highest level according to 52.63 %.

The results of Chi-square test found that x^2 (Cal $_{0.05,6}$) = 38.928 and x^2 (Tab $_{0.05,6}$) = 12.59 that x^2 was higher than x^2 from the table which indicated that the level of urgent needs in marketing management were significant different. The urgent needs in marketing were re-classified and prioritized within the cluster (Table 8).

Table 8 Average and standard deviation of urgent needs level from rubber growers, traders, and government officials in marketing

Problems of marketing	$\overline{x}$	**S.D.**	**Levels of urgent needs**	**Priority (Score)**
Rubber growers:				
1. Marketing competition of other rubber growers	2.50	1.11	Medium	3
2. Empower the bargaining of buying raw material for rubber cultivation	3.78	1.01	High	4
3. Empower the bargaining of selling the rubber to the traders	3.63	1.12	High	4
4. The diversification of rubber products	3.24	1.02	Medium	3
5. The entry of new rubber growers	3.09	1.05	Medium	3
6. Establishment of rubber central market in the northern or north eastern region	4.89	0.32	Highest	5
7. Establishment of the rubber latex and rubber sheet factories	4.80	0.40	Highest	5
8. Establishment of rubber product manufacturing	4.35	0.48	High	4
Total	3.79	0.48	High	4
Traders:				
1. Establishment of rubber transfer technology center for rubber growers	3.68	1.34	High	4
2. Increase the rubber high price and better standard	2.58	1.54	Medium	3
3. Establish the rubber central market without the price intervention of the traders	3.26	1.56	Medium	3
4. Support the public relations on market information and local auction market	3.84	1.30	Medium	3
5. Support the rubber processing, export, and products	4.74	0.45	Highest	5
6. Support the establishment of the future market	4.47	0.91	Highest	5
	3.77	0.97	Highest	5

Table 8 Average and standard deviation of urgent needs level from rubber growers, traders, and government officials in marketing (continue)

Problems of marketing	$\overline{x}$	S.D.	Levels of urgent needs	Priority (Score)
Government officials:				
1. Establishment of the rubber training and technology transfer centers for rubber growers	3.16	1.38	Medium	3
2. Increase the rubber price with the better standard	3.11	1.09	Medium	3
3. Establishment the rubber central market without the price intervention of the traders	3.78	0.87	Highest	5
4. Support the public relations on market information and local auction market	3.07	0.98	Medium	3
5. Support the rubber processing, export, and products	3.27	1.35	Medium	3
6. Support the establishment of the future market	3.53	1.24	High	4
Total	3.32	1.15	Medium	3

2. Analysis of Strategic Factors and Environment

The SWOT and TOWS matrix were analyzed with the cluster participation to reach the production, marketing strategy and policy. The analysis process included

(1) General External Factor Analysis Summary: GEFAS
(2) Industrial and Competitive Factor Analysis Summary: ICFAS
(3) Internal Factors Analysis Summary: IFAS
(4) Strategic Factors Analysis Summary: SFAS
(5) TOWS Matrix (Table 9).

Table 9 TOWS matrix for internal and external strategies

IFAS	Strength (S)	Weakness (W)
GEFAS	(S1) Phitsanulok is highly competitiveness on geographical transport location (S2) Best infrastructure and convenient communication (S3) High quality of product	(W1) Limited of suitable cultivation area (W2) The farmers lack of knowledge on rubber cultivation and harvest (W3) No central rubber market within the area (W4) Lack of group establishment with strong bargaining to traders and suppliers
Opportunities (O)	SO	WO
(O1) Demand of natural rubber in the world market: China, Japan, India, USSR (O2) Market situation within partner countries (O3) Production and market situations (O4) Production capacity of rubber industry (O5) Government policy: IRCO (International Rubber Consortium Limited) (O6) Appropriate environment for production (O7) Entrance of new farmers (O8) Competitive market of other farmers	(S3, O1) Research and development and rubber quality preservation to maintain the existing market and expand market to new partners (S1, S2, O9) World supply and price positioning	(W2, O5) Continuously training and rubber information from government sector (W3, O1, O5) The government sector set up the rubber central market in the north region or in Phitsanulok province (W4, O8) Establish the rubber farmer group to create the advantage on cost reduction and effective production
Threat (T)	ST	WT
(T1) The expansion of rubber cultivation area and rubber export of the foreign competitors (T2) The advantage on factors of production of the competitors (T3) Investment in rubber business (T4) Property of agricultural product (T5) Entrance of synthetic rubber as a substitute product (T6) Bargaining power on rubber supply to rubber traders (T7) Bargaining power on raw material buying in rubber cultivation	(S3, T1) Focus on good quality of rubber production and research on rubber new product diversity, differentiation, and value adding (S1, T4) Research on rubber clone development for good quality and reduce the lost after harvest	(W4, T6) Establish the farmer group and central market in the province for stronger bargaining power to rubber traders and suppliers

The results from Table 9 establish the strategic competency as follow;

(1.) SO: more-more, use the strength to create the advantage from opportunity. Government sector, Private sector, education institutes and related organizations should conduct further research, develop and maintain the rubber production quality in order to maintain the old partners and expand market to new partners under IRCO policy and activities.

(2.) WO: less-more, create the advantage to overcome the weakness. Government sector launch the training program and provide necessary information related to rubber to the farmers continuously. Government sector set up the central market in the north region especially in Phitsanulok province. Setting up of the rubber corporative group in Phitsanulok will create the advantage on cost reduction and effective factors of production.

(3.) ST: more-less, use the strength to overcome or avoid the threat, focus on quality of rubber production, research on new rubber product for product differentiation and value adding, and research on rubber clone development for area suitability, high quality and standard, and reduce lost after harvest

(4.) WT: less-less, improvement from the weakness and threat, create the strength and opportunity, and encourage the rubber group to set up in the province to empower the bargaining.

The results from strategic analysis, general environment analysis, industrial competitiveness analysis, and internal environment analysis could be create the strategic results to increase the potential of rubber production and market in Phitsanulok as follow

(1.) The government sector should set up the rubber central market in the north region and within Phitsanulok province on logistic and advantage.

(2.) The government sector, private sector, educational institution, and related organization should conducted research, develop and produce good quality for maintaining the old partner and expand the market to the new partner**.**

(3.) The government sector should launch the training on advance technology and provide information about rubber to the farmers**.**

(4.) Establishing the grower groups create higher competitiveness in cost reduction and possible factors of production.

(5.) Focus on produce good quality product and research on new rubber product for varying, product differentiation and value added.

(6.) Research the new rubber clone development suit for the new area, high quality and standard, and reduce lost during harvest

(7.) Promote the rubber group and market forming in the province for bargaining empowerment to the rubber traders and suppliers under IRCO network**.**

Discussion

The results of enhancement of the competitiveness of rubber production and marketing in Phitsanulok Province could be answered the research objectives, research hypothesis and could be discussed as follow

Regarding to rubber production and market problem, it was found that the major problems on production were lack of rubber information, distance of rubber delivery, lack of cultivation knowledge, high cost of production, no property rights on land, and lack of standard storage house.

The problems on marketing were lack of auction market and low with poor price bargaining power. The market activity fluctuated simultaneously with problems such as

problem on supply bargaining change in marketing system. The real cost change because uncertain price and it is likely that the rubber price at growers and local traders will lower than the market price. To setting up the strategic or policy should be the activity supporting the rubber price in the market matching to the real cost.

The results from the higher of population and area analysis found that Phitsanulok province could be developed in competitive competency regarding to the province located in the center of the country with good infrastructure and communication network (land, water, airport, and railway). Particularly, the province located in the center of Indo-china intersection which close to major world market such as China, Japan and India, if the government and private sectors can establish the strategic planning for rubber central market in the north region especially in Phitsanulok province. These will reduce the logistic cost which influenced to rubber price. Stakeholder should receive the information on rubber market from the central market that will lead to development and improvement in rubber competency in international market.

Reference

Kangpitsadan, Nutchanart and Thongner-ngam, Orrawan. The potential of Thai rubber production. 28(1).pp 42-52.

Naweekarn, Somyot. 2003. Competitive Strategy: Chanwit Publication. 345.

Phromchotechai, Phongsak (interviewee). 2007 General information on rubber production, marketing, problem and solution in Phitsanulok: The Rubber Replanting Aid Fund.

Porter, Michael E. (2000) Competition Strategy. (Somkid Jatusripitak, Suwinai Torsirisuk and Uttom Saonayon,) translate: Medsai Printing. 220 p(2007).

Prathummin, Somjate. Kasawapitak, Prasat. and Romyen, Prapat. The potential of rubber production for expansion in 2004-2006 in the north and north east: Department of Agriculture.

Sikharinmat, Somjit. Rattanapong, Suvit. Thongnueha, Somchai and Saengpradab, Sommat. 2007 Development of rubber market network. 28(1), pp 25-41.

University of the Thai Chamber of Commerce. 2003 Final Report of the study and design on administration system of indo-china distribution centre: Faculty of Economics and Faculty of Engineering and Logistics Management and Industrial Service Center.

Wattanachaiyingcharoen, Det. 2006 The potential of Para rubber production, marketing, and collaborative competency in Vietnam and Thailand: Dept. Agricultural Sciences, Naresuan University.