

**ANALYSIS OF THAI RUBBER PRICE
STABILIZATION POLICIES**

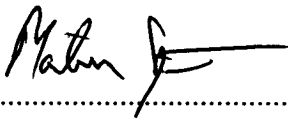
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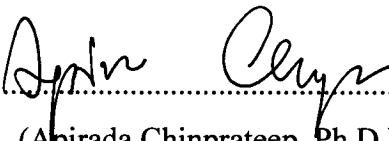
**A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Public Administration
School of Public Administration
National Institute of Development Administration
2019**

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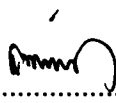
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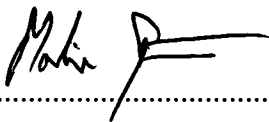
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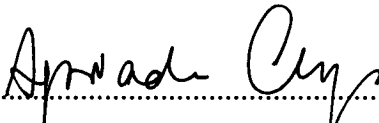
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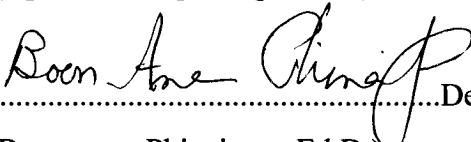
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October 2019

ABSTRACT

Title of Dissertation	Analysis of Thai Rubber Price Stabilization Policies
Author	Miss Soyfa Sertkaew
Degree	Doctor of Public Administration
Year	2019

This dissertation was aimed at 1) studying the process of Thai rubber price policies, 2) analyzing the efficiency of price policies on the Thai economic system, and 3) suggesting options for price policies affecting the efficiency of the economic system. The process of rubber price policies related to price stabilization from 1991 to 2017 was studied using a mixed method of research in order to analyze each policy process based on descriptive writing and to assess social welfare as a result of policy implementation.

With respect to the development of rubber policies between 1991 and 2017, rubber policies are classified into three types: upstream policies, midstream policies and downstream policies. Policies have been developed in accordance with value chains. In the beginning, upstream policies, namely production policies that increase plantation area, increase productivity per rai, assist farmers and help domestic markets, were emphasized. Midstream and downstream policies were formulated when farmers could not sell their rubber at a reasonable price on the market. For example, processing plants were constructed to add value, research and development was increased, as was support of business operators and international cooperation, and promotion of local rubber use. Rubber policies can be categorized into three types – quantitative and qualitative production promotion, rubber production and sale control, which had different practices in each period, and then Thai rubber market intervention.

The policy process can be classified into three processes, namely policy formulation, policy implementation and policy evaluation. Policy formulation

involves the identification of problems, starting from individual problems concerning low price rubber sales. These problems became public problems for farmers across the country. This led to identification of options to solve short-term problems through price intervention, which provided clear results and was uncomplicated. Regarding policy implementation, it was found that factors leading to success include having easy implementation of the policies, monitoring and control of those policies caused by correct policy decisions, competency of the responsible agencies, and having the needed resources for policy implementation, the implementation process and the policy-related organizations. Based on policy evaluation, there are three policy impacts: on rubber farmers, on rubber prices and on rubber quantity bought by the project. These three impacts received few benefits from the policies, compared to the total amount, while the impacts from policy implementation, namely unexpected impacts, may encourage farmers to not produce rubber to meet market demand and instead continue expanding plantation area because that's the usual support offered by the government to solve the price problem. In addition, there are two impacts on present and future conditions: due to farmers' habits, farmers have not adapted themselves to competitive markets; and policy costs, which include budget and social welfare lost.

Policy efficiency was considered in terms of social welfare. Five rubber price stabilization policies from 1992 to 2016 were studied. They include the Thai Rubber Market Intervention Scheme; Farmers' Institute Supporting Project; Farmers' Institute Potential Development Project; Buffer Product Project; and the Public Sector's Rubber Utilization Promotion Project. Social welfare measurement was based on changes in the producer surplus and the consumer surplus compared to the budget and income from policy implementation. To measure producer surplus and consumer surplus, Thai rubber demand and supply models were produced using secondary information from 1987 to 2016. It was found that policy factors did not affect Thai rubber demand and supply. It could be stated that the price intervention policy did not affect Thai rubber markets. The consumer surplus decreased by 231.15529 billion baht because rubber was bought at higher prices than the market, while the producer surplus increased by 228.20244 billion baht because of rubber sold at higher prices

than the market. The budget for policy implementation and operation loss amounted to 21.02061 billion baht. Thus, social welfare lost due to policy implementation for 24 years accounted for 23.973.47 billion baht, or 998.89 million baht per year.

There are three recommended options for Thailand's rubber price stabilization policies: 1) production policies that decrease plantation area and increase product quality (the plantation area increase promotion policy should not be adopted again despite higher rubber prices in the future), 2) Farmer Strengthening Support, to serve as a driving mechanism for managing price uncertainty and to add rubber value by providing knowledge, innovation and technology to farmers; and 3) a public role change - from the director to the operator, in particular regarding commercial policies through previous public mechanisms, this would include a role in supporting business operators and farmers to carry out their rubber business in accordance with market mechanisms and implement dynamic policies according to constantly changing global situations.

ACKNOWLEDGEMENTS

My success in studying for a doctorate degree, including this dissertation, would not have occurred without the moral support, kindness and driving force from almost all the people in my life. First of all, I would like to express my sincere thanks to my family “Sertkaew” for encouraging and inspiring me in all steps of life.

Furthermore, I would like to extend my heartfelt thanks to Assistant Professor Dr.Visit Limsombunchai for his support related to my jobs, education and life, as well as for giving me the honor to become the Dissertation Committee Chairperson. My dissertation was accomplished thanks to the kindness and advice provided by Assistant Professor Dr.Montree Socratayanurak, my advisor, for consistently giving me advice. I also thank Assistant Professor Dr.Apirada Chinprateep for honorably being on the Dissertation Committee and providing beneficial recommendations to ensure that this dissertation would be more complete.

Finally, I would like to express my deepest gratitude to my teachers and friends, who have provided me with moral support and consistently asked me about its progress.

Last but not least, I would like to give all benefit from this study to my parents and my teachers, who have provided me with all the knowledge necessary to see this dissertation to fruition.

Soyfa Sertkaew

March 2019

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CHAPTER 1

INTRODUCTION

1.1 Background and Problem Significance

The rubber policy is an agricultural economic policy formulated as a tool for developing the country. It was initiated by the government of Mr. Pridi Pahomyong, who announced the policy to parliament on June 11th, 1946. The agricultural policy related to para rubber was designed to increase the number of rubber plantations and to select good species of rubber for distribution to rubber farm owners (The Secretariat of the House of Representatives, 1997, pp. 88-89, as cited in Sophon Chomchan, Korranit Nopparat and Sopin Tongpan, 2014, pp. 10-11). Since then, the government has continuously formulated policies concerning plantations of this economic crop by supporting production through the expansion of good rubber species to other regions in Thailand in order to replace local ones. Due to increasing economic growth, rubber farmers and other relevant people have earned higher incomes from the rubber business, which has been a motivation to farmers to switch and grow more rubber. As a result, the number of rubber plantation areas, farmers, processors, exporters and other relevant people has consistently increased.

Rubber farmer numbers have continually increased. Based on data from 2007, there were at that time 1,315,000 rubber farmer households, or 22.75 percent of all farmers in Thailand. Farmers have been increasingly interested in growing rubber. Beginning in 2013, the number of 1,622,163 households of rubber farmers, or 27.48 percent, began to decline because of a fall in rubber prices. In 2017, there were 1,540,229 households of rubber famers, or 26.09 percent of the total famers in Thailand, as shown in Table 1.1.

Table 1.1 Number of Rubber Farmers Compared to Total Farmers in Thailand from 2007 to 2017

Year	Rubber Farmers (Thousand Households)	Total Thai Farmers (Thousand Households)	Proportion of Rubber Farmers to National Farmers (Percent)
2007	1,315	5,778	22.76
2008	1,429	5,782	24.71
2009	1,484	5,864	25.31
2010	1,506	5,875	25.63
2011	1,557	5,871	26.51
2012	1,584	5,910	26.80
2013	1,622	5,903	27.48
2014	1,477	5,905	25.02
2015	1,558	5,903	26.38
2016	1,542	5,909	26.09
2017	1,540	5,904	26.09

Source: Office of Agricultural Economics, 2017, p. 2, 27.

Land use in Thailand for rubber plantations in 2016 showed that 15.36 percent of the total agricultural area in Thailand was used for tree growing areas, or about 23,234,000 rai. Rubber tapping areas accounted for 80.52 percent of those growing areas. Rubber plantation areas and growing areas increased every year until 2015, at which time they began to decline, as shown in Table 1.2.

Table 1.2 Rubber Tapping Areas, Growing Areas and Agricultural Areas in Thailand from 2008 to 2016

Year	Growing Areas (Thousand rai)	Tapping Areas (Thousand rai)	Thai Agricultural Areas (Thousand rai)	Proportion of Growing Areas to Thai Agricultural Areas (Percent)
2008	18,809	13,352	149,794	12.56
2009	19,625	13,741	149,694	13.11
2010	20,264	14,883	149,417	13.56
2011	21,165	15,760	149,246	14.18
2012	22,482	16,710	149,240	15.06
2013	23,194	17,386	149,236	15.54
2014	23,583	18,159	149,225	15.80
2015	23,140	18,426	149,242	15.51
2016	22,933	18,466	149,260	15.36

Source: Office of Agricultural Economics, 2013, p. 191; 2014, p. 171; 2015, p. 175; 2016, p. 95, 175; 2017, p. 94, 170.

When considering its importance in terms of national economic development, it is noteworthy that the value of Thailand's rubber exports was ranked second in national agricultural product behind rice. In 2017 the export of rubber was valued at 216,051 million baht, or 2.96 percent of the total export value in Thailand, and 15.94 percent of Thailand's entire agricultural product export value. However, the value of rubber exports between 2012 and 2016 tended to be lower because of falling rubber prices, as shown in Table 1.3.

Table 1.3 Value of Thai Natural Rubber Exports Compared to Total Export Value and Value of Agricultural Products and Thai Product Exports from 2007 to 2017

Year	Natural Rubber Export Value (million baht)	Total Export Value (million baht)	Proportion of Rubber Exports to Total Export Value (percent)	Agricultural Products Export Value (million baht)	Proportion of Rubber Export Value to Agricultural Product Exports (percent)
2007	194,338	5,296,507	3.67	886,857	21.91
2008	223,628	5,850,777	3.82	1,054,074	21.22
2009	146,264	5,194,445	2.82	964,945	15.16
2010	296,380	6,176,170	4.80	1,135,754	26.10
2011	440,869	6,707,851	6.57	1,444,996	30.51
2012	336,304	7,082,333	4.75	1,341,826	25.06
2013	315,159	6,907,494	4.56	1,268,217	24.85
2014	244,785	7,304,899	3.35	1,308,707	18.70
2015	193,938	7,220,349	2.69	1,211,164	16.01
2016	167,156	7,534,737	2.22	1,206,598	13.85
2017	216,051	7,294,295	2.96	1,355,501	15.94

Source: Office of Agricultural Economics, 2012, p. 27, 167; 2013, p. 27, 182; 2014, p. 27, 185; 2015, p. 27, 185; 2016, p. 27, 184; 2017, p. 27, 184.

In respect to international trade, which has a major role in driving the Thai economy, Thailand was the world's number one rubber producer, with a continuous market share of more than 30 percent. However, in 2017 the Thai natural rubber market share lowered to 28.69 percent. The market share of Thai rubber on the world trade market is shown in Figure 1.1 and Table 1.4.

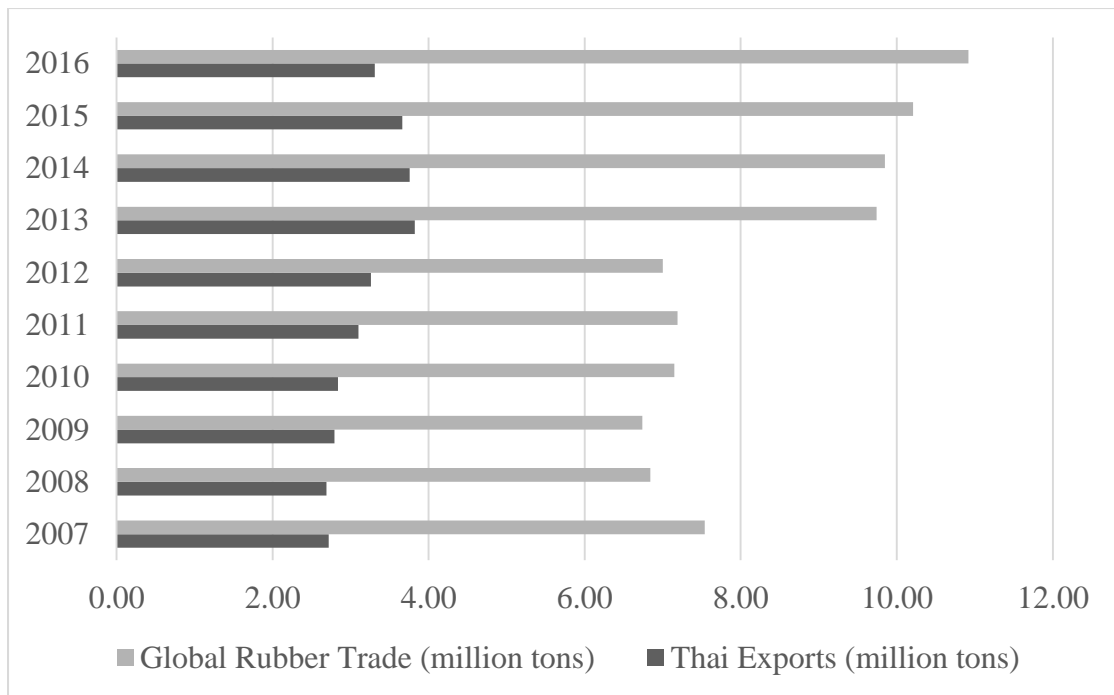


Figure 1.1 Global Rubber Trade Volume Compared to Thai Rubber Export Value from 2007 to 2017

Source: Office of Agricultural Economics, 2012, p. 27; 2013, p. 27; 2014, p. 27; 2015, p. 27; 2016, p. 27; 2017, p. 27.

Table 1.4 Thai Natural Rubber Export Value Compared to Total Export Value and Agricultural Product Value and Thai Product Value from 2007 to 2017

Year	Global Trade (million tons)	Thai Exports (million tons)	Market Share (percent)
2007	7.54	2.75	3.67
2008	6.84	2.69	3.82
2009	6.74	2.79	2.82
2010	7.15	2.84	4.80
2011	7.19	3.01	6.57
2012	8.67	3.23	4.75

Table 1.4 (Continued)

Year	Global Trade (million tons)	Thai Exports (million tons)	Market Share (percent)
2013	9.74	3.82	4.56
2014	9.85	3.76	3.35
2015	10.21	3.66	2.69
2016	10.38	3.31	2.22
2017	11.64	3.34	2.96

Source: Office of Agricultural Economics, 2012, p. 27; 2013, p. 27; 2014, p. 27; 2015, p. 27; 2016, p. 27; 2017, p. 27.

Despite the high market share of Thai rubber on the global market, Thailand is still a price taker influenced by the global market. Therefore, when global rubber prices change, business operators and rubber farmers have to bear risks caused by prices lower than their production costs. As a result, economic units relating to the rubber business suffer and therefore demands arise for the government to play a role in solving the problem by continuing to issue assistance policies during each economic period.

Due to dropping rubber prices, the government has had to formulate policies to concretely solve these problems, starting in 1967. At that time, the government urgently resolved to solve the low rubber price problem by negotiating with the US government to not dump synthetic and natural rubber into the market, to temporarily revoke the relief fund (CESS), seek more rubber markets in European countries, to participate in meetings over rubber trade problems in Kuala Lumpur and to reduce the export duty. In addition, the government continued spending on a budget to solve low rubber prices. In 1976, in response to falling rubber prices, the government initiated a natural rubber price stabilization scheme in collaboration with natural rubber producing country members, as well as accelerated the planting of a good variety of rubber to replace old rubber farms, using a foreign loan.

The government's policy on rubber production and marketing, carried out simultaneously in all periods, included production policy as well as plantation area expansion. For example, in 1989 a rubber plantation aid project with a budget of 46,336 million baht was conducted to provide rubber to those who did not have rubber farms (Sophon Chomchan, Korranit Nopparat, and Sopin Tongpan, 2014, pp. 10-18). Moreover, rubber trees were replaced with good species supported by the Office of the Rubber Replanting Aid Fund. Additionally, a price policy was initiated to intervene in the market by purchasing rubber and decreasing market demand by supporting a fund to farmers' institutes in order to buy rubber for further processing, storage and export when the prices soared. The project began in 1993 to support funding for the Rubber Fund Cooperatives for the construction of a processing plant and a revolving fund for buying rubber from retail farmers to process and stock rubber.

Rubber price stabilization policies have been implemented continuously since 1967 right up to the present. They include the purchase of rubber at a higher price than the market price, and the support of a farmer's institute and of rubber business operators in order to help purchase rubber, compensate farmers' incomes and support production factors, all of which influence the price mechanism. However, due to the role of government in the country's management, it is necessary to issue policies to mitigate problems. Although previous policy operations were suggested by academics and relevant agencies, price intervention was not the most efficient direction because rubber prices have continued fluctuating for 25 years, as shown in Figure 1.2.

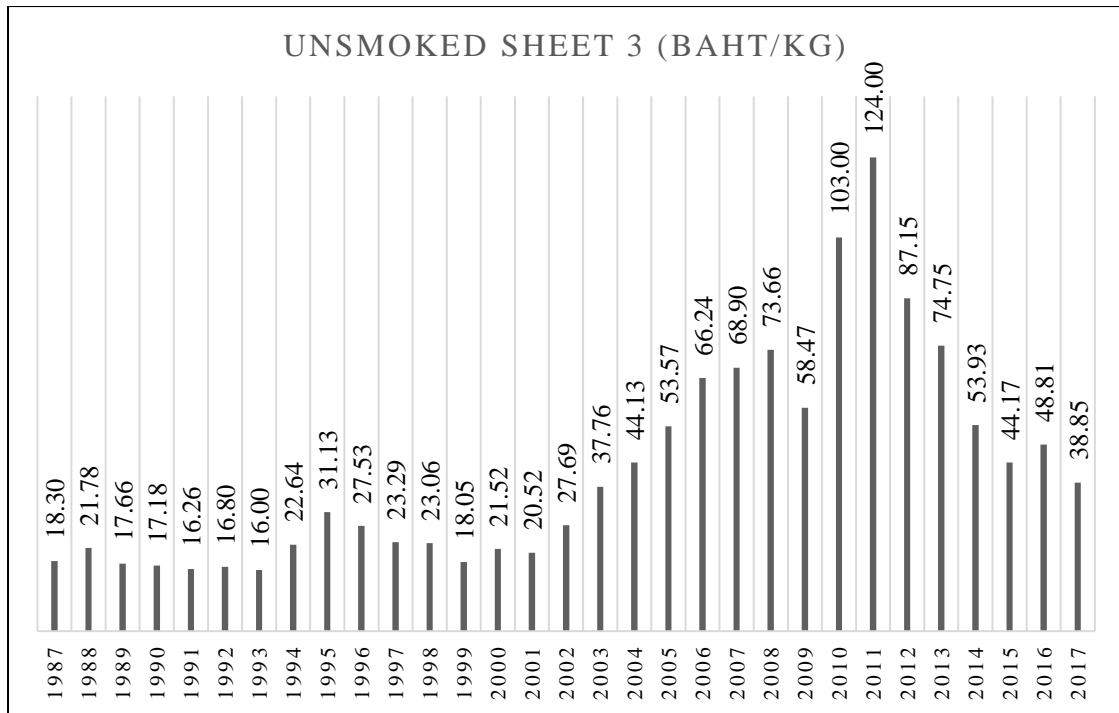


Figure 1.2 Rubber Prices Earned by Thai Farmers from 1988 to 2017

Source: Food and Agriculture Organization of the United Nations, 2017.

Therefore, to understand the process of rubber price stabilization policies continuously implemented by the government by way of criticism of the disadvantages of these policies and their appropriateness, past rubber policies were analyzed and the policies' efficiency on the economic system has been assessed. In addition, factors influencing the government to select its price intervention policy were studied. This method might lead to more loss of the government's budget than others, and to an analysis of policy options which are more efficient to further stabilize Thai rubber prices.

1.2 Research Questions

1.2.1 Major Research Question

What is the process for the policy on Thai rubber price stabilization?

1.2.2 Research Sub-Questions

- 1) How have Thai rubber policies been developed?
- 2) Do rubber price stabilization policies affect the efficiency of the economic system? How?
- 3) How should options be implemented for rubber price stabilization policies affecting the efficiency of the economic system?

1.3 Objectives

- 1) To study the process of Thai rubber price policies.
- 2) To analyze the efficiency of price policies on the Thai economic system.
- 3) To suggest options for price policies affecting the efficiency of the economic system.

1.4 Scope of the Research

Study the process of rubber policies relating to rubber price stabilization from 1991 to 2016.

1.5 Expected Benefits

Factors affecting the determination of Thai rubber price stabilization policies will be explained using the public choice theory and options of price stabilization policies affecting the future economic system.

CHAPTER 2

RELEVANT CONCEPTS, THEORIES AND RESEARCH

The following concepts, theories and research relating to the analysis of rubber policies were studied and reviewed to determine the conceptual framework and methodology.

2.1 Relevant Concepts and Theories

2.1.1 Policy Concepts and Theories

2.1.1.1 Meaning of Public Policies

Public policies are determined to be frameworks for public activities in order to solve problems and satisfy people's demands. Public policies have been defined by many academics by emphasizing different points according to their proposed importance. The meaning of public policy is summarized as follows:

Dye (1984, p. 1) defined 'public policy' as "anything a government chooses to do or not to do." This is in accordance with Tin Pratchayaphrut's definition (1992, p. 331) stating that it is the government's decision to do or not to do and such decision is legally enforced. If people do not follow it, they will be punished. Ruangvit Getsuwan (2007, p. 4) defined public policy as a practice guideline intended by the government by selecting an option and formulating plans and projects. This also includes the choice to not do it. The goal is to attain public benefits and policies, not only the government's policy but also social policies and roles. In addition, Howlett and Ramesh summarized the definition of public policy as the result of the government's decision, which may continue to keep or change the existing conditions (Howlett, Michael, and Ramesh M., 2003, as cited in Nattha Vinijnaiyapak, 2011, p. 5).

In addition, there are other thinkers who mention the attainment of goals concerning public policies, such as Jenkins (1978, as cited in Nattha

Vinijnaiyapak, 2011, p. 5). William Jenkins conceptualizes public policy as “a set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specific situation where those decisions should, in principle, be within the power of those actors to achieve.” This is consistent with Anderson (1994, as cited in Sombat Thamrongthanyawong, 2000, p. 8), who stated that “public policy as a purposive course of action followed by an actor or set of actors in solving social problems”. He has focused on not only on what is proposed or desired but also what is actually done in reality. Similarly, Prewitt and Verba (1983, as cited in Sombat Thamrongthanyawong, 2000, pp. 10-11) emphasized the goal of long-term commitment in the government’s activities focusing on the government’s real actions rather than its words. Therefore, policy is a process starting from legislation, then administration, and finally, action.

As for public policy components, Sombat Thamrongthanyawong summarized the public policy components, covering the following 13 issues: (Sombat Thamrongthanyawong, 2000, pp. 21-22).

- 1) They are activities chosen by the government as to what to do or not to do.
- 2) It is the state’s power to do activities to satisfy social values.
- 3) Persons authorized to formulate public policies include political leaders in the executive branch, legislative branch and judiciary branch, political parties, public institutions, government officers and heads of state.
- 4) Activities selected by the government shall be a set of systematic actions with clear plans and processes, which operate continuously.
- 5) Activities selected by the government shall have goals, objectives or aims to meet the needs of a large number of people.
- 6) Activities shall be made real, not just a willingness or stated intention of action.
- 7) Activities selected for action shall result in a solution to social problems, both conflicts and public cooperation problems.
- 8) A decision to act for the benefit of a large number of people, not for the benefit of individual people, and shall be a set of systematic, not separate decisions.

9) Options for what to do are considered based on the results of optimal option analysis in terms of politics, the economy and society.

10) An activity shall be caused by negotiation or compromise between relevant benefit groups.

11) Activities shall cover both domestic and international activities.

12) Activities selected by the government for what to do or not do may bring about both positive and negative social impacts.

13) Legitimate activities.

In brief, public policies are activities selected by the government of what to do or not do in order to achieve the goal of satisfying people's needs, to solve conflicts of social actions or to manage country conditions under internal and external impact factors.

2.1.1.2 Public Policy Analysis

Public policies are important to drive the country. They are related to the satisfaction of people's needs for political security and national growth. Due to the roles and importance of public policies for the country and its people, policy analysis is necessary to develop knowledge in formulating policies and applying them to practice so as to meet the goal of solving problems and troubles and bringing about the overall happiness of the people.

In response to the definition of policy analysis, Sombat Thamrongthanyawong gathered the concepts of thinkers who have given their definitions of policy analysis. For example, Susan B. Hansen stated that policy analysis is the emphasis of systematic and clear analysis affecting the output and effects on society by giving importance to efforts in measuring and assessing policy outputs to compare policies in terms of structures and impacts, and to consider both direct and indirect or reciprocal relationships between political process and policy output. Thomas R. Dye mentioned that policy analysis is an analysis and explanation of social problems focusing on the explanation and the causes and effects of policies using scientific methodology. It emphasizes a description of phenomena rather than suggestions, including theoretical development rather than solutions. In addition to seeking the causes and results of policies according to Thomas R. Dye, James E. Anderson stated that policy analysis

also involves inspection, together with a description of causes and results of policies, while William N. Dunn proposed that, apart from the explanation of causes and results of policies, he also focused on a consideration of alternatives that are effective and can solve problems (Sombat Thamrongthanyawong, 2000, pp. 257-260).

In summary, policy analysis is a systematic analysis and explanation of causes and results of policies starting from directly and indirectly explaining the causes, outputs and impacts of policy on society. In this study, policies were analyzed by taking into consideration outputs, outcomes and effects arising because of the Thai rubber stabilization policies.

Concerning the policy analysis process, policy analysts made a variety of comments on this. Key academics were widely referred to, such as Quade (1982 as cited in Sombat Thamrongthanyawong, 2003, pp. 275-278), who suggested that it involves performing the same set of logical steps, comprised of 1) Clarifying the problem as well as identifying the people who will be affected and the impacts on society, 2) Determining the objectives to solve a problem. The objectives must be specific, possible and measurable, 3) Searching and designing possible alternatives to solve problems in accordance with objectives, 4) Collecting data and information to analyze appropriate alternatives, 5) Building and testing models to select possible and appropriate alternatives for building models 6) Examining feasible alternatives, which are consistent with social values or alternatives that are supported by both practitioners and beneficiaries, 7) Evaluating cost and effectiveness in terms of the economy, society and politics, 8) Interpreting results as to whether they meet the objectives or not, or if there are problems during implementation, 9) Questioning assumptions, in particular when the outcomes do not meet the objectives, and 10) Opening new alternatives. If the outputs do not meet the objectives, they can be practiced further by improving some until they are suitable, or if they do not meet the objectives, they must be reviewed and new alternatives must be sought.

Dunn (1994 as cited in Sombat Thamrongthanyawong, 2003, pp. 284-285) mentioned that policy analysis consists of: 1) Problem structuring, which is a collection of data concerning problems and solutions to identify problems, 2) Forecasting that involves prediction of environment and outputs regarding the future of policy alternatives, 3) Recommendations that involve an analysis to prioritize

alternatives and analyze the consistency of the political, environmental and value situations of policy decision makers, 4) Monitoring policies that involve the application of policies into practice to meet policy outputs, and 5) Evaluation that is a verification of whether the alternatives are effective.

According to Quade and Dunn, suitable policy alternatives are sought to meet the objectives. Concerning the Thai rubber stabilization analysis, policies were analyzed in three parts: 1) Policy formulation consisting of policy identification, policy alternative identification and policy alternative decision making, 2) Policy implementation, and 3) Policy evaluation that is in accordance with the model and direction of the Thai rubber stabilization policy process to analyze policies relating to Thai rubber stabilizations and to suggest efficient policy alternatives.

2.1.1.3 Agricultural Policies

Kasetsart University, Faculty of Economics, The Department of Agricultural and Resource Economics (2013, pp. 389-420) mentioned agricultural policies concerning definitions, goals and policy tools as follows:

The definition of agricultural policy was summarized based on public policy as an activity that the government selects to do or not do in order to meet its objectives, satisfy people's needs and solve conflicts concerning social actions or manage country conditions influenced by internal and external impacts. The policies have to be continuously operated with commitment. Agricultural policies, sub-policies of the overall policy, are defined as any government's action to respond to agricultural economic issues, e. g. , production and consumption of agricultural products.

Agricultural policies are a product with a demand or a policy demander, either farmers or businessmen, and a supply or policy makers, comprising the cabinet, government officers, political parties and parliament. Policies can be determined by both demand and supply, such as the income guarantee policy in 2009/2010 that economists from the Thailand Development Research Institute had a role in pushing for the termination of the Rice Pledging Project, and suggesting a rice price intervention option in the form of risk guarantees from price fluctuations. It was a policy pushed by demand and the rice pledging policy. The price had been higher than the market price since 2004. It was a populist policy for farmers pushed by political parties. This

is an example of policy determined by supply (Isriya Bunyasiri, 2009 as cited in Kasetsart University, Faculty of Economics, The Department of Agricultural and Resource Economics, 2015, pp. 390-391).

Public goods policy: A farmer participates in the project, does not affect the agricultural policy, and cannot prevent other farmers from joining the project. In addition, agricultural policies made some farmers more satisfied, while some farmers were less satisfied and some had the same level of satisfaction. Thus, there are both supporters and opponents of agricultural policy depending on the size of benefit loss and transaction costs for opposing policies. However, agricultural policies are not free goods, they do have costs, which include the budget from people's taxes used by the government to implement policies.

The major goals of basic agricultural policies are categorized into three types. The implementation of agricultural policies must take into account three goals at the same time. However, the implementation of some policies may not achieve all goals, so some goals have to be selected.

1) Efficiency or expansion of the agricultural branch refers to the allocation of resources that yield overall products or the maximum income, which leads to the highest satisfaction of consumers.

2) Equity or income distribution refers to distribution of resources used in the agricultural sector and compensation of production factors among social groups.

3) Security or stability, such as food security, social safety networking for agricultural households, farmer subsidies for crop insurance, product price stabilization, etc..

Tools for implementing policies are a practice selected by the government to carry out policies to achieve its goals. Policies can be classified and examples of agricultural policy tools are as follows:

1) Production policies are categorized into two types:

(1) Policies on aggregate production include restructuring of agricultural products, policy tools, e. g. , motivation, economic zoning of key agricultural crops, etc., and policies in the agro/food-processing industry, policy tools such as research and development support.

(2) Policies on production factors include land policies concerning provision of farmland, collection of progressive land tax, irrigation policies concerning investment in irrigation system development, agricultural credit policies concerning provision of low interest rates to farmers, fertilizer and seed provision policies and agricultural research and promotion policies concerning crop, livestock and fishery policies and research transfer to farmers.

(3) Risk management policies, such as crop guarantee policies by subsidizing crop insurance premiums.

2) Marketing and price policies relating to product transfer from farms to consumers, comprising:

(1) Domestic marketing policies, which include marketing system improvement by developing medium-scale markets and improving logistics systems, price stabilization policies by buying products and supporting prices through pledging, guaranteeing lowest prices, paying compensation to farmers, establishing buffer stock or the price stabilization fund and the Agricultural Futures Exchange of Thailand.

(2) Overseas trade policies, which include export policies by collecting export tax, limiting the export volume and expanding export markets; import policies by collecting import tax and limiting import volume; and international cooperation policies by arranging free trade agreements.

3) Production and marketing policies consist of:

(1) Farmers' institutions development policies by supporting group gatherings.

(2) Poverty solving/ farmers' quality of life upgrading policies by allocating farmland to farmers without land, providing welfare to farmers and suspending farm debts.

(3) Food safety and security policies by supporting standards in the production of food and promoting organic farming.

This research stresses the policy of Thai rubber stabilization, as rubber is a key economic crop and affects a large number of Thai farmers, involving both the production and markets of para rubber.

2.1.2 Concepts and Theories of Policy Efficiency Measurement

2.1.2.1 Public Policy Implementation

The objective of the implementation of public policies is the overall well-being of society. The government has a duty to carry out policies using public expenses as a tool. The major function of the government is social well-being (Musgrave, 1959 and Stiglitz, 2000 as cited in Ponlapat Buracom, 2011: 4-5).

1) Allocation function involves a public role in allocating social resources to produce products and provide services for maximum efficiency.

2) Distribution function involves identification of products and services to distribute to population groups so that all groups of people thoroughly receive benefits.

3) Stabilization function involves making the national economy change smoothly and consistently by maintaining a high employment level and stabilizing the price of products and services.

4) Growth and development function refers to the public use of measures to encourage the allocation of social resources for maximum growth to the economy, resulting in the full use of resources.

Public expenses are needed to carry out the government's function to meet the goals of society and to drive policies to achieve policy goals and social objectives.

Well-being is the ultimate goal of public policy implementation, using public expenses based on the concept of welfare economics regarding the study on how to allocate resources in order to bring about the highest well-being of society or maximum benefits of overall society. This is determined by both efficiency and equity.

2.1.2.2 Welfare economics comprises three main concepts, as follows (Kasetsart University, Faculty of Economics, The Department of Agricultural and Resource Economics, 2015, pp. 401-402):

1) Pareto optimum, or the condition when society is the most efficient or in the best condition. If any change, someone will be less satisfied, e.g. price intervention by guaranteeing minimum prices, affecting producers to be more satisfied with the increasing prices, while consumers will be less satisfied as a result

of higher product prices. The former condition before intervention was the most efficient social condition.

2) Pareto improvement refers to any change that makes at least one person better without making anyone worse.

3) Compensation criterion, or Kaldor-Hicks criterion, states that changes in policy may be possible despite benefit losers, if benefit receivers can give compensation to benefit losers without any loser in society. This principle can be used to assess whether policies can bring about net profits rather than policy costs.

Due to the most efficient social condition, any public action must be operated while considering changes in the society, especially changes bringing about less satisfaction to anyone in the society. Compensation of the lost with the given must have maximum benefits and highest efficiency in accordance with maximum social gain theory, the principle of which is to produce products or services only when such activity brings about more benefits to society than disadvantages. Public expenses play a major part in driving the policy. Based on the principle of maximum social benefit, the government must prioritize policies which give maximum benefits comprising both benefits and disadvantages in terms of efficient allocation and fair distribution of income. In other words, benefit from the production of products and services or public policy implementation must be higher than any disadvantage due to that product's production (Ponlapat Buracom, 2011, pp. 24-32).

Social well-being or social welfare is regarded as an outcome of policy implementation and public expense allocation to undertake various activities. Social welfare is used to measure the well-being of all people in the society, including consumers, producers and the government. The consumers' well-being is measured by consumer surplus, the producers' well-being is measured by producer surplus and the government's well-being is measured by deducting the income from the expenditure. Producer and consumer surplus is a measurement of social welfare using the outcomes from producers and consumers. Consumer surplus is a benefit caused by the difference of the price that consumers are pleased to pay, and the actual price paid by consumers. This is also applied to producers concerning the price difference between the price they're willing to sell at and the actual selling price. Without intervention in a competitive market, market mechanism will cause social welfare because of

producer and consumer surplus. Because of the public policies leading to increasing or decreasing product or service prices, the producer and consumer surplus will change. For example, if agricultural prices are increased, the consumer surplus will decrease. When the producer or farmer surplus is increased, the consumer surplus is transferred to producers and none receives benefits, sometimes referred to as dead weight loss.

The measurement of policy efficiency to create well-being is a guideline to show society about the efficiency of public expenditure for implementing policy, especially policy that obstructs price mechanisms or leads to incomplete market competition. That is the policy the government usually uses for agricultural products, either price intervention by buying products, pledging, guaranteeing prices, paying compensation or establishing buffer stock that results in changes in social welfare. However, to determine policy alternatives or assess policies, it is necessary to consider the difference between the results affecting changing social changes, and public expenses for policies to provide maximum benefits.

2.1.3 Concepts and Theories of Policy Alternatives

Market system intervention through a public price intervention policy damages the market mechanism, which results in the most efficient allocation of resources and an automatic Pareto Optimum society. But market failure sometimes takes place. Thus, the government has to implement price mechanism intervention policy because of five reasons: 1) market structures that lack complete competition, e.g., monopoly markets, few sellers and dominant producers. The government should play a role in providing them more fair competition, 2) unequal information systems, 3) external impacts: the public has to manage external impacts on those that do not involve the production and consumption of products and services, which have negative impacts, 4) public products: the public is responsible for managing them; and 5) mutual assets that lead to a lack of clear ownership (Kasetsart University, Faculty of Economics, The Department of Agricultural and Resource Economics, 2015, pp. 413-414).

Apart from market failure leading to public policy of market system intervention, the government has to implement policy with the goal of social justice in

order to provide equity. This is caused by exploitation of relevant people concerning public expenditure management. According to the concept of public choice theory, humans are regarded as those who try to seek and maintain their own economic and political benefit. The theories and models relating to the determination of public policy and expenditure allocation are as follows:

1) Representative Democracy Theory explains the role of politicians and eligible voters. Politicians are compared to a company that must survive to compete in satisfying customers, which are the voters, as much as possible. The objective of politicians is to receive maximum votes so that they have power to form the government, while the goal of people or voters is to seek maximum benefit from public policies and expenses. This theory can explain well in the case of full democracy, that is, consumers or eligible voters have full information and can consider the benefits based on policies and public expenditures proposed clearly by politicians in order to make a decision to vote in accordance with the policy that will provide them maximum benefit. In reality, political mechanisms are not complete, so the public expense allocation does not truly respond to people's needs, and policy implementation may, thus, not be effective (Ponlapat Buracom, 2011, pp. 161-162).

2) Vote-Maximizing Theory is an explanation of the size of public expenses for implementing a policy as a result of seeking the highest votes of political parties or the government in the next election. According to the concept of seeking maximum votes, society is divided into two parts: political parties, which win the election and form the government, and members of society who are eligible for election. They will vote for the politicians who provide them maximum benefits. Because of no information, the expense of information dissemination, and no effort by people to search for information, voters do not know the real benefits provided to them and society and may not vote to reciprocate the party in government. Therefore, the government usually proposes public expenditure policy projects that may not be very beneficial, are uncomplicated and possible, instead of complicated policies which are difficult to explain or slow to be effective, despite having more benefits to more people and society. The price intervention policy phenomenon can be explained because the project is not difficult, not complicated and has clear results, although it will change social welfare (Ponlapat Buracom, 2011, pp. 161-162).

3) Interest Group Theory is an explanation of benefit groups' roles in formulating policies and public expenditure. These roles vary according to their ability of strong gathering and ability of influence on public expense allocation. Due to the benefit group's ability to have a role in policy determination, this may lead to ineffective allocation of public expenses, as policy implementation is only a response to strong and influential benefit groups rather than to social needs of public expense allocation (Ponlapat Buracom, 2011, pp. 174-178).

4) Rational Model is a policy aimed at maximum benefits to society, which includes: (1) no policies that have higher costs than benefits and (2) policies that provide highest benefits among all choice policies. This concept is an analysis framework for assessing decision-making in public expenditures. Policy makers must take the following factors into consideration: (1) understanding in all desirable social values, including weighing such values, (2) understanding in all possible policy choices, (3) understanding in all results of each policy choice, (4) calculation of the clear ratio of benefits and costs of each policy choice, and (5) policy decision makers must consider policy choices that have the highest efficiency (Nattha Vinijnaiyapak, 2011, p. 229).

5) Incremental Model states that public policies are the government's actions or activities continued from the past by improving only some parts. This model will be suitable in case of three conditions: (1) the policy results must satisfy most of the policy makers and relevant people, so only minor changes in policies or some parts are sufficient to peoples' acceptance, (2) policies must be continuous and consistent with the existing nature of policy problems and (3) policies must be continuous so that the existing problems can be fixed.

The above choices of public policy have led to the study of rubber price intervention policy that, apart from the cause concerning social welfare and justice, is a phenomenon that can be explained by the choice of public policy in the context of Thai rubber through analysis using the rational comprehensive theory, the incremental theory and the representative democracy theory. All of them can be developed to become a conceptual framework for further study.

2.2 Relevant Research

2.2.1 Thai Rubber Policies

Most Thai rubber research works that can be searched focus on the development of rubber production efficiency in terms of good quality and increasing yield per rai of rubber farms. Rubber-related research documents are as follows:

Nipon Kasettranun (2011) and Pradit Nualkaew (1992, pp. 61-71) studied Thai rubber policies in terms of history and foundation. Rubber policy began in the reign of King Chulalongkorn in 1901, and a tax and labor promotion policy or measure was implemented in 1934. In addition, rubber promotion policies were adjusted to rubber control policies and legal measures were applied. The Rubber Control Act was promulgated in 1934. Twenty-six years later, rubber control policies were adjusted to rubber production promotion and development policies. Legal measures were also applied by promulgating the Rubber Replanting Aid Fund Act B.E.2503 (1960). In 1961, local rubber species were planted, or deteriorated species were replaced with good species in accordance with the Rubber Aid Fund Act B.E.2503 (1960) until 1981, when the 4th National Economic and Social Development Plan (B.E. 2520-2524) ended.

Thai rubber production and trade problems between 1961 and 1981 took place because most rubber farmers still produced a low quality of rubber and a low yield per rai. Additionally, rubber prices in the global market fluctuated in accordance with global economics and social and political changes, which resulted in unstable local rubber prices and the suffering of Thai rubber farmers and operators. Later, during the period of the 5th National Economic and Social Development Plan (B.E. 2525-2529), the government formulated a rubber promotion policy in new areas apart from the existing 17 provinces by focusing on producing good quality rubber and increasing yields per rai. Standard Thai rubber (STR) has been promoted, rubber has been replanted and low rubber prices have been fixed since 1989. Rubber prices were intervened on in line with the cabinet's resolution on December 17th, 1991. The budget for rubber price intervention was also consistently allocated until 2000,

whereby the government adjusted the policy to promote a production control and development policy.

A rubber price intervention scheme was implemented from January 8th, 1992 to December, 2012 relating to 35 cabinet resolutions. 1,351,539.9 tons of rubber was intervened, valued at 32.36 billion baht, or 23.94 baht per kg on average. It was reported that the market intervention during that period experienced a loss of 15.809 billion baht: 8.656 billion baht from operation and 7.153 billion baht from interest.

Later, in 2003 the cabinet resolved to found International Rubber Consortium Limited (IRCo) to stabilize rubber prices by monitoring the analysis of domestic and foreign rubber situations. If rubber prices were low, the problem had to be prevented and solved. After the establishment of IRCo, rubber prices were continuously high, so IRCo had no role in stabilizing rubber prices. Later, at the end of 2008 the Hamburger Crisis occurred, as a result, rubber prices were low. IRCo therefore formulated an export management measure by reducing national rubber exports.

Due to the U.S. crisis, rubber prices were decreasing. The low rubber price solution measure was to reduce the domestic rubber volume by stocking local rubber because of the approval of the farmers' institution supporting projects to process rubber and increase value added to solve dumping rubber prices. Fresh latex and dry rubber sheets were processed into ribbed smoked sheets (RSS) and ribbed smoked sheet bales to be of good quality and be stored for a long time. They were stocked to wait for good prices. This project's budget amounted to 8 billion baht with the objective of solving low rubber prices for farmers' institutions. After the project's implementation, rubber prices went up to 120 baht per kg. in December, 2010.

In 2012, rubber prices still continuously dropped from 2011 as a result of an economic recession, an automotive industrial recession in Japan and floods in Thailand. The government still implemented a policy to reduce the domestic rubber volume from the rubber trading system by adopting a policy of potential development of farmers' institutions to stabilize rubber prices with a budget of about 15 billion baht to be a loan for farmers' institutions, which could buy fresh latex or rubber sheets from members and sell them to the Rubber Estate Organization or process it to concentrated latex, smoked rubber sheets, bales, STR, crepe rubber, compound rubber or cutting rubber, and sell them to the Rubber Estate Organization or the private sector. However, such policy could not affect retail rubber

farmers because farmers had to sell them to the farmers' institutions only. They could not sell them directly to the Rubber Estate Organization. Moreover, the budget was insufficient for the available rubber volume in the system, so they had to be taken out from the system. As a result, the policy implementation could not affect the rubber price as targeted (120 baht per kg.) . However, in 2013 the government still approved the Rubber Estate Organization' s loan amount of 5 billion baht from the Bank for Agriculture and Agricultural Cooperatives to operate the farmers' institution potential development scheme to stabilize rubber prices. The amount of 100 million baht was also approved for the fire insurance of rubber stocked at warehouses, including additional purchasing of rubber together with the measure of the exporter's aid collection cancellation from September 2nd to December 13th, 2013.

In 2014, the rubber price dropped continuously. Thus, the government carried out a wide variety of measures ranging from the establishment of a rubber industrial development institution, production to generate more income to rubber farming based on the sufficiency economy principle, income compensation to farmers, etc. Concrete major policies included compensation of rubber farmers' income of 1,000 baht per rai, not exceeding 15 rai, for a total of 8.5 billion baht, until 2015 when the production factor supporting policy was implemented. Production factor was supported at the ratio of 60 to 40, or 1,500 baht per rai: 900 baht per rai to rubber owners and 600 baht per rai for rubber tappers, not exceeding 15 rai, or about 13 billion baht. Additionally, a budget of 5 billion baht was granted to expand the retail rubber farmers' credit amount for additional occupations. The Rubber Authority of Thailand was also established under the Rubber Authority of Thailand Act, B.E. 2558 (2015) with the objective of complete rubber management. In January 2016, the cabinet had a resolution that the Public Warehouse Organization shall initially purchase rubber products of 100,000 tons from rubber farmers directly at a price not exceeding 45 baht per kg (Weekend Manager Online, 2016).

Rubber policies during the period of transitional democracy in 1932 reflected the roles of the kings in determining policies and nobility participation in the policy determining process. After the administration changed, political officials played a role in righteously formulating and implementing policies. Rubber policies initiated by different governments, either over production or price, were consistent as they

reduced rubber in the market system by buying it to be stocked to help farmers and sell it when the price was high, as well as to compensate income to farmers, support production factors and develop research for developing Thai rubber products. However, the policies had been implemented for a long time using huge public expenditure, but instable prices made rubber farmers suffer. Finally, they protested and continuously sent letters to the government. It is necessary to consider if the previous price intervention policies to stabilize rubber prices were efficient and brought about benefits to overall society. Suitable alternatives should be suggested further.

Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai (2014, pp. 1-20) conducted research on the study of rubber market intervention measures to prevent corruption by taking the government's measures from 1992 to 2002, during which rubber prices were low before they started increasing. The government abolished rubber market intervention and finally Thai rubber prices have remained low and stable since 1991. Therefore, the government solved the problem using a rubber intervention measure at the end of year by buying rubber from farmers at a price higher than the market price in order to make the price high as targeted. The Rubber Market Intervention Project had an operational period of 11 years divided into six phases. The project could intervene in the rubber market for only seven percent of the rubber sheets using a total budget of 25.394 billion baht. It experienced a loss of 16.841 billion baht due to interest and operations, including ambiguous and nontransparent project operations (Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai (2014, p. 1).

The study of rubber market intervention measures against corruption was aimed at studying the results of rubber market intervention projects from 1991 to 2002, comprising the structure of public organizations and the relationship of public organizations and benefit groups, which affected the formulation and operation of policies, as well as corruption types to evaluate economic policies, the size of costs and damages due to the measures. The analysis of costs and economic loss of market intervention measures was based on the concept of an economic surplus approach. Economic costs consist of public costs for buying, stocking and releasing rubber, as well as economic losses or deadweight loss, which is an economic change because of

public measures. This was measured by the consumer surplus, changes in the producer surplus and changes in public expenses (Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai (2014, pp. 3-8).

The evaluation of the Rubber Market Intervention Project, Phases 1-6 was presented by three agencies, namely the Rubber Estate Organization; Rubber Research Institute; and Thailand Development Research Institute. The Rubber Estate Organization summarized the project evaluation as being a directly efficient and effective project for rubber farmers that had direct effects on rubber market management in Thailand. As a result, rubber prices were stable despite a loss of 16.841 billion baht. However, farmers would get benefits from selling rubber sheets to the project directly at seven percent of the total rubber sheets in the national market between 1992 and 2002, during which their prices were 3.50 baht per kg higher than the market price, or 4.73 billion baht. About 93% was the rubber sheets that could not be directly sold by farmers to the project. Local merchants had to compete to buy them at higher prices than those locally sold. As a result, farmers sold rubber sheets at a higher price valued at 27,310 baht. The total benefit farmers received from higher prices was 32.04 billion baht, which was higher than the loss. At the same time, the Rubber Research Institute and the Thailand Development Research Institute thought that it was an effective project. The Rubber Research Institute concluded that the Rubber Market Intervention Project could not raise the rubber price received by farmers to be close to the intervened price and that it could not affect national rubber production. Therefore, the project's results would lead to the loss of social welfare because the public used national resources inefficiently. This corresponds to the evaluation result of the TDRI, stating that the project faced high losses compared to benefits from project participation and had very few effects on rubber prices outside the project. After considering the operation compared to the intervention of international organizations, e. g. , INRO, it is evident that Thai regulations and procedures are hardly clear, the practices are often changed and information is not disclosed to the public, especially rubber selling information in the project. The effects of intervention on market stability therefore cannot be concluded (Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai (2014, pp. 18-20).

To raise rubber prices in Thailand, there are at least three limitations of rubber market intervention measures: 1) as Thai rubber prices are determined by rubber prices on the global market, it is difficult to intervene in farm rubber markets to have higher prices, 2) Thai products are distributed to local markets almost every day, except in the leaf-falling season or when it rains, intervention costs are therefore high because the intervention must be continuously carried out and 3) due to the behavior of farmers who want to receive money quickly, they sell field latex. But the project has to stock ribbed smoked sheets, so there are processing costs. In addition, rubber plantation areas have expanded to the northeastern and northern regions, which are distributed in a wide but directionless extent, as a result, production costs per unit for intervention and purchase are higher.

2.2.2 Social Welfare Management

Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai (2014, pp. 142-148) suggested social welfare is a result of rubber market intervention. The results of the research, entitled the study of rubber market intervention measures against corruption, indicated that the economic loss of intervention measures of the ribbed smoked sheet (RSS) market were based on the economic surplus approach using RSS price and volume information under an assumption relating to three sets of supply elasticity and two sets of demand elasticity from the previous studies of Thai rubber demand and supply elasticity, which was the highest and lowest period. Thus, social welfare was calculated from the decreasing consumer surplus of 155,338,103.84–248,024,995.45 baht per year, the increasing producer surplus of 177,630,508.65–292,483,703.86 baht per year and the public loss of 1,602,947,000.00 baht per year. The annual welfare loss amounted to 1,558,488,291.59–1,580,654,595.18 baht, that is, the project was positive to rubber producers, comprising farmers and RSS producers, as some benefits of rubber users due to low rubber prices were transferred to producers due to higher rubber prices.

Woraphon Yamaka and Paravee Maneejuk (2015, pp. 2-16) conducted an economic study on social welfare in the case study of Thai rice. Social welfare as a result of the rice pledging and price guarantee policies was taken into consideration. Rice is crucial to the national economy. In 2014, rice exports were valued at 1.3

percent of GDP, so the public sector tried to promote and support Thai rice by continually applying rice market intervention policies ranging from rice tax determination, rice intervention and other policies of Thai rice market promotion. But rice farmers still experienced poverty and debts. Finally, a rice pledging and price guarantee policy was applied to solve the problem. However, the results of such policies reflected the failure of using prices as a leader. This led to the study of Thai rice policy efficiency in the past, in which the welfare economics theory was applied to study the impacts of policies on the well-being of society members related to Thai markets, such as farmers, importers, exporters and consumers.

Welfare economics is a theory explaining the well-being of people in the society, which can be applied to evaluate public policy, if and how it is beneficial or lost to society. Welfare economics is caused by the sum of the producer surplus and the consumer surplus. The producer surplus is the difference between the prices producers are pleased to sell at and the actual price producers receive. The consumer surplus is the different value between prices consumers are pleased to pay for one product or service and the actual prices paid by consumers. Actual prices are caused by market equilibrium. If the market equilibrium is disturbed by market intervention policy, which is an external factor, the demand and supply curves will change, affecting a change in the social welfare level, and may bring about a deadweight loss.

The demand and supply curves of Thai rice markets, as well as the measurement of changing social welfare levels in different periods show the efficiency of policies used in the Thai rice market. Social welfare was presented in a time series to observe changes in social welfare in each period. Then, Thai rice markets were analyzed as to which measure or market mechanism intervened in the Thai rice markets in that period. Demand and supply was produced using Markov-switching Seemingly Unrelated Regression (MS-SUR), which can explain the behavior of economic information that changes all the time. In other words, it is a bull and bear economy. Demand and supply equations relate to each other in the equation system, in which equations can be estimated efficiently using the Seemingly Unrelated Regression (SUR) and the Markov-switching to explain market changes in different situations of changing rice markets, which always have different trends.

Thai rice market demand and supply equations were used to consider social welfare. It was found that, based on the demand model during the declining market, Thai rice exports and domestic consumption volume depends on the price changes of rice exports in an opposite direction from the rice export prices of Vietnam, India and Pakistan. Their relationship was positive. It can be stated that rice of the three countries are substitution goods. Concerning the supply, it was found that during the recession period rice production changed because of changes in the Thai rice export price in the past three months; paddy prices at farms in the previous three months; rainfall and dam water amounts. These changes were in the same direction.

Based on consumer and producer surplus consideration, it was found that social welfare of the Thai rice market in the emerging market amounted to 0.0322 because of a consumer surplus of 0.0255 and a producer surplus of 0.0067. On the contrary, social welfare during the declining market amounted to 0.0202 because of a consumer surplus of 0.0185 and a producer surplus of 0.0017. It is evident that the consumer surplus is higher than the producer surplus both in the emerging and declining markets because the demand is very elastic, particularly in a declining market. That is, when the rice export price changes, the production volume changes more than the changing price. The results of the study revealed an unbalanced Thai rice market based on the Thai rice market existence for 10.3 months during an emerging market and 8.61 months during a declining market.

While social welfare of Thai rice markets was high, the analysis of social welfare and Thai rice market intervention policies was divided into three periods: Phase 1, Quarter 4/2005 to 2/2007 as a result of the paddy pledging policy, Phase 2, Quarter 2/2010 to 3/2011 during the excess demand because of limited export of Vietnamese and Indian rice resulting in considerably higher Thai rice prices, and Phase 3, Quarter 4/2012 to 2/2014, in which the rice market was intervened by the Paddy Pledging Scheme and the Indian rice market period. As a result, the rice supply in the market was increasing and the export was decreasing, affecting the Thai rice export price. Thus, consumers received benefits from the decreasing price and the consumer surplus was high. At the same time, the producer surplus was high too because the project pledging price was much higher than the market price. The results of the study concluded that during the implementation of the Paddy Pledging Scheme

policy, social welfare to Thai rice markets was higher than the period using the farmer's income guarantee policy. However, this study does not include external factors and benefit costs which may arise, such as budget burden, damage from corruption, etc.

2.2.3 Rubber Demand and Supply

Pranat Pipitkul and Arporn Kongsawas (2003, pp. 38-42) analyzed Thai rubber demand and supply aimed at 1) studying the demand, supply and price of natural rubber from 1975 to 2002, 2) studying the elasticity of prices affecting the production volume, export volume and domestic demand of natural rubber 3) forecasting the demand, supply and natural rubber prices between 2003 and 2020 and 4) studying the impacts from the rubber plantation increase of one million rai using analysis of the Thai rubber demand and supply for future quantitative forecasting which used a quantitative model based on the time series from 1975 to 2002 using the ordinary least square. The study consists of domestic demand, export demand, production volume and rubber prices, including an analysis of the impact on changes in farmland over domestic rubber prices.

The demand study is comprised of the domestic demand of natural rubber and the demand of Thai natural rubber exports. Domestic demand of natural rubber is the demand of rubber used in the rubber product industry. The industry that uses natural rubber the most is the automotive tire industry, which is a multinational industry. The demand for domestic rubber use depends on three changing factors: economic conditions, natural rubber prices and product export values. The variable representing economic conditions is the GDP per capita in Thailand. Variables in determining natural rubber prices are future prices in the Singapore market, because the automotive tire industry is a multinational industry; thus, natural rubber trading is made via agents in Singapore. The model can explain the relationship of variables by 98% and the coefficient of three variables are significant at the 99% confidence level. The most important variable based on the elasticity is Thai per capita income. The elasticity of domestic demand of natural rubber to changing Thai per capita income amounts to 0.64, while the elasticity of rubber product exports is 0.22 and the elasticity of future market price in Singapore is 0.07.

The demand and the equation model of Thai natural rubber exports comprise the requirement of natural rubber exports to key trading partner countries, e.g., Japan, the United States, China and other countries. The relationship of the demand of Thai natural rubber exported to four trading partner countries (one equation per one country) was considered. Variables in each country were used to find the relationship with the following six variables: Thai F.O.B. export prices; Indonesian (Thailand's key competitor) F.O.B. export prices; synthetic rubber prices on the global market, including both substitution goods and products used with natural rubber; economic conditions of trading partner countries, which use their GDP as a representative; natural rubber prices in China; and economic crises in Asia. The results of the study indicated that factors affecting the demand of natural rubber exported to Japan included the GDP in Japan; Thailand's F.O.B. export prices; and Indonesian F.O.B. export prices. The elasticity was 0.69, 0.25 and 0.26, respectively. Factors affecting the changing demand of exports to the U.S. included Indonesia's F.O.B. export prices, Thailand's F.O.B. export prices and synthetic rubber prices on the global market. The elasticity was 1.06, 0.82 and 0.50, respectively. In China, the factor that most affected the change in export demand was the natural rubber price in China, with elasticity of 2.19. Other factors included Thailand's F.O.B. export prices, the GDP in China and economic crisis with the elasticity of 0.84, 0.84 and 0.48, respectively. Factors affecting natural rubber exports to other markets included Thailand's F.O.B. export prices; Indonesia's F.O.B. export prices and synthetic rubber prices on the global market with the elasticity of 5.99, 4.86 and 1.68, respectively.

As for supply, the models were studied in two parts: output and price equations. The results of the study showed that factors affecting rubber output include production potential and prices received in the last six years. Production potential is the most important factor affecting the determination of Thai natural rubber output. Based on the consideration of elasticity of 2.08 and 0.08, potential output was considered based on the sum of the multiplication of output per rai in year i and changes in plantation areas in year $t-i$. In terms of price sold by farmers, the analysis of price equation revealed that factors affecting price sold by farmers include the Thai F.O.B. export price and future prices on the Singaporean market. Elasticity consideration indicated that the Thai F.O.B. export price is the most vital factor in the

determination of prices sold by farmers. The elasticity is 2.52, while the elasticity of future prices on the Singaporean market is 0.61.

Panee Sintanabadee (2008, pp. 1-6, 48) studied the supply of Thailand's import of rubber from the Republic of Korea, which became an industrial country with a strong economic system in the middle of the 1980s. Its structure stressed heavy industry and large-scale high technology focusing on production for export. As for the Korean automotive market, which is related to rubber, it was found that the market expanded rapidly because of foreign investment for producing cars to be exported to Asia. As a result, total car sales (domestic and overseas) rose rapidly; thus, South Korea had to use rubber as a raw material to produce more tires in 2008. Therefore, it was necessary to study which factors affected Korea's import demand of rubber from Thailand in order to serve as information for maintaining export markets in the competition period at that time.

Factors influencing the Korean demand of rubber imported from Thailand were based on secondary information or annual information of time series between 1984 and 2006 which was used for analysis by applying ordinary least squares (OLS) to the analysis of Korea's import of Thai rubber. The results of the study indicated that Thai rubber prices from Thailand to South Korea, the actual gross domestic product of South Korea and the foreign exchange rate (baht to US dollar) had a statistically significant effect on the variance of South Korea's demand of rubber imported from Thailand. The elasticity of demand for rubber imports and the actual GDP of South Korea was high, at 1.6, while the elasticity of exported rubber prices and the exchange rate of Thai baht to the US dollar ranged from 0.28 to 0.31.

Kiattisak Phadungsereewit (2010, pp. 27-28) studied the impact of factors affecting Thailand's rubber exports. The relationship of quantitative variables from January, 2000 to December, 2009 was analyzed. The study included the influence of factors, namely Thailand's rubber export prices, the foreign exchange rate of baht to US dollar, the index of Thai rubber, the inflation rate and the loan interest of farmers affecting Thailand's export of rubber in that period. Multiple-Regressions were produced using the Ordinary Least Squares (OLS). The results of the study revealed that only one factor that had a statistically significant effect on Thailand's rubber export at a confidence level of 0.01 was an indicator of Thailand's rubber, as prepared

by the Bank of Thailand to reflect changes in production volume and the production cycle, as well as to indicate the production level of Thailand's rubber. Thus, when the indicator of Thailand's rubber tends to be higher, it means that the demand of rubber consumption is higher too.

Wararat Leevarangkul (2010, pp. 11-63) studied the production and marketing factors determining the demand of Thai natural rubber and the demand of natural rubber exports to China, Thailand's key trading partner. Three types of rubber products were studied: ribbed smoked sheets (RSS), standard Thai rubber (STR) and concentrated latex. Annual information from 1997-2007 was used to forecast the demand of rubber product use based on the Multiple Linear Regression Model.

The study model consists of two functions: the demand function of Thai natural rubber product used domestically and the demand function of Thai natural rubber products exported to China. The results of the analysis indicated that factors affecting the demand of Thai RSS included export prices of RSS, the U.S. synthetic rubber prices on the global market and the GDP. The demand of Thai STR use revealed that the factors that had a statistically significant effect were the U.S. synthetic rubber price on the global market and the GDP. As for the demand of concentrated latex, only the GDP affected any change. The factors affecting Thailand's export of RSS, STR and concentrated latex to China indicated that the Thai baht to Chinese Yuan exchange rate had an effect on the demand of RSS exports to China and the GDP in China, while the export price of concentrated latex imported from Indonesia to China and the GDP in China affected the export demand of concentrated latex to China.

Regarding the production of Thai natural rubber, it is evident that the natural latex processing industry which produces the raw material for natural rubber products is classified into two categories: dry rubber and concentrated latex. The objective is to produce them to meet the standard of rubber buyers and rubber exporters in each category. There are two Thai natural rubber product markets: domestic and overseas markets. Thai rubber trading conditions depend mainly on overseas trading conditions. Domestic rubber markets were categorized into five levels: 1) local small-scale markets that buy rubber at the source; 2) local major markets that buy rubber located in major districts and provinces; 3) central markets that are the center of

trading and market and price information. Currently, there are three markets, namely Hat Yai District Central Market, Surat Thani Central Market and Nakhon Si Thammarat Central Market. 4) International markets that are major markets of rubber business comprising Bangkok Market, Songkhla Market and 5) Futures Market. Rubber is exported overseas via direct and open markets, which are traded in specific areas that serve as a channel for the members' purchase of products. These markets are the Singapore, Tokyo, Osaka, London, New York, Hamburg, Shanghai and Hai Lam markets.

Vichai Rungreunganun, Sompoap Talabgaew, and Sukanya Cherdchoongam (2014, pp. 97-107) studied the impact of factors affecting rubber price stabilization because rubber always changes in accordance with affecting factors. Therefore, the factors affecting rubber prices were studied to serve as a basis for making decisions in doing the rubber business properly. Rubber price stabilization policies using system dynamics were also suggested. It is a concept of analyzing the entire structural data system or the linked supply chain used in the study of rubber price fluctuation behavior. Data used in the study was monthly time series and secondary data from January, 2002 to December, 2012. RSS3 (ribbed smoked sheets 3) prices that are actually traded in the market were used to be representative of natural rubber prices in Thailand.

The study revealed that factors affecting the price of Thai natural rubber included the price of natural rubber in the world; the price of natural rubber in the Tokyo commodity market (TOCOM) and the price of synthetic rubber in the world, ranked by the importance affecting Thai natural rubber prices based on the elasticity.

When considering the impact of factors on rubber price based on system dynamics, it is evident that a change in price of crude oil by one percent will cause synthetic rubber prices in the world to change by 0.502 percent in the same direction. Thai natural rubber prices will also change by 0.188 percent and the exchange rate affecting future rubber prices will go in the opposite direction. If the currency changes by 1 percent, the future rubber price in the market will change by 0.261 and the Thai natural rubber price will change by 0.096 percent in the opposite direction. The use of Chinese natural rubber will also affect the global use of natural rubber. Thailand's natural rubber prices will change by 0.020 percent in the same direction when China's

natural rubber use changes by 1 percent. In addition, when Thailand's natural rubber production changes by 1 percent global rubber production changes by 1.554 percent in the same direction and Thailand's natural rubber price also changes by 0.010.

The testing of three policies using the dynamic model of Thai rubber prices: increased productivity per rai; limited export of rubber; and establishment of the Rubber Price Stabilization Fund (RPSF), indicated that the rai productivity increase policy made Thai rubber prices become their highest. Productivity increase per rai increased rubber prices, despite fluctuations due to seasonal rubber products, but the average fluctuation was not high compared to the rubber export limitation policy. In addition, the RPSF establishment policy at the target price did not affect the maximum and minimum rubber price, as well as the maximum fluctuation period of rubber prices. Thus, to have the highest rubber price, the productivity increase policy should be adopted. However, to make rubber prices fluctuate less, the export limitation policy should be adopted. But there are some restrictions in this study because political situations and Thai and global economic conditions have not been considered. Therefore, there are some deviations in this trial.

Chalermpon Jatuporn and Patana Sukprasert (2016, pp. 220-227) studied product forecasting models and Thai rubber exports with the objective of forecasting the trend of products and rubber exports from Thailand. From 2005 to 2014, Thailand's rubber production tended to expand continually due to an increase in plantation area, increased tapping areas and production acceleration to meet market demand. Due to the global economic crisis between 2012 and 2014, the economy of China, which is the world's highest rubber importer, decelerated; as a result, rubber demand on the global market decreased, while the supply was still high. This made the world rubber price plunge dramatically and continuously. The prediction for production and export is therefore vital to manage the domestic demand and supply of rubber so that it will not affect the farmers' income, and to plan policies and measures to cope with problems which may arise in the future.

The objective of the research is to forecast the trend of Thailand's rubber products and exports based on monthly time series data from January, 1998 to August, 2015. Variables include rubber products and their export to produce the forecasting models and forecast the trend of Thai rubber products and exports using

three statistical techniques, namely a forecast using the regression equation based on the seasonal dummy variable and time trend, the Box-Jenkins forecasting model and Holt-Winters multiplicative seasonal exponential smoothing. A comparison of forecasting model efficiency using RMSE statistics revealed that the regression model using the seasonal dummy variable and time trend was the most efficient and accurate. The forecast of rubber production and export in 2016 compared to the previous year indicated that rubber products tended to increase by 0.31 percent. This shows that production surplus from the demand and supply are not consistent. This has negative impacts on rubber prices and farmers' income.

Apirada Chinprateep (2017, pp. 34-50) studied factors affecting the rubber export equilibrium using simultaneous equations. The study aimed to study the key factors that determine the demand and supply of Thai rubber exports and study how changing factors of the demand and supply affect the rubber export price and produce a demand and supply model of rubber using equation systems related to relationships of various factors in order to forecast the price and volume of Thailand's rubber exports.

Thailand is the world's number one rubber producer because of production potential and a climate conducive to cultivation. Ribbed smoked sheets are the highest export volume of Thailand. Most important rubber export markets are industrial countries using natural rubber, especially China, the U.S. and Japan. Although Thailand is a leading producer and exporter, the growth rate of Thai products and exports tends to increase at a decreasing rate. This differs from competitors like Indonesia and Malaysia, where the expanding rate is increasing. In addition, Thailand's competitiveness is reducing constantly.

The equation systems used in this study are comprised of structural equations and reduced-form equations. Structural equations explain changes in the demand and supply curves when other factors remain stable and when external variables change. Reduced-form equations explain changes in equilibrium prices due to changes in external variables. Structural equations consist of Thailand's rubber import demand equations and export supply equations. Annual secondary information from 1970 to 2013 was used for the study comprising three linear equations – rubber import

demand equations, rubber export supply equations and rubber price equations at market equilibrium.

The results of the study indicated that factors affecting changes in the demand of rubber imports, comprising average rubber prices; GDP per capita of rubber import countries, namely the U.S., Japan, China, Germany and India; the world vehicle production volume; and crude oil prices, which affect the production of synthetic rubber which is a substitute for natural rubber. As for the supply equation of rubber exports, factors affecting the supply include price, which is crucial to a farmer's decision-making in the production. They also affect the quantity supplied by producers, cultivation areas and prices of oil palm, which is a competitive product that affects rubber plantation areas. Additionally, the reduced-form equations for studying equilibrium prices revealed that factors that determine the rubber price in the global marketplace include the importer's demand, peoples' income, the volume of car production and crude oil prices. However, the factors on export supply are not statistically significant to explain changes in rubber prices at market equilibrium.

Following the review of research and theories relating to Thai rubber policies, rubber price policies, policy evaluation, social welfare measurement and rubber demand and supply estimates, a conceptual framework will be developed to analyze rubber price stabilization policies. The conceptual framework will be presented in Chapter 3.

CHAPTER 3

CONCEPTUAL FRAMEWORK AND METHODOLOGY

The analysis of rubber price stabilization policies is aimed at studying the policy process, measuring the policy efficiency and suggesting policy options for Thai rubber stabilization. The research has been designed and data has been collected. The conceptual framework has been summarized from relevant theories and research, as well as tools and data analysis as detailed below:

3.1 Research Design

This research is a mixed-method research consisting of:

3.1.1 Qualitative Research

The study of the rubber policy process involves descriptive research and statistics to describe general and specific conditions, problems and limitations, as well as policy development.

3.1.2 Quantitative Research

The quantitative research involves the assessment of social welfare as a result of policy implementation. Demand and supply functions of Thai rubber were estimated between 1991 and 2017. Social welfare caused by the policy was calculated by determining the producer and consumer surplus.

3.2 Data and Data Collection

Data pertaining to the policy process and the results of process operation, articles, research and reviews concerning Thai rubber policies from 1991 to 2016 and statistics regarding the measurement of Thai rubber price stabilization policy efficiency were collected.

3.3 Study Conceptual Framework

The concept of the analysis of rubber price stabilization policies involves the analysis of the policy process and the measurement of policies for society based on the benefits to producers, consumers and the public sector measured by social welfare. Policy choices were suggested. The study's conceptual framework is illustrated in Figure 3.1.

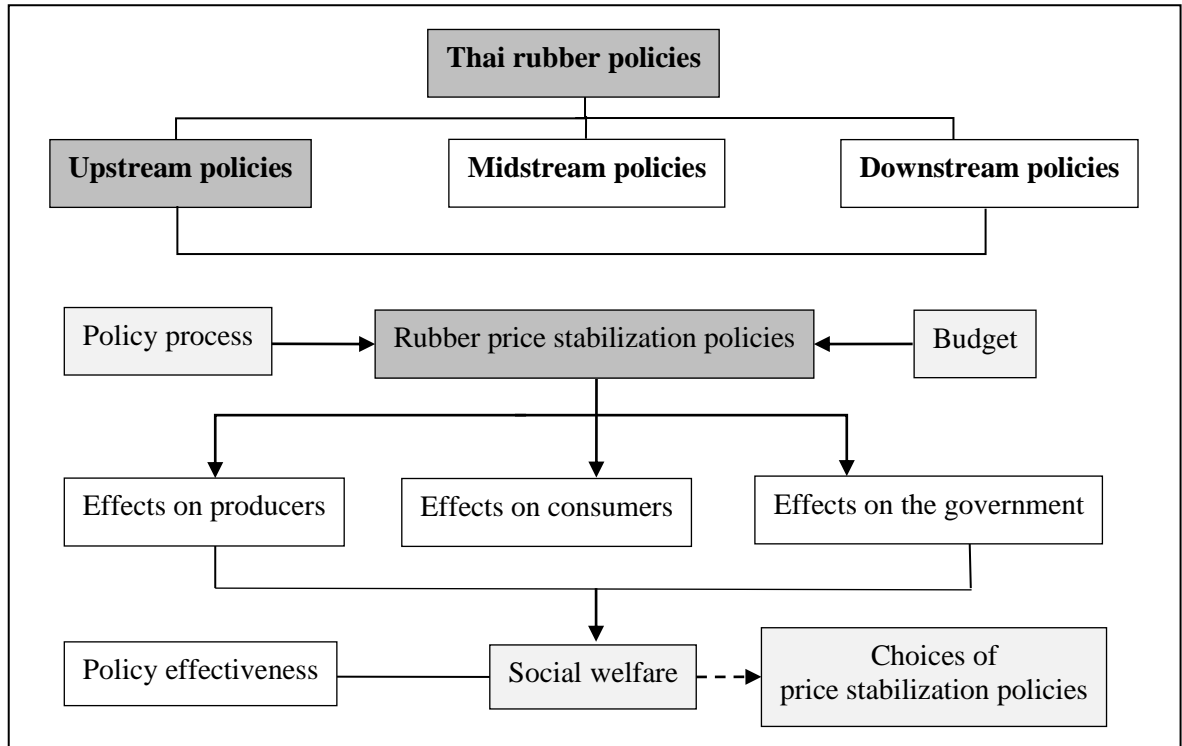


Figure 3.1 Study Conceptual Framework

3.3.1 Thai Rubber Policies were analyzed in accordance with relevant manufacturing chains at three levels: upstream policies relating to on-farm production, midstream policies concerning processing for increasing value and downstream policies related to domestic and foreign consumption. Relevant rubber policies at each level and in each period were categorized to show the development and adoption of Thai rubber policies.

3.3.2 Thai Rubber Price Stabilization Policies were analyzed in the following three main processes:

1) Policy formulation involves an analysis of concepts and methods of policy formulation comprised of three parts:

(1) Determination of policy problems is based on identification of policy problems, problem importance, problem complexity and policy novelty.

(2) Determination of policy choices is based on policy choice characteristics, choice searching, policy scrutinizing and policy choice screening.

(3) Decision in policy choices is based on the concepts of choice decision in accordance with the three theories of public choice: the rational comprehensive theory, the incremental theory and the representative democracy theory.

2) Policy implementation relates to the factors resulting in the success of policy implementation comprising accuracy of policy decisions, organizational performance of policy implementation, resources used for policy implementation, the process of policy implementation and organizations concerned.

3) Policy evaluation pertains to the consideration of performance compared to the specified targets. Three parts of policies were considered: outputs, outcomes and impacts.

3.3.3 Measurement of Social Welfare Caused by Thai Rubber Price Stabilization Policies involves the efficiency of policies by measuring social welfare. The concept of welfare economics was used to calculate social welfare from the

producer and consumer surplus. The method analysis will be presented further under the topic of tools and data collection methods.

3.3.4 Choice of Thai Rubber Price Stabilization Policies is an analysis to suggest choices for rubber price stabilization policies based on the study results of each policy process that affects the efficiency of policies in order to present suitable policy choices in line with the public choice theory and the policy process.

3.4 Tools and Data Analysis Method

Tools and data collection methods used for this research require tools of qualitative research and content analysis in accordance with the policy process' components. Data was also presented using descriptive statistics, such as mean, median and mode for policy lecture.

3.4.1 Positive Theory is the explanation of actual events, such as:

3.4.1.1 The process of Thai rubber price stabilization is based on content analysis of the documents collected and interviews with the people concerned.

3.4.1.2 Analysis of policy implementation efficiency is based on statistics to measure social welfare based on the producer and consumer surplus. Social welfare is measured by the implementation of Thai rubber price stabilization policies using welfare economics. It is a tool to measure the social well-being of society or social welfare as a result of policy implementation. It is used to measure people's well-being in society comprising consumers, producers and the government. The consumers' well-being is measured using the consumer surplus, the producers' well-being is measured by the producer surplus, and the government's well-being is measured by deducting the income from the expenditure (Kasetsart University, Faculty of Economics, The Department of Agricultural and Resource Economics, 2015, p. 403).

$\text{Social welfare} = \text{consumer surplus} + \text{producer surplus} + \text{the government's income} - \text{the government's expenses}$

The changed social welfare is analyzed because of rubber price stabilization policies, where rubber is bought at a higher price than the market price. This is a measurement of change in the consumer surplus, change in producer surplus and the government's expenditure. Consideration of the consumer surplus is a measurement of the total consumer surplus in the market. The consumer surplus is caused by the difference between willingness to pay and the actual price paid. The producer surplus is the measurement of the total producer surplus in society based on the market supply curve. The producer surplus is caused by the difference between the market price and the price producers are willing to supply it at.

The measurement of social welfare based on price intervention is a measure operated by the government during the low rubber price period. Rubber is bought at a target price that is higher than the market in order to lead the market price to be higher in line with the target price. Social welfare can be analyzed by the implementation of policies, as shown in Figure 3.2.

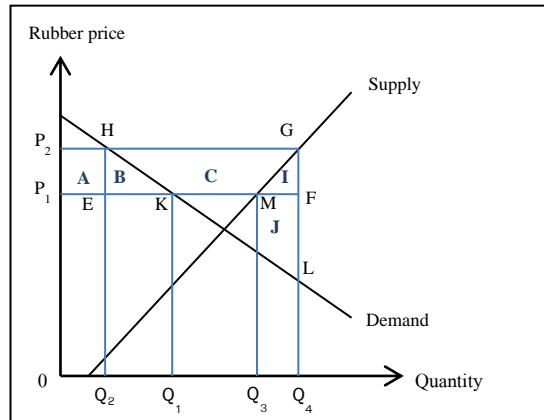


Figure 3.2 Social Welfare Measurement

Source: Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai, 2014.

When prices are low (OP_1), the government fixes a target price that is higher than the market (OP_2). Thus, the demand of proposed sales increases from $0Q_3$ to $0Q_4$ but the demand of buying decreases from $0Q_1$ to $0Q_2$. Therefore, the government buys the surplus rubber (Q_2Q_4) at the target price and sells it at the market price that is below the target price. The buying cost is Q_2Q_4GH . The government sells rubber at

the OP_1 price, so the government has an income of Q_2Q_4FE . Therefore, the net income from the minus sale is $HGEF$.

$$\Delta CS = - (P_1P_2HE + EHK) = -(A + B) = - A - B$$

$$\Delta PS = (P_1P_2HE + EHK + KMGH) = A + B + C$$

$$\Delta \text{The government's expenditure} = - (EFGH) = - (B + C + I) = - B - C - I$$

So, social welfare is $- B - I$

B is CS decreased by the purchase of more expensive products.

I is part of the loss from the production increased to the level that social welfare is greater than increasing social benefit.

$$\text{Triangle area I equals to } \frac{1}{2} KF \times FG = \frac{1}{2} \times \Delta Q_s \times \Delta P$$

$$\text{Triangle area B equals to } \frac{1}{2} KF \times FL = \frac{1}{2} \times \Delta Q_d \times \Delta P$$

Where $\Delta Q_s = (OQ_3 - OQ_1)$

$$\Delta P = (OP_2 - OP_1)$$

$$\Delta Q_d = (OQ_1 - OQ_2)$$

To calculate economic loss, rubber demand and supply are required. Thus, the creation of the demand and supply model of Thai rubber is a tool for considering social welfare arising in the central rubber market. Secondary information from 1987 to 2016 was used to create the demand and supply equations of Thai rubber. The demand of Thai rubber consists of the domestic demand and the export demand of rubber using the seemingly unrelated regression (SUR) because the demand and supply equations are related in equations. The price received by farmers is an independent variable for considering both equations.

3.4.2 Normative Theory is the study of the most efficient policy, including the analysis of choices for price stabilization policies, suggesting a choice that brings about more benefits to society than disadvantages of policy implementation. This reflects the value of social welfare.

3.5 Study Steps

3.5.1 Study development of rubber policies from the beginning to the present period by collecting data from the cabinet's resolution relating to rubber policies, dissemination documents from agencies concerned and project assessment reports, as well as relevant articles and theses.

3.5.2 Study the process of rubber policies concerning price stabilization from 1992 to 2016.

3.5.3 Estimate the demand and supply functions of Thai rubber using equations.

3.5.4 Assess the impact of policies on efficiency by measuring social welfare.

3.5.5 Analyze policy options to determine which are the most efficient based on the analysis of policy process and social welfare as a result of the policies.

With respect to the conceptual framework and research methodology, the results can be analyzed in accordance with the study objectives, and the research questions, as follows, can be answered: What is the process for the policy on Thai rubber price stabilization? Do rubber price stabilization policies affect the efficiency of the economic system? And, which options of rubber price stabilization will result in the highest efficiency

CHAPTER 4

THAI RUBBER POLICIES

Since rubber was first planted in the south of Thailand in 1899, the Thai rubber farm business has been developed under continuous government support to enable rubber to become a key product that generates national income and growth. Rubber policies have been focused on by the government because of the large number of people involved in the value chains. This research has emphasized the Thai Rubber Price Stabilization Policies that affect Thai social welfare. However, the Thai government's rubber policies have a wide variety of dimensions apart from price. In Chapter 4, the overall development of rubber policies and pricing policies, from 1991 to 2016, will be presented.

4.1 Thai Rubber Policy Development

The government's rubber policy appeared to be clear in 1942, when the rubber farm business began in Thailand. The government placed importance on rubber as an economic crop that generates an income for farmers and the country. Relevant policies were issued through the government's policy statement while taking its position. With reference to the cabinet's resolution on policy guidelines, including many relevant state projects between 1991 and 2016, the development of Thai rubber policies is here chronologically summarized in accordance with rubber value chains, as shown in Figure 4.1, and detailed below:

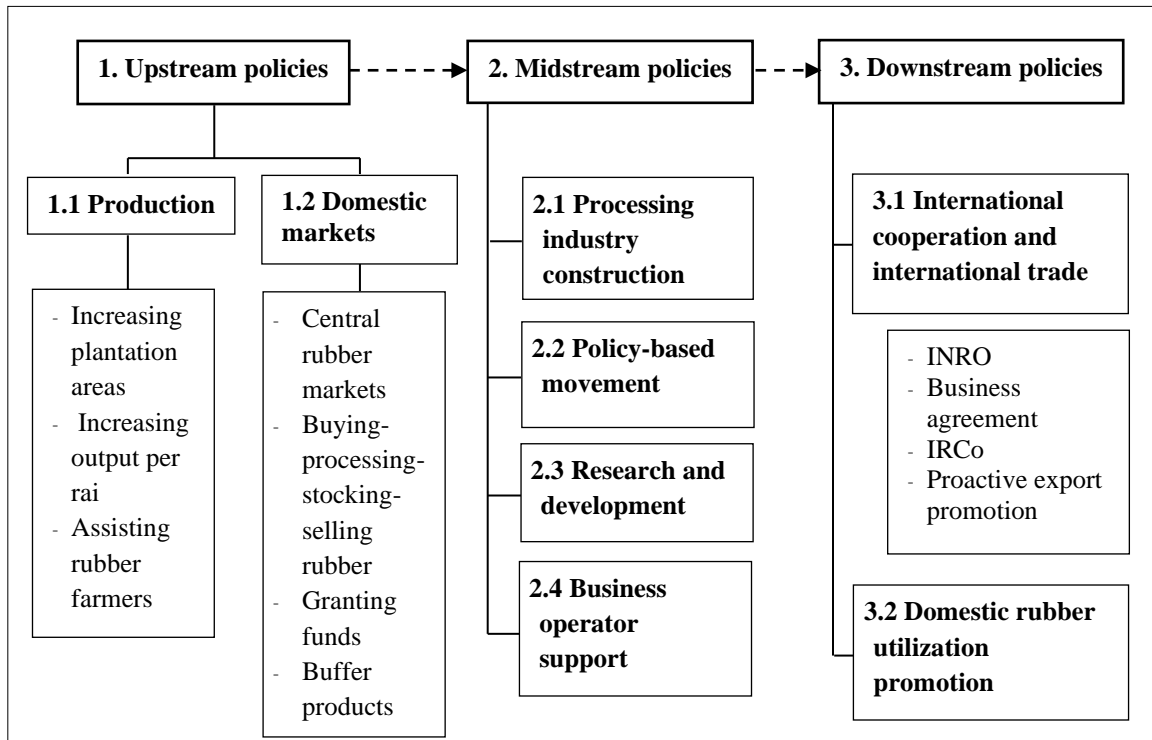


Figure 4.1 Rubber Policy Development in Accordance with Value Chains

Source: Summarized by the Researcher

4.1.1 Upstream Policies

Upstream rubber policies involve rubber farmers and production of rubber as an upstream raw material, which is an upstream product type related to farmers, who are the majority of beneficiaries of the government's policy implementation. Upstream policies are categorized into three types, as follows:

4.1.1.1 Production Policies are aimed at increasing rubber products in terms of quantity and quality.

1) Plantation Area Increasing Policies: At the beginning of the promotion of rubber as a national key product, rubber was not only promoted at the beginning of the project, it also continued despite low rubber price situations. Plantation Increasing Policies comprised (1) rubber farming promotion policies from 1959 to 1999, they promoted rubber plantations by providing good rubber varieties to farmers in order to produce a large amount of rubber as a national key product. In addition, as suggested by the World Bank when stating that Southern Thailand was

suitable for growing rubber as an economic crop required by the world market and tending to become an important product for the global economy's growth, then came (2) the Rubber Planting Aid Project in 1989 for those who did not have rubber land before, with a budget of 46.336 billion baht, and (3) the Rubber Plantation in New Areas Scheme, implemented in three phases: Phase 1 from 2004 to 2006 to upgrade farmers' incomes and stability, and the One Million Rai Rubber Project to promote rubber plantations in the northeast and north. The Rubber Plantation in New Area Scheme, Phase 2, was approved by the cabinet in 1996 and operated from 1997 to 2001. The Rubber Plantation Scheme in Phase 3 was aimed at increasing plantation area by 800,000 rai between 2011 and 2013 in the north, northeast and south, but rubber trees were found dead and their growth did not meet the standard. As a result, it was agreed to review and terminate the project in 2015.

2) Output Per Rai Increasing Policy involves the promotion of good varieties of rubber and the establishment of the Office of the Rubber Replanting Aid Fund (ORRAF) to help and support rubber farmers to replace local old rubber of low yields with the better varieties. This policy has been carried out from its inception to the present time. ORRAF has granted funding to farmers who grow good species of rubber as specified.

3) Small-scale Farmer Assistance Policies involve policies that help rubber farmers after the rubber has been bought to be stocked without affecting the market price. Due to policies operated by farmers' institutes, small farmers might not widely obtain benefits. The following policies were conducted to directly assist farmers: (1) Rubber Farmers' Compensation Project at the rate of 1,000 baht per household but not exceeding 15 rai in 2014, (2) Small-scale Rubber Farmers Credit Provision Project for additional occupation (not exceeding 100,000 baht per household at an annual interest rate of 2% in 2014, (3) Packed Rice Scheme to help rubber farmers in 2016 and (4) Rubber Farmers' Cost of Living Assistance Project in 2016 through the sale of necessary consumer products at prices lower than the market price in 14 southern provinces.

4.1.1.2 Local Marketing Policies: Upstream rubber products of Thai farmers were sold in both domestic and international markets. Domestic marketing policies of the government were implemented during the low rubber price period.

Markets were intervened by purchasing rubber from farmers in order to raise the price and reduce rubber in the market. Local marketing policies were implemented chronologically as follows:

1) Central rubber market was first opened in 1991, during which rubber prices started declining, resulting in impacts on a wider extent. The central rubber market was established to purchase rubber and to announce the reference price to buyers and sellers in different areas.

2) Rubber purchasing, processing and stocking was a policy to intervene in rubber markets used by the government to mitigate low rubber prices from 1991 to 2002. Rubber was bought by the Rubber Estate Organization in two types: bought at the target price to lead the market price and bought in the target amount to reduce the market supply, expecting the price to be higher when the amount decreased.

3) Funding for buying rubber was a policy to provide zero-interest or low interest loans. As for the reduction of rubber in the market through processing or stocking to be sold at an appropriate time, the government adopted such policies as (1) buying a promissory note from business operators for rubber exports in 1991, (2) setting up Rubber Fund Cooperatives and constructing air dried and ribbed smoked sheet plants in 1994 by providing zero-interest loans to institutes who bought rubber from farmers to be processed in ribbed smoked sheet factories and stocked for sale.

4) Buffer products to stabilize rubber prices involved a short-term measure to buy rubber and to lead the market price using loans as a revolving fund. This project was applied to solve rubber price problems in 2014.

4.1.2 Midstream Policies

Midstream Policies are designed to promote rubber processing by adding value to products so that they can be kept longer and solve low upstream rubber price problems. The following midstream policies were adopted by the government:

4.1.2.1 Constructing processing factories was aimed at reducing the rubber amount during rubber intervention projects and to increasing rubber quality to suit stocks for sale. This project was conducted in 1993. A budget was granted to

construct 675 processing factories and in 2011 three standard Thai rubber (STR20) factories with equipment were purchased by the Rubber Estate Organization.

4.1.2.2 Policy implementation involves the formulation of policies so that state agencies can request cooperation in buying rubber for their use, e.g., in 2000 50,000 tons rubber from the rubber intervention project were used in rubber product factories participating in the project, state agencies shall buy rubber products from the project participating factories.

4.1.2.3 Research and development involves policies assigned by the government to state agencies to study guidelines and techniques for processing rubber in a wide variety of forms. Competition opportunities should also be considered. This policy was initiated in 2003.

4.1.2.4 Supporting business operators in processing: This policy is part of a low rubber price solution policy. Zero-loans or low-interest loans were provided to farmers' institutes and rubber processing business operators to add rubber value. The project was initiated in 2009. Later, in 2012, the Farmers' Institute Potential Development Project was launched to stabilize rubber prices. The operations of both projects were similar. Loans were provided to farmers' institutes to gather rubber to be processed to add to their value and to be stocked in order to be sold when the prices got higher.

4.1.3 Downstream Policies

4.1.3.1 International Cooperation and Trade Policy: After confronting low rubber prices due to global economic conditions and rubber importers, rubber producers were encouraged to cooperate in solving the problem and develop the rubber business to bring about more overall benefit. Thus, Thailand has conducted the following international cooperations:

1) International Natural Rubber Organization (INRO): Thailand started participating in this organization in 1982. The objective of the organization was to stabilize and reduce the fluctuation of prices of rubber without distorting market prices in the long term. However, Thailand, as a member who received maximum benefits and losses in accordance with rubber productivity and paid the highest member fee, resigned its membership in 1999 because Thailand thought that

the INRO's stabilization did not solve the local rubber problem at all. Due to the resignation of Thailand and Malaysia, INRO eventually stopped operations.

2) The Rubber Trade Agreement was made between countries to release rubber from stocks caused by the purchase of rubber during market interventions. There are two types of agreement: exchange rubber for products, namely (1) the exchange of rubber for chemical fertilizer from The People's Republic of China in 1993 and 2000, and (2) a rubber sale agreement, in which the rubber importer's government made an announcement to buy rubber on behalf of the government for general purposes. For example, The People's Republic of China announced to buy 400,000 tons of rubber from Thailand in 1999.

3) International Rubber Consortium Limited (IRCo) comprising Thailand, Malaysia and Indonesia was established in 2003 with the objective of raising rubber prices so that farmers would have profits, thus stabilizing rubber prices and building bargaining power in the global market.

4) The Proactive Export Promotion Plan is aimed at expanding the rubber and product export market. It has been concretely operating since 2015. The Department of International Trade Promotion conducts business negotiations matching activities, participating in product exhibitions and dispatching trade representatives to visit trade partner countries. The total of rubber and products has amounted to 1.00952 billion US dollars. The proactive market expansion still remained in 2016.

4.1.3.2 Local Rubber Utilization Promotion Policy is aimed at promoting domestic rubber utilization by both public and private agencies. The policy was so clear that it was concretely adopted by state agencies in 2016. The cabinet agreed that the Bureau of the Budget shall properly prepare standard prices for rubber-modified materials, durable goods and structures at 45-60 baht per kg in accordance with rubber quality. The Bureau of the Budget shall also allocate additional budget to government agencies to compensate for different prices pertaining to rubber purchases. In addition, coordination shall be made with state agencies to carry out procurements related to projects/tasks in accordance with the Annual Expenditure Act of Fiscal Year of B.E. 2559 (2016) and shall use rubber as a main or mixed component in order to increase the use of local rubber.

In brief, Thai rubber policies have been developed in line with problems and value chain movements. They are comprised of upstream policies concerning production and local markets, midstream policies concerning construction of processing factories, policy statements, funding support, as well as research and development, and downstream policies concerning international cooperation and trade, as well as local rubber use promotion. The implementation of policies is consistent with the development of rubber value chains. Thai rubber policies from 1999 to 2016 are chronologically summarized and shown in Table 4.1.

4.2 Thai Rubber Policy Models

Based on the collection of Thai rubber policies from 1999 to 2013, various policies were implemented in accordance with the production and marketing situations at that time. Thai rubber policies from 1999 to 2013 are summarized in three models, as follows:

4.2.1 Promotion Policies were promoted by the government to increase more rubber in terms of cultivation areas and productivity per rai. It was the first policy model to be adopted to Thai rubber in 2011, during which the first rubber trees were expanded from Kantang District, Trang Province to Chanthaburi Province. Since 1946 rubber has been promoted by increasing production efficiency through the promotion of good varieties of rubber among farmers. Rubber was also advertised in TV and radio broadcasting so that farmers were informed about the government's rubber plantation promotion projects. In 1960 the cabinet agreed in principle to the Rubber Replanting Aid Fund Act B.E.2503 (1960) and the establishment of the Office of the Rubber Replanting Aid Fund in order to help and support farmers in cutting local aged rubber with low yields and switching to good varieties. The Rubber Estate Organization was established in accordance with Royal Decree on Establishment of Rubber Estate Organization, B.E. 2504 (1961) with the objective of carrying out the business related to rubber and rubber product production.

At the beginning of 1967, Thailand faced low rubber prices, as a result, the cabinet resolved to accelerate a solution for the low rubber price problem. At the same

time, the cabinet agreed at the end of that year to increase rubber aid funds from 1,850 baht per rai to 2,000 baht per rai. Later in 1984, the Accelerated Rubber Plantation Replacing Cassava Project was carried out and a budget of 46.336 billion baht was allocated in the middle of 1986 for the Rubber Plantation Assistance Scheme for those who had never owned rubber farms. However, from the middle to the end of the year, rubber prices were so low that a latex and rubber factory quality control policy was issued. Similarly, at the beginning of 1990 the low rubber price problem was solved, while the goal of rubber farm assistance for 281,250 rai was determined at the end of the year in accordance with the Rubber Replanting Aid Fund Act. Similar to 1991, the operation was carried out in response to the rubber replacement plan in the amount of 12.226 billion baht, although the low rubber price problem was fixed in February.

From 1992 to 2002, the Central Rubber Market Intervention Project was conducted in six phases during a low rubber price period. However, rubber promotion policies were continuously implemented; for example, in August 1994 the period of the Rubber Planting Aid Project for those who had never owned rubber farms, in the amount of 495.381million baht, was extended. Between 1997 and 2001, the rubber plantation in new area project, Phase 2, was conducted, and in 2002 the Rubber Variety Improvement Project was initiated for 350,000 rai in order to obtain good rubber varieties with high yields. Until 2004 the Rubber Plantation Project was conducted to upgrade farmers' incomes and security in new rubber plantation areas, Phase (2004-2006). However, rubber plantations in new areas were promoted until 2010 throughout the country. In 2011, the Rubber Plantation in New Area Project, Phase 3, was interrupted. The Rubber Plantation Promotion Project was terminated in 2015 along with a decrease in the promotion of rubber plantation area.

In summary, rubber plantation policies emphasized the expansion of rubber cultivation areas to other areas, apart from the south, due to the reason of farmers' income distribution to other areas of Thailand. The policies included the use of good varieties to replace local ones in order to increase productivity per rai. As a result, the amount of rubber in Thailand rose with increasing numbers of farmers related to the rubber business. Therefore, there were more people affected and Thailand still experienced continuous rubber price fluctuation problems. Finally, rubber plantation

area decreasing policies had to be implemented to reduce the quantity of natural rubber and to mitigate impacts caused by Thai price takers.

4.2.2 Control Policies involve state policies to control rubber production and sales in each period by using different practices. In 1967 Thailand faced a low rubber price problem. The government, therefore, formulated a measure to cancel the collection of the relief fund (CESS). Later, in 1982, the Natural Rubber Policy Committee was established with an authority to formulate policies and measures relating to natural rubber activities.

In the middle of 1989 rubber prices began to recede. In September the low rubber price was solved by checking the quality of latex and surveying rubber stocks in order to manage rubber and improve sub-standard rubber factories. In December, the problem was fixed by waiving the rubber export fee, the rubber replanting aid fund and the withholding tax. Later, in 1990, an adhoc committee was formed to determine guidelines for solving the low rubber price problem.

The Rubber Control Act B.E. 2542 (1999) involves requirements covering all rubber businesses in Thailand, starting from production and processing to export. It was announced in 1999 in the Royal Thai Government Gazette, Vol.116, Pt 105A. Action plans were announced in accordance with a complete cycle rubber development policy (1999-2003). In 2003 there was rubber cooperation between Thailand, Indonesia and Malaysia in implementing two control measures: the Supply Management Scheme (SMS) and the Agreed Export Tonnage Scheme (AETS), along with the adjustment of the relief fund (CESS) in relation to rubber prices. At the end of year, the establishment of the Rubber Authority of Thailand was approved in principle.

In 2010, it was determined that the Natural Rubber Policy Committee and relevant agencies shall adopt rubber development strategies (2009-2013) to integrate cooperation from the public and private sectors. In 2014, the National Council for Peace and Order (NCPO) approved the implementation of an Entire System Rubber Solution Project by stressing upstream, midstream and downstream industry promotion policies, strengthening farmers, reducing rubber plantation areas and supporting Thai rubber utilization. In 2016 the promotion of rubber use by state

agencies was clear. Standard prices for rubber-modified materials, durable goods and structures were prepared, along with the allocation of additional budget for compensating the different prices.

Control policies were formulated to control Thai rubber businesses based on the Rubber Control Act. Additional polices or measures were issued in accordance with the rubber situation in each period, such as production control measures, export control measures, CESS collection determination, tax increases or decreases, as well as cooperation or enforcement of measures to solve rubber problems in order to fix the rubber price problem with the objective of finding a national rubber problem solution.

4.2.3 Intervention Policies were implemented through the intervention of Thai rubber markets in 1990. Since 1989 rubber prices had been continuously low. Measures against this problem included an inspection of latex quality, a survey of rubber stocks, an improvement of rubber production factories, an exemption of relief fund collection, as well as a request for cooperation from rubber traders to give fair prices and from rubber exporters to buy rubber from small-scale merchants. In February 1990 rubber prices were intervened to solve receding prices. In 1991 rubber markets were intervened by buying smoked rubber sheets, Grade 3 (RSS3) for at least 17 baht per kg.

The Rubber Market Intervention Project was implemented between 1992 and 2002 in six phases. The Rubber Estate Organization bought unsmoked sheets from farmers at a specified price. Then they were processed to become ribbed smoked sheets so that they could be kept for sale when the prices were higher. However, during the Rubber Market Intervention Project period, promotion policies were still being implemented.

In 2005, the rubber price problem in southern border provinces was fixed with a budget of 137.998 million baht, 60 million baht of which was a revolving fund. Later, in 2009, a low rubber price solution was adapted by implementing a project to support farmers' institutes to process rubber in order to add value and to solve the low-price problem. From 2010 to 2011 rubber prices increased, as a result, the

Intervention Policy Processing Promotion Project was slowed down while a productivity increase was supported.

Afterwards, in 2012 the rubber prices tended to be lower. The government, therefore, carried out the Farmer's Institute Potential Development Scheme to stabilize rubber prices through credits to farmers' institutes in order to buy rubber to be processed and stocked for further sale. Later, in 2013 suffering rubber farmers protested by blocking the traffic at Khuan Nong Hong Junction in Cha-uat District, Nakhon Si Thammarat Province. The government carried out four rubber projects to solve the problem in 2014 with loans and a budget of more than 25.52845 billion baht. In 2015 16 measures were added to solve the problems of the whole rubber system including market intervention measures, e.g., Buffer Product Project, Farmers' Income Compensation Project, etc. In 2016, local rubber utilization was focused on in order to assist farmers.

Intervention policies were the government's way of operation pertaining to supply and demand, which affects rubber prices at local markets. In the beginning, rubber was bought from small-scale farmers to be processed, stocked and sold, but it faced problems of stock management, resulting in continuous losses. Later, a budget was funded for farmers' institutes in order to buy, process and stock rubber for further sale. This was a burden on each procedure, leading to consistent losses. However, price intervention policies through purchases were still needed by the government to solve problems and mitigate pressure from affected farmers.

In conclusion, Thai rubber operations are classified into three types: promotion policies stressing an increase in productivity by enlarging plantation areas and using good varieties to produce high yields per rai; control policies emphasizing control using laws, measures and asking for cooperation from agencies concerned; and intervention policies focusing on a solution to low rubber prices by purchasing rubber from small-scale farmers or farmer groups to mitigate their sufficient income problems. The producer price is one factor that leads to the rubber growers' problems and must be solved by the government. In each period inconsistent policies have been determined, especially in the year the rubber price problem was solved, while the expansion of rubber plantation areas was promoted in the following period. Policies

and rubber prices gained by farmers each year are compared in Figure 4.2. Rubber policies from 1899 to 2016 are summarized and shown in Table 4.1.

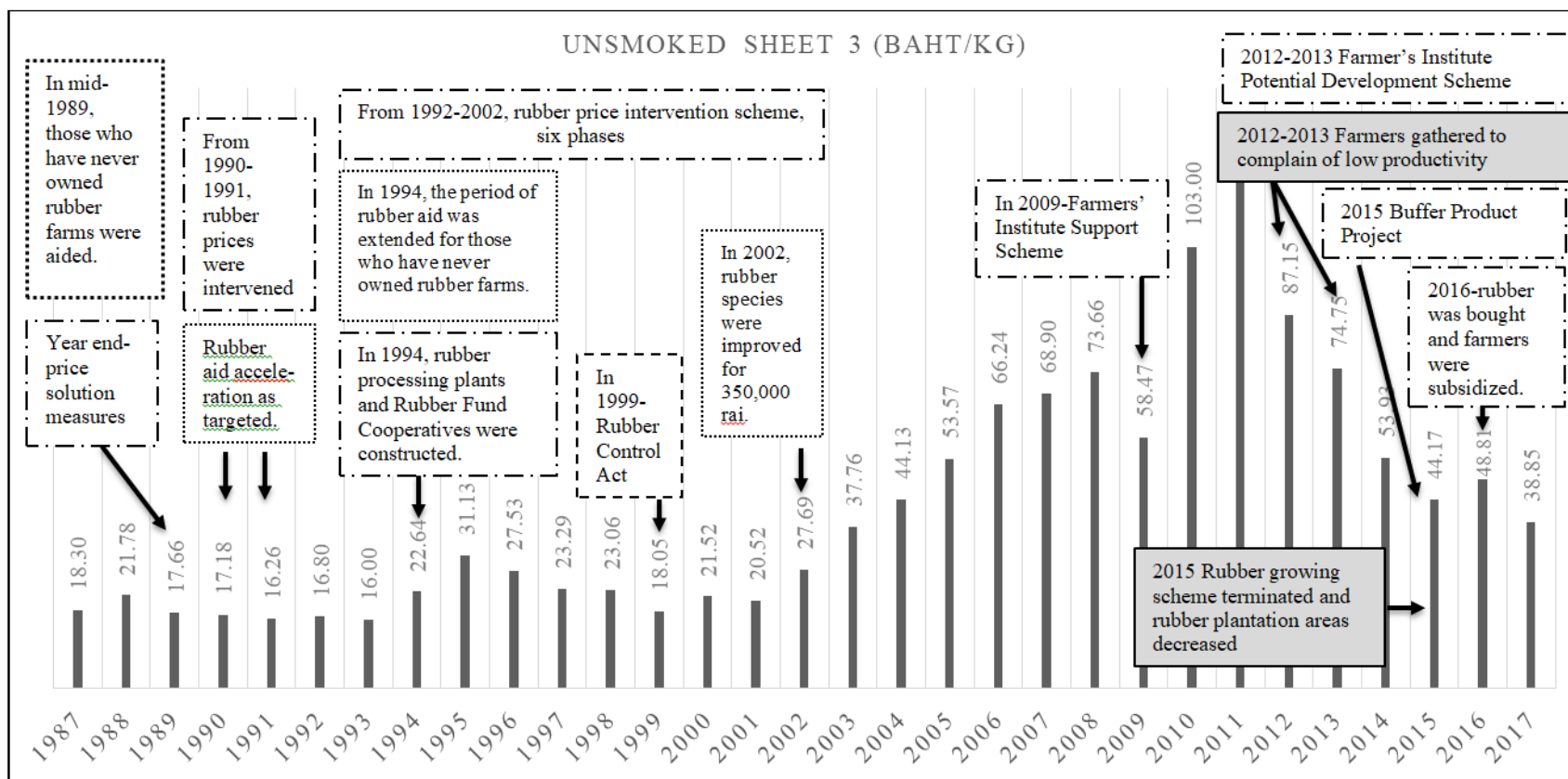


Figure 4.2 Thai Rubber Policies Compared to Prices Obtained by Farmers

 are promotion policies
 are control policies
 are intervention policies

Source: Producer Price: FAO, 2016.

Table 4.1 Summary of Thai Rubber Policies between 1899 and 2016

Year	Events/Policies
1899	<p>First rubber plantation</p> <p>Phraya Ratsadanupradit Mahison Phakdi imported rubber to be grown in Kantang District, Trang Province.</p>
1911	<p>Expansion of plantation areas</p> <p>Rubber was planted more in Chanthaburi Province.</p>
1939	<p>Rubber farm business started in Thailand.</p> <p>The Minister of Finance gave money to Phraya Anuwatwanarak, Chief of the Rubber Division, the Royal Forest Department to buy land for rubber business.</p>
1946	<p>The government began to focus on rubber.</p> <p>The government's policy focused on promoting increased rubber plantations by providing good varieties to farmers.</p>
1949	<p>Rubber promoted to be the national key product</p> <p>After the announcement of the constitution, the government's statement concerning rubber was announced. Rubber plantations were promoted to acquire increasing amounts of rubber so that it became the national key product.</p>
1958	<p>Suggestion from the World Bank to let the south expand rubber plantation areas</p> <p>The report of the Public Development Program for Thailand suggested an option for agricultural development relating to rubber, that is, expansion of rubber farms in the south because of suitable areas and global market demand.</p>

Table 4.1 (Continued)

Year	Events/policies
1959	<p>Rubber promotion advertisement</p> <p>Rubber plantations were publicized in TV and radio broadcasting.</p>
1961	<p>The Rubber Estate Organization was founded.</p> <p>The head office of the Rubber Estate Organization was situated in Nakhon Si Thammarat Province in accordance with the Royal Decree on Establishment of Rubber Estate Organization, B.E. 2504 (1961) with the objective of carrying out business related to rubber and rubber products production with capital of 30 million baht.</p>
1967	<p>Low rubber price situation</p> <p><i>July:</i></p> <p>The cabinet resolved to urgently solve the low rubber price problem and to negotiate with the US government not to put too much synthetic and natural rubber into the market.</p> <p><i>September:</i></p> <ul style="list-style-type: none"> - Relief fund collection was temporarily suspended. <p><i>October:</i></p> <ul style="list-style-type: none"> - Thai representatives were dispatched to join the rubber trade meeting in Kuala Lumpur. - Rubber export duty was reduced by 10% by the Ministry of Finance. - Rubber aid fund was increased from 1,850 baht per rai to 2,000 baht per rai.

Table 4.1 (Continued)

Year	Events/policies
1971	<p>Rubber farmers' suffering was solved.</p> <p>The cabinet approved the Rubber Estate Organization to borrow loans of 14.51 million baht from the national budget and accelerated the Ministry of Agriculture and Cooperatives to solve rubber farmers' problems.</p>
1976	<p>Rubber prices were stabilized and good varieties were utilized.</p> <ul style="list-style-type: none"> - An ageing rubber replacement with good variety project was implemented and supported by loans from two sources: 50 million US dollars from the World Bank with an interest rate of no more than 8.5% per year for 22 years, and the Commonwealth Development Corporation in the amount of no more than 3.4 million pounds sterling. - The Natural Rubber Price Stabilization Project was established in collaboration with natural rubber production member countries. The treaty of the rubber stabilization project was signed in Jakarta, Indonesia in November.
1982	<p>Policy motion</p> <p>The Natural Rubber Policy Committee</p> <p>The Natural Rubber Policy Committee was appointed with an authority to formulate policies and measures for activities concerning natural rubber.</p> <ul style="list-style-type: none"> - Joining INRO <p>Thailand joined the membership of the International Natural Rubber Organization (INRO), which stabilized rubber prices, as well as the rubber amount and quality comprising seven production countries and 23 import countries (Supachai, 1998).</p>
1984	<p>Cassava was replaced with rubber.</p> <p>The cassava replacement with rubber project in the east.</p>

Table 4.1 (Continued)

Year	Events/policies
1989	<p data-bbox="423 449 1360 533">Mid-year expansion of cultivation areas to new growers, and by year-end the rubber price problem was fixed.</p> <p data-bbox="423 558 493 585"><i>June:</i></p> <p data-bbox="423 611 1360 695">Rubber Aid Project for those who never owned land was operated with a budget of 46.336 billion baht.</p> <p data-bbox="423 720 570 747"><i>September:</i></p> <p data-bbox="423 772 1360 968">The cabinet assigned the Ministry of Industry, the Ministry of Commerce and the Board of Investment of Thailand to solve low rubber price problems by inspecting the quality of latex, surveying the amount of rubber stocks and improving sub-standard rubber production plants.</p> <p data-bbox="423 993 565 1020"><i>December:</i></p> <ul data-bbox="423 1052 1360 1850" style="list-style-type: none"> <li data-bbox="423 1052 1360 1577">- The cabinet resolved to solve rubber problems in two phases: 1) immediate guidelines, e.g., exemption of the rubber export tax at 12 satangs per kg, exemption of relief fund collection, exemption of withholding tax for one year, announcement of average rubber prices in the market as a criterion of import duty assessment once a week, assistance in providing production factors to farmers, as well as upgrading of rubber prices, and 2) long-term measures based on the possibility for providing loans to farmers to establish plants to improve rubber quality, control rubber plantation areas and organize an unsmoked rubber research and development institute. <li data-bbox="423 1602 1360 1850">- Request for cooperation from rubber buyers at two levels: at the area level, whereby governors in provinces, where rubber is grown and produced, ask rubber merchants to fairly treat rubber farmers; and at the export level, whereby the Ministry of Commerce requests exporters to buy export rubber from small-scale merchants.

Table 4.1 (Continued)

Year	Events/policies
1990	<p>At the beginning of the year - rubber price problems were tackled, and in the middle of year - rubber farming was aided.</p> <p><i>February:</i></p> <ul style="list-style-type: none"> - Rubber prices were intervened. -The Federation of Rubber Farmers Association of Thailand was established. - The Natural Rubber Policy Committee was established. <p><i>July:</i></p> <ul style="list-style-type: none"> - Rubber farming was aided in accordance with the Rubber Replanting Aid Fund Act for 281,250 rai. - The rate of relief fund (CESS) was determined to suit rubber prices at that time.
1991	<p>Rubber prices were low and the central rubber market was opened in Hay Yai.</p> <p><i>February-the low rubber price problem was tackled:</i></p> <ul style="list-style-type: none"> - The Ministry of Agriculture and Cooperatives encouraged the INRO to buy Thai rubber for buffer products. - The Ministry of Commerce checked the global market's demand to expand the market to Middle Eastern countries. - Packing credits of some commercial banks were checked to buy agricultural products for other purposes which were not in line with the objectives. - An ad hoc committee was established to determine the guidelines for solving low rubber price problems. - Farmers were exempted from paying 0.75% of withholding tax for three months.

Table 4.1 (Continued)

Year	Events/policies
	<p data-bbox="418 436 889 468"><i>April-Rubber plantation as planned:</i></p> <ul style="list-style-type: none"> <li data-bbox="418 491 1359 579">- Followed the rubber replacement planting plan in 1992/1996 for the amount of 12.226 billion baht. <li data-bbox="418 602 1359 690">- Adjusted the rate of relief fund collection from 60 satangs to 90 satangs per kg from the 1st of June 1991 onwards. <li data-bbox="418 714 1359 800">- The Ministry of Industry promoted industries using rubber as local raw materials.
	<p data-bbox="418 823 1000 854"><i>June - Supported exports and bought rubber:</i></p> <ul style="list-style-type: none"> <li data-bbox="418 877 1359 1077">- Supported financial measures to promote exports and buy rubber: The Bank of Thailand made an announcement to buy a promissory note caused by the purchase of rubber in the production period in 1991 from the 1st of May to the 30th of December, 1991.
	<p data-bbox="418 1100 521 1131"><i>August:</i></p> <p data-bbox="418 1155 1359 1354">Operated the first central rubber market in Hat Yai District, Songkhla Province to provide an option for farmers and farmers' institutes, to cut out the middlemen, to provide fairness and to serve as the national price announcement source.</p>
	<p data-bbox="418 1377 1143 1409"><i>December - urgent measures to solve low rubber prices:</i></p> <ul style="list-style-type: none"> <li data-bbox="418 1432 1359 1682">- Approved a budget of 200 million baht from the Rubber Estate Organization and intervened in the rubber market by buying unsmoked rubber sheets, Grade 3, at at least 17 baht per kg and approved an additional 500 million baht on the 25th of May 1993 (Preedee Leelasettawong, p.33).
1993	<p data-bbox="418 1705 1135 1736">Rubber Market Intervention Scheme from 1992 to 2002</p> <ul style="list-style-type: none"> <li data-bbox="418 1759 1243 1789">- Operated between the 8th of January 1992 and December 2002.

Table 4.1 (Continued)

Year	Events/policies
1993	<p>- The Rubber Estate Organization borrowed loans from the Krung Thai Bank. The Ministry of Finance acted as a guarantor. In case of any loss, the Bureau of Budget shall allocate the budget to compensate for the loss and actual interest rate.</p>
Cont'd	<p><i>October:</i></p> <p>Exchanged Thai rubber for Chinese fertilizer and negotiated with Mme Gu Xiulian, Chinese Minister of Chemical Industry, for the purchase of 5,500 tons of rubber, Grade 4.</p> <p><i>November:</i></p> <p>- Reported the result of rubber trade for 200 million baht as allocated by the government to the cabinet and closed the account in May 1993 with some profits.</p> <p>- The Krung Thai Bank provided an additional packing credit of 1 billion baht to the Rubber Estate Organization and the Ministry of Finance acted as a guarantor.</p> <p>- The Bank of Thailand increased a special additional credit amount of 1 billion baht for the Rubber Estate Organization and extended the credit period so that rubber could be stocked for further sale. The Ministry of Finance acted as a guarantor.</p>
1994	<p>Established the Rubber Fund Cooperatives and extended the rubber replanting aid period</p> <p><i>June:</i></p> <p>The air dried and ribbed smoked sheet factory construction project with a target of 1,500 factories and the Rubber Fund Cooperatives: 675 factories were opened: 310 factories from 1993 to 1994 and 385 factories in 1995.</p>

Table 4.1 (Continued)

Year	Events/policies
1994 Cont'd	<p>The cabinet resolved in May 1997 to indefinitely slow down the construction of the remaining 815 factories (Office of the Rubber Replanting Aid Fund, referred to by Preedee Leelasettawong, 2013: 128).</p> <p><i>August:</i></p> <p>- Operated the Rubber Replanting Aid Extension Project for those who had never owned land with the expense of 495,381,900 baht in the fiscal years of 1995-2004.</p>
1996	<p>Constructed warehouses and rubber sheet making buildings, and increased loans for rubber intervention</p> <p><i>February:</i></p> <p>Warehouse Construction Project to stock rubber.</p> <p><i>April:</i></p> <p>The Rubber Estate Organization borrowed loans of 200 million baht and a packing credit of 500 million baht from Krung Thai Bank Ltd., to be a revolving fund to intervene in rubber markets, to stabilize rubber prices and to solve low rubber prices.</p> <p><i>August:</i></p> <p>Approved an additional loan to buy rubber in accordance with the Rubber Market Intervention Scheme.</p> <p><i>September:</i></p> <p>Constructed good quality rubber sheet making buildings and provided equipment to 200 buildings.</p>

Table 4.1 (Continued)

Year	Events/policies
1997	<p>The Rubber Market Intervention Scheme, Phase 3, for selling stocked rubber and growing rubber in new areas.</p> <p>The Rubber Plantation Project in New Areas, Phase 2 (1997-2001), was approved in 1996.</p> <p><i>March:</i></p> <p>Adjusted the buying price of unsmoked rubber sheets, Grade 3, from 25 baht to 27.50 baht per kg to solve the short-term rubber price problem.</p> <p><i>April:</i></p> <p>Agreed in principle on the Draft Rubber Control Act, B.E.</p> <p><i>September:</i></p> <p>The Office of the Rubber Replanting Aid Fund shall sell 9,345.31 tons of rubber, which has been stocked since 1994. The Rubber Estate Organization shall sell rubber bought from the rubber market intervention scheme. The Bureau of Budget shall allocate a budget to compensate the loss to the Office of the Rubber Replanting Aid Fund.</p> <p><i>October:</i></p> <p>Farmers' institutes comprising 13 farmer groups and five agricultural cooperatives shall participate in the rubber market intervention scheme. Unsmoked rubber sheets, Grade 3, shall be intervened and rubber smoking and management shall be hired at 2 baht per kg based on the smoked rubber sheet weight.</p> <p><i>November:</i></p> <p>The cabinet approved the following three measures for a solution to the low rubber price problem:</p>

Table 4.1 (Continued)

Year	Events/policies
1997	1) Extended the loan period of the Krung Thai Bank PLC Ltd. from the 30th of December 1997 and 31st of December 1998 to the 30 th of December 1999, guaranteed by the Ministry of Finance.
Cont'd	2) Approved the Ministry of Agriculture and Cooperatives to continue the Rubber Market Intervention Scheme from the 1 st of December 1997 to the 31st of March 1998.
	Approved the Ministry of Agriculture and Cooperatives to sell the existing rubber owned by the Rubber Estate Organization to foreign countries by using a suitable method apart from the government-to-government method.
1998	Rubber Market Intervention Scheme, Phase 4
	<i>April:</i>
	- Extended the revolving credit of 2.476 billion baht to implement the Rubber Market Intervention Scheme for one more year, until the 31 st of December 1998. Krung Thai Bank Public Company Limited shall waive the penalty temporarily.
	- Increased an additional revolving credit of 450 million baht to pay for interest guaranteed by the Ministry of Finance.
	<i>August:</i>
	- Publicized public news to widely create an understanding among rubber farmers.
	- Immediately purchased rubber in accordance with the Rubber Market Intervention Scheme by informing farmers of where and when rubber would be bought.

Table 4.1 (Continued)

Year	Events/policies
1999	<p data-bbox="420 436 1325 520">- Launched a campaign to promote farmers to sell their products in the form of field latex instead of rubber sheets to save time.</p> <p data-bbox="420 543 1360 630">Rubber Market Intervention Scheme, Phase 5 - Stocked rubber was insured and sold to China.</p> <p data-bbox="420 653 537 684"><i>January:</i></p> <p data-bbox="420 707 1360 793">Add the Cooperative Promotion Department as an additional rubber market intervention agency.</p> <p data-bbox="420 816 521 848"><i>March:</i></p> <p data-bbox="420 871 1360 1178">The Rubber Estate Organization shall buy fire insurance in the amount of 2 and 4 billion baht for fire or lightning only, to cover smoked rubber sheets under the rubber intervention scheme. Smoked rubber sheets were deposited at four warehouses of the Department of Agriculture and private warehouses. The insured rubber amounted to 180,000 tons at a value of 5.332 billion baht.</p> <p data-bbox="420 1201 488 1232"><i>May:</i></p> <p data-bbox="420 1255 1360 1341">Compensated for the loss and interest arising from the project implementation from 1996 to 1997 for 388 million baht.</p> <p data-bbox="420 1365 488 1396"><i>July:</i></p> <p data-bbox="420 1419 1360 1621">Provided an additional source of loans from financial institutes for 4 billion baht to the Rubber Estate Organization to intervene in the rubber market and to pay for operating and service costs by the 31st of December 1999.</p> <p data-bbox="420 1644 521 1675"><i>August:</i></p> <p data-bbox="420 1698 1360 1890">Sold 400,000 tons of rubber to the People's Republic of China (100,000 tons bought from the Ministry of Commerce and 30,000 tons to be bought by the People's Republic of China for general purposes). However, Indonesia proposed a low price and as a result, the Ministry of</p>

Table 4.1 (Continued)

Year	Events/policies
1999 Cont'd	<p data-bbox="423 449 1360 533">Commerce dispatched representatives to negotiate with the People's Republic of China again.</p> <p data-bbox="423 558 570 590"><i>September:</i></p> <ul data-bbox="423 615 1360 974" style="list-style-type: none"> <li data-bbox="423 615 1360 758">- The Rubber Estate Organization shall use the rest of the loan of 4 billion baht and income from selling rubber in the Rubber Intervention Scheme, Phases 4 and 5, to buy rubber in Phase 6. <li data-bbox="423 783 1360 974">- The cabinet approved the Ministry of Agriculture and Cooperatives to spend the remaining supporting budget of 14,365,000 baht to construct smoking and drying houses, improve smoking and drying furnaces and rehabilitate and develop cooperatives. <p data-bbox="423 999 545 1031"><i>October:</i></p> <ul data-bbox="423 1056 1360 1140" style="list-style-type: none"> <li data-bbox="423 1056 1360 1140">- Announced the Rubber Control Act B.E. 2542 (1999), Vol 116, Pt 105A in the Royal Thai Government Gazette. <p data-bbox="423 1165 570 1197"><i>December:</i></p> <ul data-bbox="423 1222 1360 1520" style="list-style-type: none"> <li data-bbox="423 1222 1360 1362">- The action plan in accordance with the complete cycle rubber development policy (1999-2003) was approved in principle by the cabinet. <li data-bbox="423 1388 1360 1520">- A loan valued at 16.59658 billion baht borrowed from Krung Thai Bank PCL Ltd. and the Rubber Market Intervention Scheme was extended.
2000	<p data-bbox="423 1545 1008 1577">Released the stock of rubber and aided rubber</p> <p data-bbox="423 1602 537 1633"><i>January:</i></p> <p data-bbox="423 1659 1360 1850">Exchanged ribbed smoked sheets, Grade 3, valued at 241,757,610 baht from the Rubber Market Intervention Scheme for 40,000 tons of fertilizer from Shandong Lianocheng Luxi Chemical Group Corporation, the People's Republic of China.</p>

Table 4.1 (Continued)

Year	Events/policies
2000	<i>February:</i>
Cont'd	It was agreed to use 50,000 tons of rubber in rubber product factories participating in the project, and state agencies shall buy rubber products from factories participating in the project. Relevant agencies shall emphasize and accelerate the use of more local natural rubber.
	<i>July:</i>
	Approved the Office of the Rubber Replanting Aid Fund to borrow zero-interest loans of 277 million baht from the Rubber Replanting Aid Fund to assist rubber farms in 2000.
	<i>September:</i>
	There was cooperation in rubber between Thailand, Malaysia and Indonesia and serious agreement on rubber prices and trade to provide fairness to small-scale farmers.
	<i>October:</i>
	There was cooperation between the Office of the Rubber Replanting Aid Fund and the Thai Hevea Wood Association to solve insufficient capital for assisting rubber replanting and solve rubber wood shortage for export.
2001	International cooperation in solving rubber price problems
	<i>December:</i>
	- The cabinet's resolution on international rubber cooperation between Thailand, Malaysia and Indonesia in setting up working groups to determine negotiation guidelines and assigning the government's representatives to sign the agreement on behalf of the country.
	-Assigned the Ministry of Agriculture and Cooperatives in collaboration with the Ministry of Education and the Ministry of Science and Technology to prepare rubber plantation plans to suit areas, climate, as

Table 4.1 (Continued)

Year	Events/policies
	well as the demand of domestic and global markets to solve low rubber price problems.
	- Approved additional loans of 4 billion baht from Krung Thai Bank PCL Ltd to the Rubber Estate Organization to implement the Rubber Market Intervention Scheme, Phase 6
2002	Established International Rubber Consortium Limited to sell rubber in stock in Phase 6 and improve rubber varieties for 350,000 rai
	<p><i>March:</i></p> <p>Cabinet's resolution on the establishment of International Rubber Consortium Limited comprising Thailand, Malaysia and Indonesia.</p>
	<p><i>July:</i></p> <p>The Rubber Estate Organization made an agreement to sell 133,000 tons of stocked rubber for the Rubber Market Intervention Project on the 9th of July 2002 at 82.50 US cents per kg.</p>
	<p><i>September:</i></p> <p>With respect to the Rubber Variety Improvement Project, with the target of 350,000 rai, the Ministry of Agriculture and Cooperatives shall monitor the use of rubber varieties to replace old ones that must be cut with good varieties with high yields.</p>
2003	Promotion of the use of local rubber and rubber cooperation measures
	<p><i>January:</i></p> <p>Assigned state agencies to study guidelines and techniques for rubber processing based on competition opportunities.</p>

Table 4.1 (Continued)

Year	Events/policies
2003	<i>February:</i>
Cont'd	<p>The progress of rubber cooperation between Thailand, Malaysia and Indonesia: two measures included the Supply Management Scheme (SMS) in 2002 and 2003 aimed at reducing production by 4%, and the Agreed Export Tonnage Scheme (AETS) measure, aimed at reducing exports by 10% in 2002.</p>
	<i>March:</i>
	<p>Adjusted the collection of relief fund (Cess) in accordance with rubber prices and the Ministry of Agriculture and Cooperatives announcing the rubber price used to calculate the aid fund on the 1st and 16th of every month.</p>
	<i>May:</i>
	<p>Approved the rubber plantation project to upgrade farmers' incomes and security in new plantation areas, Phase 1 (2004-2006).</p>
	<i>June:</i>
	<p>Approved the establishment of the Rubber Authority of Thailand in principle.</p>
2004	<p>Transformed rubber into capital and extended the loan period for the intervention scheme</p>
	<i>January:</i>
	<p>- The cabinet approved the Rubber Farm into Capital Transformation Project in principle with the objective of transforming farmers' rubber wood in reserved forests into capital in order to add value to rubber wood and its industries. There were 529,985 farmers from 17 provinces participating in the project in a rubber area of 6,947,931 rai.</p>

Table 4.1 (Continued)

Year	Events/policies
2005	<p>for the amount of 12.5 billion baht ending on the 31st of December 2004 to pay for interest on every payment after the 31st of December 2003.</p> <ul style="list-style-type: none"> - The Rubber Estate Organization shall accelerate the preparation of financial reports of the rubber market intervention scheme so that the State Audit Office of the Kingdom of Thailand can audit the account. <p>Used the loan to pay for interest of the Intervention Scheme and established the central rubber market</p> <p><i>January:</i></p> <ul style="list-style-type: none"> - The cabinet agreed to let the Rubber Estate Organization extend the loan period for the Rubber Market Scheme, Phases 4-6, for another year in the amount of 12.5 billion baht ending on the 31st of December 2005 to pay for interest in every payment after the 31st of December 2004. - The Rubber Estate Organization closed all remaining financial statements of the Rubber Intervention Scheme as soon as possible and sent them to the State Audit Office of the Kingdom of Thailand for internal audit by the 1st of April 2005. <p><i>October:</i></p> <ul style="list-style-type: none"> - Established the Eastern Rubber Central Market in Rayong Province using the provincial integrated budget (CEO's budget) in fiscal year 2006 planned by Rayong Province to support the Eastern Rubber Central Market Establishment Project in Rayong for 30 million baht. <p><i>December:</i></p> <ul style="list-style-type: none"> - Solved the rubber problem in southern border provinces (Yala, Pattani and Narathiwat) using a total budget of 137,998,648 baht: operational budget of 77,998,648 baht, rubber tapping training of 129,988 baht and a revolving fund of 60 million baht for rubber trade.

Table 4.1 (Continued)

Year	Events/policies
2007	<p>Solved the rubber sapling problem and compensated for the loss in the Rubber Intervention Scheme</p> <p><i>June:</i></p> <p>Approved the principle of switching from the Department of Agriculture's production of rubber varieties distributed to farmers to farmers' arrangement of poly bag rubber costing a total of 250,722,221 baht (16,144,380 trees or 15.53 baht per tree) and project management cost of 6,941,200 baht.</p> <p><i>August:</i></p> <p>Solved the Rubber Project of 1 million rai so that farmers could obtain rubber varieties as planned or no later than the 31st of July 2007.</p> <p><i>November:</i></p> <p>The cabinet agreed, as requested by the Ministry of Agriculture and Cooperatives, on a budget to compensate for a loss of 573,409,752.29 baht caused by interest of 378,444,193.12 baht from the operation of the Rubber Market Intervention Scheme, Phase 3, as the project account could not be closed as scheduled.</p> <p>value of 200,000 tons.</p>
2010	<p>Rubber development strategies increased the relief fund and planted rubber in new areas, Phase 3.</p> <p><i>May:</i></p> <p>- Agreed on rubber development strategies (2009-2013) to serve as a framework for Thailand's efficient rubber development covering production, processing, marketing, research for capacity enhancement, quality of life development, farmers' and business operators' security, natural rubber value adding and the government's support.</p>

Table 4.1 (Continued)

Year	Events/policies
2010	<i>July:</i>
Cont'd	<ul style="list-style-type: none"> - The cabinet agreed in principle on the New Area Rubber Plantation Project, Phase 3 (2010-2012), with the goal of 800,000 rai in the north, northeast and south.
	<i>August:</i>
	<ul style="list-style-type: none"> - Increased the relief fund collection in accordance with the Rubber Replanting Aid Fund Act and the resolution of the Rubber Replanting Aid Committee and the Natural Rubber Policy Committee.
	<ul style="list-style-type: none"> - The Office of the Rubber Replanting Aid Fund shall check a stock of rubber from the 20th to the 30th of September 2010.
	<i>December:</i>
	<ul style="list-style-type: none"> - The cabinet approved the annual expenditure budget in fiscal year 2011 to carry out the New Area Rubber Replantation Project, Phase 3 (2010-2012). The first-year operation for 200,000 rai area amounted to 580.05 million baht.
2011	<p>Risk support plans caused by the purchase of rubber and interruption of the Farmers' Institute Support Project and New Area Plantation Project, as well as Rubber and Rubber Wood Development Strategies</p>
	<i>February:</i>
	<i>Risk support plans related to the purchase of rubber</i>
	<ul style="list-style-type: none"> - The Rubber Estate Organization hired three STR20 factories and equipment and six rubber product purchase centers using a revolving fund of 150 million baht and a bank loan of 100 million baht.

Table 4.1 (Continued)

Year	Events/policies
2011 Cont'd	<p data-bbox="423 449 1360 590">- The Rubber Estate Organization set the goal of rubber product sales to China, Japan, South Korea, the US and India of at least 80% using both direct and brokered systems.</p> <p data-bbox="423 617 854 644"><i>Rubber prices tended to increase.</i></p> <p data-bbox="423 672 1360 812">- Slowed down the extension of the period for the Farmers' Institute Support Project to process rubber and add value to solve the low rubber price problem as rubber prices tended to be higher.</p> <p data-bbox="423 840 521 867"><i>March:</i></p> <p data-bbox="423 894 1360 1083">- The cabinet agreed in principle on Rubber and Rubber Wood Product Development Strategies and the establishment of the Rubber and Rubber Wood Development Institute in the form of a network institute under the Ministry of Industry.</p> <p data-bbox="423 1110 1360 1356">- Cooperation with the People's Republic of China on a study trip and cooperation exchange in Dongying City, Qingdao, Shandong Province by inviting Chinese investors to invest in the establishment of rubber processing plants in Thailand and cooperate with Thailand in manufacturing tires.</p> <p data-bbox="423 1383 505 1411"><i>April:</i></p> <p data-bbox="423 1438 878 1465">New Area Rubber Plantation Project</p> <p data-bbox="423 1493 1166 1520">- Delayed the New Area Rubber Plantation Project, Phase 3.</p> <p data-bbox="423 1547 1360 1736">- Relevant agencies shall review the rubber plantation promotion process and the results of promotion in Phase 2, especially in the northeast, where the vulcanized rubber problem occurred and rubber trees did not meet the standard.</p> <p data-bbox="423 1764 1360 1885">- An area of 200,000 rai that was operating in Phase 3 in 2011 should be continued. But as for the operation to be conducted in 2012 and the following years, the Ministry of Agriculture and Cooperatives and</p>

Table 4.1 (Continued)

Year	Events/policies
	<p>relevant agencies shall assess the results of previous project operations and determine appropriate operation guidelines.</p>
	<p><i>November:</i></p> <p>Assisted rubber farmers damaged by floods and landslides in 2011 by using the annual fiscal year of 2011 and the main budget in the name of reserved money for emergencies or necessary reserves for overlapping reimbursements in the amount of 160,982,634 baht.</p>
2012	<p>Farmers gathered to claim productivity prices and to carry out the operation of Farmer's Institute Potential Development Project to stabilize rubber prices.</p> <p><i>January:</i></p> <p>- Due to protests, the Minister and Deputy Minister of Agriculture and Cooperatives shall negotiate with rubber farmers to solve the low rubber price problem.</p> <p>Implemented the Farmers' Institute Potential Development Project by allowing the Bank for Agriculture and Agricultural Cooperatives to grant credits of 15 billion baht to farmers' institutes participating in the project and the Rubber Estate Organization to buy rubber to be processed, checked and stocked.</p> <p>Short-term solutions to ribbed smoked sheets of farmers' institutes, which could not be sold due to low prices. The Bank for Agriculture and Agricultural Cooperatives shall support a credit amount of 2 billion baht using rubber products as a pledge security. The farmers' institutes shall bear the interest burden, while the government shall be responsible for non-life insurance.</p>

Table 4.1 (Continued)

Year	Events/policies
2012	<i>March:</i>
Cont'd	Agreed the Draft Rubber Authority of Thailand Act B.E.....
	<i>May:</i>
	- Conducted the Wildlife Sanctuary Encroachment Suppression Project and the Watershed for Rubber Plantation in the South Encroachment Suppression Project.
	<i>July:</i>
	The cabinet approved in principle on Bureau of the Budget plans for a budget to compensate for the loss of the farmers' institute potential development project in order to stabilize rubber prices.
2013	Increased the capital of International Rubber Consortium Limited and rubber farmers blocked traffic routes
	<i>March:</i>
	Increased the capital of International Rubber Consortium Limited in accordance with the resolution of the Communique Ministerial Committee Meeting. Thailand had to pay 3.3 million US dollars and the Ministry of Finance, as a shareholder of the International Rubber Consortium Limited, shall plan an annual expenditure budget for 2014.
	<i>August:</i>
	- Traffic routes at Khuan Nong Hong Junction in Cha-uat District, Nakhon Si Thammarat Province were blocked by farmers suffering from low rubber prices.
	- The Natural Rubber Policy Committee considered solution guidelines for the whole system from upstream, midstream and downstream, as well as negotiated with farmer representatives who understood and accepted the solution, and those who did not accept the proposal.

Table 4.1 (Continued)

Year	Events/policies
2013	<i>September:</i>
Cont'd	The relief fund collection was waived from the 2 nd of September to the 31 st of December 2013.
2014	Rubber stock management and rubber solutions to the entire system
	<i>June:</i>
	The National Council for Peace and Order approved the rubber solution project in 2014 with a budget 6.159996 billion baht
	<i>July:</i>
	The National Council for Peace and Order deemed necessary to accelerate the implementation, expansion and upgrading of the rubber city project to become the Rubber Corridor Project in order to expand the rubber market in the ASEAN Region.
	<i>August:</i>
	- Approved the principle of rubber development guidelines consisting of two measures (urgent and continuous measures), nine approaches and 12 projects in the amount of no more than 5.93825 billion baht.
	- Accelerated the assistance of rubber farmers facing the low rubber price problem.
	- Improved the national rubber strategy to support more midstream and downstream industries in a concrete manner.
	<i>October:</i>
	- Guidelines for rubber management of the Rubber Estate Organization to release the stock because of the farmers' institute potential development project in order to stabilize rubber prices by adjusting stationary stocks to mobile stocks through a rotation sale along with new purchases. However, rubber had to be released to send out of the country so as not to increase the local supply, except for domestic use for public businesses.

Table 4.1 (Continued)

Year	Events/policies
2014	- Four rubber solution projects are as follows:
Cont'd	<p data-bbox="423 495 1360 747">(1) Buffer Product Project to stabilize rubber prices: The Rubber Estate Organization borrowed loans from the Bank for Agriculture and Agricultural Cooperatives in order to buy rubber at a target price of 60 baht per kg (ribbed smoked sheets, Grade 3) to lead the market for the credit amount of 6 billion baht for six months.</p> <p data-bbox="423 768 1360 1346">(2) Rubber Farmer's Income Compensation Project borrowed loans from the Bank for Agriculture and Agricultural Cooperatives (BAAC) to compensate farmers for their income, who had tapped farm areas with title deeds at the rate of 1,000 baht per rai not exceeding 15 rai per household for a target of 850,000 households for six months. The total amount born by the government was 8.45399 billion baht: 8.2 billion baht for farmer compensation, and 253.99 million baht for the BAAC's interest compensation and management costs. Based on the performance in May 2015, 7.70427 billion baht compensated for the farmers' income of 767,518 households (ThaiPR.NET referred to in the Agricultural News of the Office of the Rubber Replanting Aid Fund).</p> <p data-bbox="423 1367 1360 1843">(3) The Small-scale Rubber Farmers' Credit Support Project for Additional Occupation: The credit amount was in line with farmers' production plans for no more than 100,000 baht per household at an annual interest rate of 2% for the target of 100,000 households of farmers. Money sources were from the BAAC's credit of 10 billion baht at an annual interest rate of 5% (the government bore the interest burden of 3%). The payback period could not exceed five years. The amount born by the government for paying the BAAC's interest and management cost 1.57947 billion baht. About 111,210 households of</p>

Table 4.1 (Continued)

Year	Events/policies
2014 Cont'd	<p>farmers participated in the project. An amount of 1,824.18 baht in loans was approved for 20,117 households (ThaiPR.NET referred to in the Agricultural News of the Office of the Rubber Replanting Aid Fund).</p> <p>(4) The credit support project as a revolving fund for business operators supported business operators by providing a credit amount of 10 billion baht at an annual interest rate of 2% through the mechanism of commercial banks (the statement of the cabinet's meeting on the 21st of October 2014, Source: www.thaigov.go.th).</p>
2015	<p>Terminated the Rubber Plantation Project and 16 rubber solution measures</p> <p>16 rubber solution measures</p> <ol style="list-style-type: none"> 1) Rubber Buffer Stock Program. 2) Farmers' Income Compensation Scheme (15,000 baht per farmer). 3) Small-scale Rubber Farmer's Credit Support Scheme for Additional Occupation for the amount of no more than 100,000 baht. 4) Rubber Business Operator's Revolving Fund Support Scheme for the amount of 10 billion baht. 5) Farmers' Institute's Revolving Fund Support Scheme for Collecting Rubber. 6) Farmers' Institute's Credit Support Scheme for Rubber Processing for the amount of 5 billion baht. 7) Rubber Business Operators' Credit Support Scheme for the amount of 15 billion baht. 8) Market Development Project in line with the rubber market system restructuring plans. 9) New Market Provision Scheme for Export.

Table 4.1 (Continued)

Year	Events/policies
2015 Cont'd	<p>10) Local Rubber Product Investment Promotion Scheme/Rubber Product Business Operator's Support Scheme.</p> <p>11) Rubber Industry Development Institute Establishment Scheme.</p> <p>12) Production Volume Control Project.</p> <p>13) Production project to generate more income from rubber farms based on the sufficient economy philosophy.</p> <p>14) Production Cost Reduction Project.</p> <p>15) Technology Transfer Scheme to reduce rubber production costs.</p> <p>16) Short-time Rubber Solution Project in 2014 through the support of production factors of 2,520 baht per rai to farmers (Local News, Thansettakij newspaper referred to in Agricultural News, the Office of the Rubber Replanting Aid Fund, 13th December 2014).</p> <p><i>February:</i></p> <p>The cabinet agreed to use the rubber stock from the Farmer's Institute Potential Development Project to stabilize rubber prices along with the Rubber Buffer Stock Program.</p> <p><i>March:</i></p> <ul style="list-style-type: none"> - The cabinet agreed to terminate the New Area Rubber Plantation Project, Phase 3 (2011-2013). - Decreased local rubber plantation areas starting from encroached forests. - Sought guidelines for strengthening the Rubber Estate Organization, cooperatives groups or farmer communities and integrating their operations to be systematic (Summary of the cabinet's resolution and instructions in 2015). <p><i>June:</i></p> <p>Stringent measures of forest encroachment for rubber plantations.</p>

Table 4.1 (Continued)

Year	Events/policies
2016	<p data-bbox="427 449 792 476">Assistance to rubber farmers</p> <p data-bbox="427 506 537 533"><i>January:</i></p> <p data-bbox="427 562 732 590"><i>Local rubber utilization</i></p> <ul style="list-style-type: none"> <li data-bbox="427 619 1360 863">- The Bureau of the Budget shall properly prepare standard prices for rubber-modified materials, durable goods and structures at 45-60 baht per kg in accordance with rubber quality. The Bureau of the Budget shall also allocate additional budget to government agencies to compensate for different prices pertaining to rubber purchases. <li data-bbox="427 892 1360 974">- Promoted rubber processing in medium-scale and small-scale state enterprises through good governance. <li data-bbox="427 1003 1360 1085">- Rubber utilization promotion scheme and bought 100,000 tons of rubber from small-scale farmers. <p data-bbox="427 1115 792 1142"><i>Farmer assistance measures</i></p> <ul style="list-style-type: none"> <li data-bbox="427 1171 1360 1520">- Packed Rice Scheme to assist rubber farmers, mitigate their suffering and help rubber farmers who had insufficient income by providing white rice 5% in 4,014,315 5-kg bags to registered farmers of 802,863 households (five bags per household) in 68 provinces. The operation period lasted for three months between January and March 2016. White rice in the government's stock was used in accordance with the Rice Pledging Scheme in 2013/2014. <li data-bbox="427 1549 1360 1730">- Rubber farmers' cost of Living Assistance Scheme in 2016 to help rubber farmers by letting the Department of Internal Trade sell necessary consumer products at prices lower than the market in 14 southern border provinces. <li data-bbox="427 1759 1360 1881">- Rubber and Rubber Product Export Promotion Plans to expand the rubber and rubber product export markets. In 2005, the Department of International Trade Promotion conducted business negotiation matching

Table 4.1 (Continued)

Year	Events/policies
2016 Cont'd	<p>activities, participated in product showcases and dispatched trade representatives to visit trade partner countries for six projects. The total rubber and rubber product sale value was 1.00952 billion US dollars or 36.34272 billion baht. In 2016, proactive Rubber and Rubber Product Export Promotion Plans were continuously formulated.</p> <p><i>Rubber solution guidelines to urgently assist rubber farmers</i></p> <ul style="list-style-type: none"> - The Office of Agricultural Economics, Ministry of Agriculture and Cooperatives fixed the production cost of ribbed smoked sheets, Grade 3, at 64.21 baht per kg. - Coordinated with state agencies which carry out procurement related to projects/tasks in accordance with the Annual Expenditure Act of Fiscal Year of B.E. 2559 (2016) and shall use rubber as a main or mixed component in order to increase the use of local rubber. - The government's buying rate should not exceed 60 baht per kg for 200,000 tons of rubber for the amount of 12 billion baht.

Source: Sophon Chomchan et al., 2014.

4.3 Thai Rubber Stabilization Policies

The government's agricultural product price intervention is usually aimed at helping producers in periods when the yield tends to be higher than the demand. The government will fix the price higher than the market; as a result, producers have a motivation to produce more, while buyers demand less. As a result, the overproduction will pressure the price to be lower. Thus, the government has to buy the excess supply so that the market price remains high. Therefore, the government has to issue additional

measures to stabilize prices. This leads to additional costs that society must pay. Apart from economic costs, the market system is inefficient because markets are distorted; as a result, it leads to motivation for using resources to produce goods more than the demand.

4.3.1 Rubber Market Intervention Scheme (1992-2002)

Low rubber price problems in Thailand have taken place since the beginning of 1989 as a result of global economic changes, which have direct impacts on rubber farmers. Thus, the government had to solve rubber price problems through rubber market interventions operated from January 1991 to December 2002. The operations consisted of six phases. Such operations could intervene in the rubber market by 7% of unsmoked sheets in the market. The total budget amounted to 25.394 billion baht and the interest and operational loss amounted to 16.8405 billion baht. Each operation period is shown in Table 4.2.

Table 4.2 Operation Period of the Rubber Market Intervention Project from 1992 to 2002

Phase	Period	Years and months
Phase 1	8 th January 1992 – 31 st March 1997	6 years and 3 months
Phase 2	13 th May 1997 – 31 st December 1997	7 months and 18 days
Phase 3	4 th February 1997 – 31 st December 1997	10 months and 24 days
Phase 4	21 st January 1998 – 31 st December 1998	11 months and 9 days
Phase 5	11 th January 1999 – 31 st March 1999	2 months and 20 days
Phase 6	16 th June 1999 – 30 th December 2002	3 years, 6 months and 14 days

The Rubber Market Intervention Scheme started from the 8th of January 1992 to December 2002 for 10 years in six phases. The main concept was to intervene in the market by buying unsmoked sheets in line with specified prices and quantity to lead the market price to follow the target price, processing unsmoked sheets to become smoked

sheets and storing them until their prices were high. The project management mechanism is summarized as follows:

1) Rubber purchase: The Rubber Market Intervention Scheme involves the purchase of unsmoked rubber sheets based on the target price in order to stock them because this method can maintain rubber quality better than unsmoked sheets. Then, a company or a private smoking plant is hired and warehouses are provided to stock them before being sold.

A total budget of 25.394 billion baht was spent by the government to buy rubber under the Rubber Market Intervention Scheme. The Rubber Estate Organization borrowed the funds from the Krung Thai Bank as approved by the cabinet. The Ministry of Finance was the guarantor. This is different from the Rice Pledging Scheme, in which the budget was subsidized by the government.

As for the purchase of rubber, there are three groups of those eligible for selling rubber to the project, namely (1) farmers possessing less than 50 rai of land, (2) farmers having possessed land for more than 50 years but allowing the sale to the project not exceeding the productivity in a 50 rai area, and (3) rubber farmer cooperatives. Those who wish to sell rubber to the project must register with the Ministry of Agriculture and Cooperatives first.

The government opened the intervention locations to buy rubber from rubber farmers in 32 provinces across the country, as shown in Table 4.3.

Table 4.3 Intervention Locations to Buy Rubber from Rubber Farmers

Region	Provinces
14 provinces in the south	Pattani, Yala, Narathiwat, Songkhla, Phatthalung, Krabi, Phuket, Phang-nga, Trang, Satun, Surat Thani, Nakhon Si Thammarat, Chumphon and Ranong
11 provinces in the northeast	Khon Kaen, Udon Thani, Nong Khai, Sakon Nakhon, Nakhon Phanom, Loei, Buri Ram, Surin, Si Sa Ket, Nakhon Ratchasima and Ubon Ratchathani
Five provinces in the east	Prachuap Khiri Khan, Rayong, Chon Buri, Trat and Chanthaburi
Two provinces in the west	Kanchanburi and Chachoengsao

2) Fixing the target price was in line with the government tenure in each period. The aim was to lead the market price of unsmoked rubber sheets as targeted. This was determined in many forms by the Natural Rubber Policy Committee, chaired by the Deputy Prime Minister. For example, the intervened prices were about 15% higher than the market price, or about 0.75 baht per kg added to the production cost.

3) Rubber bought by the government to be stocked in order to reduce the rubber quantity in the market and to be sold when the price is higher. To maintain rubber quality, ribbed smoked rubber sheets must be stocked after farmers' unsmoked sheets are bought by the government. Therefore, the government must hire a smoking plant on auction in order to specify the scope of areas responsible for smoking sheets. There are four Rubber Research Institute warehouses, which can stock up to 60,000 tons of rubber. However, those warehouses and the Office of the Rubber Replanting Aid Fund's small-scale warehouses were insufficient for the rubber amount bought by the government in the project. It was necessary to rent private warehouses based on the warehouse standard and the distance. The production cost for stocking and opportunity loss was about 3 baht per kg (Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai, 2014, pp. 27).

4) The stock of smoked rubber sheets was released by selling them when their prices had increased or selling them to foreign markets. Due to budget constraints in some periods, responsible agencies sold the stock on the domestic market in order to use the income as a revolving fund to buy new rubber. Domestic sale of rubber increased the domestic supply and the decreasing price was not consistent with the project objectives. Some rubber was bought by private companies and resold to the project. With respect to the six phases of project operation, up to 1,351,539.90 tons of rubber had intervened, valued at 32.36130 billion baht. The total loss amounted to 15.80950 billion baht, or 11.96 baht per kg. Farmers received fewer benefits from the project than the loss because the stocking and sale were inefficient, responsible state agencies did not have knowledge about business management, as well as there were corruption problems, the state direction was not clear, and there was political pressure. Some parts of rubber stocks were sold in exchange for some goods, e.g., 12,000 tons of rubber were exchanged for 40,000 tons of fertilizer from China, etc.

The Rubber Market Intervention Scheme, Phases 1-6 was assessed by the rubber market intervention agencies, which were not much different. In other words, the rubber price intervention measures did not affect the rubber market stability. The following key agencies for assessing the Rubber Market Intervention Project, Phases 1-6, are as follows:

The Rubber Estate Organization's assessment of the performance of the project, Phases 1-6, in 2004 revealed that the farmers' benefit was higher than the state cost. A total approved loan of 25.394 billion baht generated a project income of 29.9286 billion baht. The total expenditure was 46.7961 billion baht. The total loss was 16.8405 billion baht: loss from the operation at 7.5947 billion baht and loss from interest at 9.2458 billion baht. The price of 1,351,539.9 tons of rubber that had intervened was valued at 32.3613 billion baht. The average rubber price was 23.94 baht/kg. The project's operation brought about two benefits: benefits from directly selling 1,351,539.9 tons of unsmoked sheets to the project at 3.50 baht higher than the market price, or 4.73 billion baht, and (2) benefits from price competition. Of the remaining rubber, or 93% of that not sold to the project, local traders had to buy it to compete with the project price, which was 1.50 baht

per kg higher than the actual local price. As a result, farmers could sell rubber at a higher price. The total value was 27.31 billion baht. The total project benefit amounted to 32.04 billion baht, while the project loss amounted to 16.8405 billion baht, or 56.56% of benefits received by rubber farmers. Finally, the Rubber Estate Organization concluded from the project's evaluation that the project management was directly efficient to farmers and had direct impacts on the management of local and international rubber markets. Consequently, the rubber prices have remained stable so far (The Rubber Estate Organization referred to by Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai, 2014, p. 18).

The Rubber Research Institute's project assessment in 2002 indicated that the rubber market intervention could not raise the farmer's rubber price to be close to the intervened price and could not affect national rubber production, although the price was adjusted to be close to the price intervened by the government. In addition, it could not be stated that the increasing price was because of the government's market intervention or because of external factors. As for the rubber market, buyers had a high effect on the price change based on the relationship of rubber prices related to export prices and foreign market prices rather than the intervened price. Those who benefited from rubber purchased at prices determined by the government included farmers who had knowledge to access information and lived near the intervention locations. Other farmers who had a higher proportion than farmers benefiting from the project had to accept prices determined by merchants. Therefore, the Rubber Research Institute concluded from the result of the Rubber Market Intervention Scheme in six phases, that social welfare loss took place due to inefficient government utilization of national resources (The Rubber Research Institute referred to by Patamawadee Pochanukul Suzuki and Phonlawit Sapsisanjai, 2014, pp. 18-19).

The operation of the Rubber Market Intervention Scheme in six phases is summarized in Table 4.4.

Table 4.4 Summary of the Rubber Market Intervention Scheme Operation

Phase/Year	Price*	Quantity and Value	Budget and Results
Phases 1-2			
1992-1993	- Prices before intervention 14 baht/kg	- Quantity of rubber purchased 262,376 tons	- Total loans 3.394 billion baht
	- Target prices 17 baht/kg	- Value of rubber purchased 6.217 billion baht (from 1992-1996)	Total loss 3.3715 billion baht (loss from operation 1.4683 billion baht and loss from interest 1.9032 billion baht)
1994-1996	- Leading the market prices 0.30-0.50 - Average buying prices 23.69 baht/kg	(from 1992-1996)	(from 1992-1996)
1997 Feb-Dec	- Prices before intervention in February 24.33 baht/kg	- Quantity of rubber purchased 168,606 tons	- Total loans 5.700 billion baht
1997 Feb-Dec Cont'd	- Average buying prices 28.32 baht/kg	- Value of rubber purchased 4.775 billion baht	- Total loss 3.5853 billion baht (loss from operation 1.498 billion baht and loss from interest 2.0873 billion baht)
Phase 4			
Jan-Dec1998	- Prices before intervention in January 24.24 baht/kg	- Quantity of rubber purchased 156,696 tons	- Total loans 2,000 million baht
	- Average buying prices 26.31 baht/kg	- Value of rubber purchased 4.123 billion baht	- Total loss 3.1794 billion baht (loss from operation 22403 billion baht and loss from interest 939.1 million baht)

Table 4.4 (Continued)

Phase/Year	Price*	Quantity and Value	Budget and Results
Phase 5			
Jan-Mar 1999	- Prices before intervention in January 18.50 baht/kg - Average buying prices 21.33 baht/kg	- Quantity of rubber purchased 81,817 tons - Value of rubber purchased 1.745 billion baht	- Total loans 4 mbillion baht - Total loss 1.2157 billion baht (loss from operation 379.2 million baht and loss from interest 836.5 million baht
Phase 6			
Jun-1999- Dec 2002	- Prices before intervention in June 17.77 baht/kg - Average buying prices 22.73 baht/kg	- Quantity of rubber purchased 682,044 tons - Value of rubber purchased 15.511 billion baht.	- Total loans 8 billion baht - Total loss 4.4576 billion baht (loss from operation 3.0707 billion baht and loss from interest 1.3869 billion baht
Total	Average buying prices 23.94 baht/kg	- Quantity of rubber purchased 1,351,539.9 tons - Value of rubber purchased 32.3613 billion baht	- Total loans 25.394 billion baht - Outstanding loan 11.7567 billion baht as of 30 th December 2002

Table 4.4 (Continued)

Phase/Year	Price*	Quantity and Value	Budget and Results
			- Total loss 15.8095 billion baht (loss from operation 8.6565 billion baht and loss from interest 7.153 billion baht - Compensation of loss and interest of 5.75088 billion baht in fiscal years 2000, 2001, 2002 and 2003 from the national budget

Source: Preedee Leelasettawong, 2013.

Note: * Prices before intervention, the Office of Agricultural Economics, 1991-2002

4.3.2 Air Dried and Smoked Sheet Manufacturing Plant Construction and Rubber Fund Cooperatives Establishment Policies (1993-1995)

Due to low rubber price situations in 1993, the government formulated future Thai rubber strategies in 1995 by focusing on the improvement of rubber quality and standard to serve the growth of the processed rubber product industry and to support the processing of unsmoked sheets into smoked sheets so that farmers could stock rubber for sale and increase rubber quality. The Office of the Rubber Replanting Aid Fund had a policy to construct aired and smoked rubber manufacturing plants with a capacity of two tons per day, which is sufficient for 30-50 rubber farmers, and to support the establishment of rubber fund cooperatives so that farmers can gather to produce and sell rubber in the form of cooperatives under the supervision of the Office of the Rubber Replanting Aid Fund, which supports the establishment of cooperatives, plant construction, provision of technical assistance devices and group accounting.

With respect to the cabinet's resolution pertaining to the approval of the airing and smoking plant project on the 10th of June 1994 and 19th of November 1995, a total of 1,500 factories nationwide were planned to be built in 24 provinces: 14 provinces in the south, four provinces in the east, five provinces in the northeast and one province in the west. Responsible agencies included the Office of the Rubber Replanting Aid Fund, the Cooperative Promotion Department, the Cooperative Auditing Department and the Rubber Research Institute. The two project main goals were (1) establishment of a total of 1,500 rubber producer cooperatives: 300 cooperatives in 1994, 400 cooperatives in 1995 and 800 cooperatives in 1996, and (2) promotion of cooperative business operations with the target of 300 cooperatives in 1994, 700 cooperatives in 1995 and 1,500 cooperatives per year from 1996 to 1998 using a total budget of 700 million baht, as shown in Table 4.5.

Table 4.5 Goals and Budget of the Aired and Smoked Rubber Plant Construction Project and Rubber Fund Cooperatives Establishment Project

Activity	Goal (Year)					Total
	1994	1995	1996	1997	1998	
1. Establishment of rubber fund cooperatives	300	400	800	-	-	1,500
2. Promotion of cooperative business operation	300	700	1,500	1,500	1,500	1,500
Budget (million baht)	7.984	122.486	160.278	174.416	222.088	687.254

Source: Winai Atkonghan and Krittaya Pakanan, 1997.

Concerning the Rubber Fund Cooperatives' construction of aired and smoked rubber factories, there were 310 factories from 1993 to 1994 and 385 factories in 1995. A total of 695 factories were operational. According to the cabinet's resolution dated the 13th of May 1997, the construction of factories which have not operated yet was indefinitely delayed because of changing rubber situations. However, after 1997 more

rubber fund cooperatives were established in the northeast. In 2011 a total of 724 rubber fund cooperatives were registered.

In 2011 there were 477 rubber fund cooperatives, or 65.88% of registered cooperatives. In 2000 a total of 71,949.77 tons of rubber, or 1.60448 billion baht, was collected. The value of rubber collected and sold by rubber fund cooperatives increased annually. This was in accordance with rubber price situations. As for the profit from the operation of rubber fund cooperatives, the profit from 2000 to 2001 was positive. In 2011 the profit of the rubber fund cooperatives was the highest, at 592.52 million baht. This was in line with rubber prices at the Hat Yai central market at 124 baht per kg ((Preedee Leelasetawong, 2013: 132-133). The operating rubber fund cooperatives had a profit of 84.43%, or 60.88% of the operating cooperatives.

Currently, the market demand has changed from smoked rubber sheets to standard Thai rubber. As a result of readiness of cooperatives' processing and uncompetitive costs with the private sector, the cooperative business style has switched to collection of products for sale rather than processing. The products collected to be sold to the private sector include unsmoked rubber sheets, cup lump and field latex, which have not been processed to smoked rubber sheets. As a result, factories invested in by the government have not benefited. However, such projects have led to the gathering of rubber farmers despite changing business types in accordance with market conditions caused by economic dynamics that changed from the projects' goals, which was analyzed in the past.

4.3.3 International Rubber Consortium Limited (IRCo) was established in 2003 with the objective of raising rubber prices to the level that farmers have a profit, making the investment worthwhile and stabilizing the rubber price, as well as creating bargaining power on the global market. In addition, IRCo involves the gathering of the three major manufacturing countries: Thailand, Indonesia and Malaysia. This differs from the International Natural Rubber Agreement (INRO), whose members include both manufacturing and importing countries.

Thailand joined the IRCo membership in 2004 with an initial capital of 12 million US dollars. Member countries pay for the operation in accordance with their rubber proportion: 4:3:2, 5.33 US dollars for Thailand, 4.00 million US dollars for Indonesia and 2.67 million US dollars for Malaysia. A ratio of nine committees from the three countries is also applied.

The IRCo operation involves the analysis of rubber price situations. In case of any problem, problems will be solved by the IRCo using the three following measures:

1) Supply Management Scheme (SMS): Rubber plantation areas are promoted in order to be expanded in their own countries in line with market demand.

2) Agreed Export Tonnage Scheme (AETS) is a short-term measure not exceeding one year. The governments of the three countries shall control exports to prevent and solve rubber problems.

3) Strategic Market Operation (SMO) involves a measure adopted by the IRCo to buy rubber at the market facing problems to solve low rubber price problems.

Between 2003 and 2008, rubber prices were high. The IRCo, therefore, did not play a role in stabilizing rubber prices. Later, at the end of 2008, the US experienced an economic crisis. As a result, rubber prices were low and the IRCo adopted the AETS by reducing rubber exports from the three countries. Afterwards, in 2011, the rubber crisis occurred again. The International Tripartite Rubber Council (ITRC) resolved that each country delay tapping and selling, but continue stocking rubber.

The results of the IRCo operation revealed that the IRCo played a slight role in solving low rubber prices. In addition, the assistance to rubber farmers was not in a concrete manner. One of the reasons was because there was no Rubber Price Stabilization Fund to buy rubber and to tackle problems. Only the capital of company establishment was left.

4.3.4 Farmers' Institute Rubber Processing Support Scheme to tackle low rubber prices from 2009 to 2010 was aimed at delaying the release of rubber into the market and strengthening farmers' institutes by granting zero-interest loans to farmers' institutes,

which joined the project in order to buy 200,000 tons of field latex and unsmoked rubber sheets to be processed and stocked. The operation period lasted from the 25th of February 2009 to the 31st of December 2010.

A total of 132 farmers' institutes joined the scheme, 40 institutes were approved with loans, 32 institutes requested for loans and 23 institutes operated rubber processing in 12 provinces. The total loans amounted to 319.60 million baht, comprised of seven institutes in the south, three in the east, and one each in the central and northeast. Farmers' institutes have already returned the full amount of the loans.

The results of rubber collected by 23 farmers' institutes for processing indicate that 8,517 tons of rubber was collected. The weight of dry rubber amounted to 4.26% of the target of 200,000 tons, or 0.15% of the national rubber. The total value accounted for 758,719,630 baht, or 89.08 baht/kg, which was higher than the specified price of 80 baht.

Three types of rubber processing were adopted by farmers' institutes participating in the scheme. They are: 1) collection of rubber sheets to be sold to the Rubber Estate Organization without processing (16 institutes), 2) collection of rubber sheets to be processed (seven institutes), and both 1) and 2): one institute. Rubber was processed in three types: ribbed smoked sheet bales (5,103 tons), compound rubber (2,621 tons) and standard Thai rubber (STR 20, 352 tons). The total rubber amounted to 8,076 tons. Then, processed rubber was sold valued at 775 million baht. About 54.92% was locally sold and 45.08% was exported.

With respect to the operation types, it is evident that most of farmers' institutes collected and sold rubber to the Rubber Estate Organization without processing because they were not ready for processing technology. The market demand involved compound rubber, STR and ribbed smoked sheet bales. Farmers' institutes might not have sufficient potential. Apart from that, rubber prices during the project period increased, so rubber collection did not meet the specified target.

4.3.5 Farmers' Institute Potential Development Scheme to Stabilize Rubber Prices

Due to low rubber price situations since mid-2011, the government issued a policy to tackle rubber price problems through the Rubber Price Stabilization Scheme by delaying the sale of rubber to the market during a price fluctuation period. The guideline from the Farmers' Institute Potential Development Scheme was to support the loans for farmers' institutes so that they could buy field latex, unsmoked rubber sheets or ribbed smoked bales to be processed or sold to the Rubber Estate Organization. Rubber was processed into concentrated latex, ribbed smoked sheet bales and STR. By this, farmers' institutes could store rubber and sell it at the end of the project or when prices were suitable (State Audit Office of the Kingdom of Thailand, 2015).

Zero-interest loans funded by the government were divided into two parts: five billion baht for farmers' institutes participating in the project to serve as a revolving fund for buying field latex, unsmoked sheets, cup lump and scraps to be processed and sold to the Rubber Estate Organization, and loans of 10 billion baht to the Rubber Estate Organization. This amount was to buy rubber from farmers' institutes. A total of 42 locations were opened for buying rubber: seven locations in the south, one in the east and three in the northeast. A budget of 162.490 billion baht was spent by the Rubber Estate Organization to manage the Farmers' Institute Potential Development Project to stabilize rubber prices.

A total of 1,441 farmers' institutes joined the project. Since the criteria for project participation were changed from juristic persons at the beginning to juristic persons and non-juristic persons, the number of farmers' institutes duly increased and the amount of bought rubber rose to 194,000 tons, while warehouses could accommodate only 80,000 tons (State Audit Office of the Kingdom of Thailand, 2015).

As for the project operation in accordance with the major objectives, rubber prices should be increased to 120 baht/kg. The development of farmers' institutes potential revealed that upon the projects' completion, rubber prices could not be led to meet the target. The government made an announcement to buy unsmoked rubber sheets, Grade 3,

at 92 baht/kg (Preedee Leelasettawong, 2013, pp. 152) and cup lump at 83 baht/kg. The results showed that the average price of unsmoked rubber sheets, Grade 3, received by farmers in 2012 and 2013 was 81.15 and 74.75 baht/kg, respectively. The decreasing price led to the demonstration of rubber farmers and road obstruction at Khuan Nong Hong Junction in Cha-uat District, Nakhon Si Thammarat Province to request the government to tackle the rubber price problem.

The farmers' potential development was aimed at letting farmers process rubber for stock and sale when prices were higher. The sampling project assessment by the State Audit Office of the Kingdom of Thailand revealed that only 159 farmers' institutes out of 214 institutes involved processing. From 1994 to 1995, farmers' institutes supported factories to deal with processing, not because of policies. Not only was the potential of farmers' institutes not consistent with the target, but also the decreasing prices did not result in farmers processing and stocking. However, only field latex, concentrated latex and cup lump were immediately collected and sold to the Rubber Estate Organization under the projects' operations.

4.2.6 The Buffer Product Project to Stabilize Rubber Prices involved a state operation to solve low rubber price problems in 2014. The Rubber Estate Organization borrowed loans of 6 billion baht from the Bank for Agriculture and Agricultural Cooperatives to buy rubber at a guiding price of 60 baht/kg (ribbed smoked rubber sheets, Grade 3) for six months. The government allocated a loan of 20 billion baht for the buffer fund.

Rubber was bought by the Rubber Estate Organization to be sold abroad without being stocked like in the past. The results of the operation in June 2015 indicated that the overall auctioned rubber of 148,402.24 tons was valued at 8.5533 billion baht. Additionally, rubber prices successfully rose to 60 baht/kg, as targeted ("Eradicating Weak Points of Thai Rubber Strategies," 2015).

4.2.7 Farmers' Institute Credit Support Project to Process Rubber aimed to have capital of 5 billion baht for collecting rubber: 3.5 billion baht as credit for investment and 1.5 billion baht as credit for a revolving fund.

In June 2015 there were 31 participants who requested for 173 million baht of credits for investment and 21 participants for 143 million baht of credits for the revolving fund.

4.2.8 Rubber Utilization Promotion Project through government agencies involved the purchase of 100,000 tons of rubber from small-scale farmers. One farmer was eligible to buy 150 kg. Unsmoked rubber sheets, Grade 3, were bought at a price not exceeding 45 baht/kg, latex at 42 baht/kg and cup lump at 41 baht/kg. One farmer could buy no more than 15 rai and 10 kg per rai, or not exceeding 1,500 kg in total.

On the 25th of January 2016, 621 rubber buying locations across the country were opened with the target of 834 locations between the 25th of January and the 30th of June 2016.

The overall Thai Rubber Price Stabilization Policy was initiated to let the Rubber Estate Organization buy rubber to mitigate farmers' impacts caused by fixing the target price and buying price to guide the market. Loans were used to buy, stock and sell rubber. The policy faced a loss from both the operation and interest because rubber could not be sold at a higher price than the buying price, including stocking expenses. In addition, market prices could not meet the target. One reason was because the amount of rubber bought was low compared to the proportion of national rubber productivity.

The development from the government's buying and stocking to support farmers' institutes to buy, process and stock rubber was aimed at reducing the rubber amount in the market. However, the operation did not achieve the goal due to the government's management problems during the implementation process and rubber stock release. In particular, the failure might be caused by the potential of farmers' institutes in terms of processing and marketing.

The Rubber Fund was applied to serve as a tool for stabilizing rubber prices to buy rubber when the price was low. The fund shall manage rubber bought by making an actual

sale contract rather than processing and stocking, which was the government's cost. However, the stock management still led to a project loss.

Lastly, the government focused on small-scale farmers and switched to directly buying rubber from small-scale farmers to tackle the farmers' income problems due to low prices of product. However, the proportion of buying was low compared to the total amount of rubber.

In brief, the Thai Rubber Price Stabilization Policy was adopted to solve low rubber price problems. Short-term measures to urgently mitigate problems included the purchase of rubber at a target price to lead the market. They were used to be a political tool to lessen the conflict between farmers and the government. Long-term measures were aimed at increasing the quality and value of products, as well as increasing rubber demand. They are measures that have been continuously implemented, but they may be less prioritized than measures that yield faster results in mitigating the problem.

CHAPTER 5

RESULTS OF THE STUDY

The analysis of rubber price stabilization policies is aimed at studying the policy process, policy development, the efficiency of economic systems, and factors affecting policy formulation, as well as suggesting policy options affecting economic systems. The results of the study are ranked, as follows:

- 5.1 The process of Thai rubber price stabilization policies
- 5.2 Thai rubber price policy efficiency affecting Thai economic systems
- 5.3 Options for Thai para rubber policies affecting economic systems

5.1 Process of Thai Rubber Price Policy

The analysis of Thai rubber price stabilization policies involves the study of the public policy process, starting from the beginning, to the completion of policy implementation. The policy process has been categorized into three parts in accordance with Thai rubber price stabilization policies, namely: policy formulation, policy implementation and policy evaluation.

5.1.1 Rubber Price Policy Formulation

The analysis of policy formulation pertains to the identification of policy problems and options to solve policy problems, as well as the decisions involving options for policy application. The components are detailed, as follows:

5.1.1.1 Identification of policy problems relates to an analysis of the problem background, which leads to the identification of options that are suitable and practical for problems, and decision-making with suitable options. The identification of Thai rubber price stabilization problems involves the analysis of the policy problem identification process on the four following issues:

1) Identification of policy problems involves public problems, which are the background of the formulation of rubber price stabilization policies. This can lead to options that are suitable for addressing the problems. Public problems of rubber price stabilization policies start from individual problems, when rubber farmers earn less income due to low rubber prices. Rubber farmers across the country have been affected, resulting in public problems. Therefore, public problems, which are the source of the policy process, are low rubber prices affecting rubber farmers' incomes.

2) Importance of policy problems: In terms of the dimension of people involved in these problems, Thailand's low rubber price problems are mass problems related to rubber farmers throughout the country. Such people have to experience insufficient income to meet their costs. As a result, a stress situation occurs. This pressures relevant public agencies to solve the problems urgently. If these problems are unsolved and don't satisfy the masses, there will be protests to block the roads, as occurred from 2012 to 2013. Such problems had a direct impact, which then became a problem for the elites, e.g., politicians who have farmers as their bastion of eligible voters. If the problems are left unsolved over time, they can affect the votes of politicians in those areas. Politicians, therefore, have to immediately solve these problems, especially short-term problems concerning an increase in farmers' income affected by low rubber prices, this might include directly buying rubber from farmers, supporting a budget for farmers' institutes in order to buy rubber to be processed, or paying compensation to farmers.

Thus, low rubber price problems are important to rubber farmer masses, affecting votes, which become elite or politician problems. Rubber price stabilization policies are, therefore, necessary in order to solve these problems.

3) Complexity of policy problems: Low rubber price problems do not concern economic dimensions only, they also carry social, environmental and political dimensions because low rubber price problems are partly the result of external factors, whereby Thailand is a price taker. Although Thailand is a large exporter to the rest of the world, it cannot fix buying and selling rubber prices. As a result, Thailand has to face risks due to rubber price fluctuations in the global market, which relies on economic conditions and the demand in rubber user countries.

When rubber prices are low and affect the farmers' incomes, this puts stress on all agencies concerned. Elite groups have to provide a quick fix to these problems in order to maintain the bastion of constituents in their areas. This leads to short-term policies, which means only facing the problems by buying rubber at a price required by farmers or leading prices, which leads to a sufficient income for the farmers in order to cover their production costs. Short-term policies are, therefore, formulated to solve that problem. This has an effect on the efficiency of policies in terms of budget loss and social welfare.

In addition to the implementation of price intervention policies during low rubber prices, and the promotion of rubber planting during high rubber prices, there is a motivation for expanding plantation areas in order to increase income during high rubber prices. Compared to other crops, during low rubber prices, the government usually has a policy to help them. This affects the supply of rubber. Additionally, forest areas are encroached on to plant rubber in some areas. It should be noted that rubber price stabilization policy problems are complex and have economic, social, political and environmental impacts.

4) Novelty of problems: Low rubber prices have taken place often since 1967 and continued ever since. These problems are not new or unheard of. New problems can be difficult to identify options or mitigation measures for. It also takes a long time to implement policies to mitigate the problems. Therefore, the problems caused by rubber price problems are not new but usually happen during the promotional period of Thai rubber activities, and policy implementation should deal with it as a continuous and efficient problem-solving effort to avoid repeated problems, which may be because of the efficiency of policies selected to be implemented in short- or long-term periods that contradict each other. For example, during low rubber prices, urgent policies include the purchase of rubber in order to upgrade farmers' incomes or reduce the plantation area. At the same time, long-term policies promote the planting of good varieties or augment plantation areas to increase the rubber supply so that excess supply occurs when the global demand for rubber decreases or is lower than the rubber supply. Policy problems occur in ongoing cycles that the government has solved by continuously using the same method, which is not sustainable.

5.1.1.2 Determination of policy options: A practical possibility that enables the solution to be successful is a key factor for determining policy options, which must take into consideration the forecast of results to arise. The analysis of policy option determination is based on the four following parts:

1) Characteristics of policy options: Policy options should consist of two characteristics: creativity that brings something new into being, and innovation that brings something new into use. The government's solution to low rubber prices by buying it at a higher price than the market is aimed at leading the market price and helping farmers who are facing decreasing income from their rubber sales. This problem often occurs with the same characteristics, just like in the past. The determination of policy options was based on creativity and innovation after implementation for a while, by changing from direct purchase by the Rubber Estate Organization to be processed, stocked and sold when prices were higher, in order to support a budget for farmers' institutes, which collected rubber from the farmers to be processed, stocked and sold. This, however, encountered an insufficient storage area leading to the financing of a budget for the farmers' institutes to collect more rubber from farmers to be processed, stocked and sold. It was developed with the establishment of a buffer product fund in order to buy rubber at a low price and sell it when its price rose. In 2015 the promotion of increasing rubber plantation area stopped and rubber plantation area was reduced to decrease the excess supply of Thai rubber. It should be noted that the rubber price stabilization policy is creative in terms of adjusting policy options and solving problems in line with changing situations and the results of previous policies.

2) Option seeking: The Ministry of Agriculture and Cooperatives is directly responsible for Thai agricultural business and is an agency that must recognize problems and consider policy options in order to solve rubber's low prices. Policy options are sought based on two aspects (Sombat Thamrongthanyawong, 2000, p. 362):

(1) To consider whether to take action or not, this involves the selection of doing nothing but letting situations occur naturally without any intervention. However, this is if it has been forecast that time will fix the problem. Otherwise, it will intervene to solve the problem. The low rubber price is mainly

caused by external factors and market mechanisms, which is the first alternative chosen by the government. If it is not adjusted to benefit rubber farmers during the period that farmers can bear the burden, when the income is lower than the expenditure, this will dissatisfy farmers and put pressure on the area. Thus, the government deems it necessary to implement an action when prices are continuously low prior to the farmers' protests. However, price period is a key factor for considering options. During higher prices, the government promotes production by supporting good varieties to replace local species and by promoting the planting of rubber in new areas. Despite low prices, the government still promotes rubber production and purchases it at the same time in order to mitigate low prices. For policy options in both short-term and long-term periods, rubber planting is still promoted.

(2) To consider suitable options: Good policy options should be creative and practical. Policy series should be possible or practical and creative in solving problems that used to occur, by using new methods. The selection of policy options should be based on options that can solve short-term problems in order to reduce the pressure caused by farmers' problems. When rubber prices are low, farmers' incomes have been insufficient to meet their expenses for consecutive periods of time. The selection of doing nothing cannot reduce that pressure. Therefore, practical policies rely on the mitigation of short-term problems by buying rubber from farmers using many methods. This has been developed starting at the time of the government's purchase, processing, stocking and selling, and ranging to the support of budgets for farmers' institutes to collect rubber from small-scale farmers to be processed, stocked and sold, also the support of a budget for business operators to buy local rubber, as well as the support of public agencies to use rubber. All of these policies can reduce the excess supply in the market, which is part of the reason for farmers' insufficient income.

3) Policy screening involves the scrutinizing of alternatives to ensure they are possible, practical, suitable for necessary resources that will be used, and consistent with social values. In addition, they should bring about benefits to all people concerned and be able to meet the demands of the target people. Unsuitable options should be deleted. To solve low rubber prices, many options have been

proposed by the agencies concerned and by academic departments. They include the decrease of plantation areas, increasing the quality of rubber to compete with the quality of competitor countries, rubber processing to add value, and support of domestic rubber use. Those options were suggested by relevant sectors. However, the government has focused on policies with results in the short term because that can mitigate the problem of political pressure. Options that cannot meet the rubber farmers' price demands in the short-term during a low-price period will be cut. However, necessary resources used, such as budget, personnel and facilities, are still a factor prioritized by the government during policy screening. For example, insufficient warehouses lead to the rent of private warehouses. This is a waste of budget. This implies that resources are insufficient concerning the policy options of purchasing rubber to be stocked and sold.

4) Examination of policy options deal with verification of the economic, social, political and environmental possibilities of policy options based on direct and indirect costs and benefits, including to whom in society (who pays the costs and who receives the benefits). However, policy examination has its limitations; in particular, examination time, since the problem of low rubber prices occurs suddenly and needs to be solved rapidly. Thus, policy examination is not concretely operated for and publicized to the people who will benefit from the Rubber Purchase Project in order to solve low prices from previous periods. There are also factors related to the pressure of farmers who suffer and need an urgent solution. This contributes time to being a major limitation of policy examination.

5.1.1.3 Policy option decision-making: As for the solution to low rubber prices since 1989, the government has selected an alternative that solves short-term problems, so that suffering farmers can sell rubber at a higher price than the market when market prices are lower than the cost or farmers' expectations. Rubber was purchased from farmers in various forms in order to be processed, stocked and sold. Due to the government's limited budget and resources, e.g., the number, knowledge and ability of personnel in marketing and rubber warehouses, only some farmers benefited from the previous policies despite disagreement or the assessment report of external agencies on the policy implementation performance that the government's purchase policy was not cost-effective and could not solve the problem

in the long term. The decision-making in the rubber price stabilization policy in the form of rubber purchase to mitigate short-term problems can be analyzed using the policy decision-making theory, as follows:

1) Representative Democracy Theory: This rubber price stabilization policy was formulated to solve the problem of rubber farmers who were a major customer of politicians holding positions at that time. It was necessary to satisfy the people's demands. The objectives of politicians were to maintain their popularity and receive the maximum votes in the next election. Therefore, politicians, whether holding any position at the Ministry of Agriculture and Cooperatives or not, would play their roles in driving the policy and rapidly solving problems in a short time.

2) Vote-Maximizing Theory: This price intervention policy is a phenomenon under the concept of seeking maximum votes because it is an easy project to operate, its uncomplicated and yields obvious results. Although social welfare has changed, the government can bring about definite benefits to farmers. This is a factor of farmers deciding to cast a vote to those politicians who provide them certain benefits in the next election. Although the Price Intervention Project changes social welfare, which will be presented and analyzed in the next topic, the concept of seeking the maximum profits becomes the easiest approach for farmers who are politicians' constituents. Thus, the solution to low rubber prices involves price intervention in a short-term period rather than a price stabilization policy in a long-term period.

3) Rationale Model: The rubber price stabilization policy in the form of market intervention does not follow the rationale model to make a decision in policies. In particular, it is a policy aimed at providing maximum benefits to society, namely (1) no policy that has costs higher than benefits and (2) the policy selected should provide maximum benefit costs among all the policy options. However, policy examination does not take benefits and costs arising from policy implementation into consideration, especially the costs for buying, processing and stocking. As a result, a continuous loss occurs. However, it is a quick fix that can only solve some problems for some rubber farmers who have access to the project, so that they receive income

as desired, but the results arising for the government budget, consumers, rubber farmers in the long term, and society are not considered.

4) Incremental Model: This market intervention policy to stabilize rubber prices has been continuously active since the past, and has been partly improved. An analysis of the three models indicates that (1) the policy results are satisfactory among policy makers and relevant people and slight changes of policies are sufficient to be accepted by people, (2) with this price intervention policy it is not necessary to be operated continuously, but may be in accordance with problems that should be solved rapidly in order to meet the demand of suffering farmers before it turns into political tension. In terms of a continuous dimension, it is consistent with (3) the policy characteristic, which must be continuous in order to deal with the existing problems. The price intervention should not be continuously implemented, but the long-term solution should be emphasized more.

However, the price stabilization policy in the form of market intervention through purchasing, processing, stocking and selling during high prices is still used despite the objection of agencies and scholars to its cost-effectiveness and ability of problem-solving. Each policy operation has changed from the previous one in terms of its operational model, namely (1) increasing the agencies concerned to add resources used for policy implementation, including corruption prevention pertaining to policy implementation, e.g., increasing farmers' institutes and processing plants for purchasing, processing, stocking and selling, increasing relevant public agencies, and (2) adapting policies to sell stocked rubber and find markets when prices rise. A contract should be made with local and international traders to lessen risks relating to the selling of stocked rubber. As some changes are caused by policy implementation in the form of continuous market intervention over a long time, it is improved and enables the operation to be more successful.

With reference to the analysis of policy formulation, it is obvious that the price of rubber is a problem mainly caused by external factors. It affects rubber farmers because their income is not sufficient to meet their expenses. This problem is an important and massive problem and links to elites who are members of the House of Representatives in the area. This problem has to be emphasized, and although it is not a new problem it often takes place when the global

economy changes. The government has settled on an alternative that solves short-term problems in order to mitigate troubles and political pressure arising from rubber farmers who wish that their income would meet their expenses. As a result, the screening and examination of options do not stress the costs and benefits. The decision-making of a price stabilization policy in the form of market intervention follows the concept of seeking maximum votes and the Representative Democracy Theory, whereby policies must be pushed to directly benefit a target population. They must also be easy to understand and must be continuously carried out by changing some policies in accordance with changing conditions. Although they do not follow the rationale model and change social welfare, the price stabilization policy in the form of market intervention has still been used since 1989.

5.1.2 Policy Implementation

The main principle of a policy implementation is that it is easy to conduct, control, monitor, evaluate and use the evaluation's results to improve it. When considering the success of the policy in terms of solutions to farmers' incomes and price stabilization, it was found that external factors have a higher effect on domestic rubber price levels than the government's policy implementation. This has a direct effect on the rubber farmers' income. However, the government's project implementation does have some effect on farmers because it is a specific intervention, not a comprehensive price guarantee that is beneficial to all farmers. In addition, project corruption concerning the rubber price stabilization policy has been continuously mentioned. However, it cannot be proven in written or legal judgments that corruption actually takes place during the process. Following the analysis of policy implementation, the factors affecting the success of rubber price stabilization policy implementation are summarized in the five following topics:

- 1) Correctness of policy decision-making: Rubber prices in Thailand depend on the supply and demand of global markets. This was agreed on by people involved in all policies. Thus, the solution to local rubber price problems through price intervention may not be a suitable problem-solving solution. As a result, the price intervention policy may not be implemented in accordance with the expected goals if the price factor on the global market does not change. In particular, the

farmers' rubber purchase policy pertaining to the surplus supply, the target population, who can participate in the Public Sector's Rubber Purchase Project, must be identified. As the rubber supply is higher than the policy's ability to buy it, it is difficult to operate the policy.

2) Competency of responsible organizations: Many organizations have been involved in the implementation of the rubber price stabilization policy in the previous 20 years. The number of organizations has changed, increased and decreased in each period in accordance with the policy and administration. The main agencies that are responsible for managing the trading, processing, stocking and selling of rubber, including the Rubber Estate Organization and the Office of the Rubber Replanting Aid Fund, do not have major missions or expertise in commercial management and ability to trade rubber. As a result, the Rubber Price Intervention Scheme faced a loss from the operation and sale of rubber, which was bought at a high price in order to solve farmers' low rubber prices.

3) Resources used for policy implementation: Based on the evaluation of the Price Intervention Scheme, rubber had to be bought from plantation areas distributed in various regions. It was found that there were not enough personnel to buy rubber distributed in all areas where problems arose. Buying locations were not sufficient to suit the farmers' rubber amounts. In addition, warehouses were not sufficient and did not meet standards. The insufficiency of resources led to construction of rubber smoking plants, as well as the support of farmers to buy and process rubber from small-scale farmers to solve this problem. However, due to the problem's size and the large number of people involved, the public sector has insufficient and unsuitable resources for the Price Intervention Scheme.

4) Process of policy implementation: As the implementation of the price stabilization policy involves a large number of public agencies, there are different practices from many agencies. It is, therefore, difficult for operators to manage it. In addition, work methods are unclear and require staff judgement concerning determination of the target population to receive services, standard determination of rubber to be bought, as well as project success evaluation criteria. Such unclarity has led to corruption.

5) Organizations concerned: Concerning the operation of the Price Stabilization Scheme, there are three groups of stakeholders, namely producers, consumers and policy implementation agencies. Producers include farmers and farmers' institutes. Consumers include business operators who buy rubber. Policy implementation agencies include the Rubber Estate Organization and the Office of the Rubber Replanting Aid Fund. Knowledge and understanding of policy goals and potential in accordance with relevant organizational policies are significant factors affecting policy implementation. It is evident that the rubber price stabilization policy involves a large number of producers in terms of rubber farmers and farmers' institutes, whose rubber production and processing activities are affected and wish to benefit from the policy. However, the policy implementation agencies are insufficient and their competency may not be consistent with policy implementation. Additionally, consumers consist of both small and large-scale business operators pertaining to rubber purchases, including middlemen, producers and processors at local, provincial and regional levels. It is necessary to create a clear understanding and communication about goals, regulations and practices of policies in order to efficiently implement policies.

In summary, factors leading to the success of policy implementation include easy implementation, and the monitoring and control of policies, which are caused by correctness of policy decisions, competency of responsible agencies, resources used for the implementation of policies, operational processes and organizations relating to policies, which must be suitable and have potential in line with the goals of rubber price stabilization in each policy model and each period of time, e.g., direct purchase from farmers in order to support prices, purchases via farmers' institutes, income compensation, as well as rubber utilization promotion in the public sector. Success factors for policy implementation are, therefore, dynamic factors for relevant people, who have to adapt to suit changes and policy goals, which finally results in success according to the policy's intention.

5.1.3 Policy Evaluation

By virtue of law, all public expenses for policy implementation require evaluation and reporting to the public. The evaluation data must also be accessible.

However, there is no concrete evaluation on rubber policy for some projects, but only the comments of relevant people who predicted the project's failure and corruption, etc. The projects with evaluations, including the Six-phase Rubber Price Intervention Scheme and the Farmers' Potential Development Project, were presented in Chapter 4.

With respect to evaluation by relevant sectors, the causes of rubber price problems include fluctuating rubber prices, low rubber prices while incurring higher production costs and living costs, small-scale farmers who are taken advantage of, and the expansion of rubber plantation area. As a result, the output yield is higher than the demand. The problem's identification has led to the formulation of rubber price stabilization policies, such as the Thai Rubber Market Intervention Project from 1992 to 2002, the Farmers' Institute Support Scheme in Rubber Processing to solve low rubber prices, and the Public Sector's Rubber Utilization Promotion Project.

Based on output from the rubber price stabilization policy, there are three policy impacts: on rubber farmers, on rubber prices and on rubber quantity bought by the project. Most agencies and academics agree that rubber farmers and project rubber quantity accounts for only 10-20%. This does not affect rubber prices beyond the project. This can only mitigate the problems of farmers who access project information and benefits. The results of policies include higher farmers' incomes during low rubber prices, while institutes supported by policies are strengthened and have potential in business operations. Policy evaluation indicated that some farmers received higher income from selling rubber to the project compared to the market price, while some farmers' institutes that were supported did not have adequate potential for purchasing, processing and selling rubber during low prices. Finally, they experienced loss and stopped their operation.

The impacts from the Rubber Price Stabilization Scheme can be summarized in four issues, namely 1) impacts on policy problems, which do not affect low rubber prices because they do not increase rubber market prices. Only some farmers' problems have been solved because of low rubber prices, 2) unexpected impacts; during low rubber prices, there are rubber purchase or market intervention policies, as a result, producers have an idea to produce rubber to meet the market or market competition because problems are usually solved by the government. In addition,

thanks to the good variety of rubber promotion policy, farmers still want to plant more rubber. This may promote the encroachment of forest areas for rubber plantations or plantations in inappropriate areas, 3) impacts on current and future conditions: the market is intervened on through rubber purchases or price compensation. This may lead to familiarity, and as a result, farmers do not adapt themselves to competitive markets, and 4) policy costs in terms of public budget, the consumer's burden and social welfare is lost due to policy implementation.

Previous studies revealed that the evaluation of the rubber price stabilization policy was not complete. Additionally, information on performance was not disclosed from the relevant agencies. Thus, the evaluation results followed only the available information and suggestions were made according to the situations that the evaluators found. However, there are consistent recommendations for the rubber price stabilization policy. For example, the price intervention policy is a model that generates a lot of project costs caused by product stocking and rubber selling. Since state agencies responsible for buying rubber at a cheap price and selling it at an expensive price do not have potential for such operations, the rubber supply should be controlled by controlling plantation areas. Policy evaluation should be conducted completely in terms of financial, economic, social and environmental dimensions. In addition, the evaluation results should be considered for canceling, improving or continuing the project.

5.2 Rubber Price Policy Efficiency in the Thai Economic System

The measurement of social welfare using price intervention involves a measure implemented by the government during the low rubber price period. Rubber was bought at the target price, which was higher than the market price so as to lead the market price in accordance with the target price. Social welfare can be analyzed by the operation of policies based on the measurement of changing producer surplus and consumer surplus compared to the budget used for the operation and income from the policy implementation. The following calculation steps are as follows:

5.2.1 Creation of the Rubber Demand and Supply Models: Rubber demand and supply are required for calculating social welfare. Thus, the Thai rubber demand and supply models are created using the Seemingly Unrelated Regression (SUR) method to consider social welfare in the rubber market. Secondary information from 1987 to 2016 was used to create the Thai rubber demand and supply equations. Thai rubber demand consists of the demand of local rubber use and the demand of rubber exports.

Based on the literature review pertaining to factors affecting rubber demand and supply, there are relevant factors and variables that are used to test the relationship, as shown in Table 5.1.

Table 5.1 Dependent and Independent Variables Testing the Relationship of Thai Rubber Demand and Supply

Dependent Variables	Independent Variables
1. Thai Rubber Supply	
Quantity of rubber yields in Thailand (thousand tons)	1) Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) Plantation area (hectares) 3) Harvest area (hectares) 4) Palm oil prices sold by farmers (baht per kg) 5) Rubber price stabilization policies
2. Thai Rubber Demand	
2.1 Demand of Local Rubber	
Quantity of unsmoked rubber sheets, Grade 3, used locally (thousand tons)	1) Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) Car production quantity in Thailand (thousand) 3) Number of Thai population (thousand) 4) Gross domestic products in Thailand (billion US dollars) 5) Rubber price stabilization policies

Table 5.1 (Continued)

Dependent Variables	Independent Variables
2.2 Demand of Exported Rubber	
Quantity of exported unsmoked rubber sheets, Grade 3 (thousand tons)	1) Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) F.O.B prices of unsmoked rubber sheets, Grade 3 (baht per ton) 3) Global synthetic rubber production (thousand tons) 4) Global synthetic rubber used (thousand tons) 5) Global synthetic rubber stocked (thousand tons) 6) Global natural rubber used (thousand tons) 7) Synthetic rubber price in the London Market (US dollars per ton) 8) Gross domestic products in China, United States, Japan and India (billion dollars) Rubber price stabilization policies

Factors affecting demand and supply were analyzed based on the estimate of model coefficient using the Seemingly Unrelated Regression (SUR) method. The factors affecting rubber demand and supply are shown in Table 5.2.

Table 5.2 Factors Affecting Thai Rubber Demand and Supply

Dependent Variables	Independent Variables
1. Thai Rubber Supply	
Qs: Quantity of rubber yields in Thailand (thousand tons)	1) PP: Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) AH: Plantation area (hectares) 3) YIELD: Harvest area (hectares)
2. Thai Rubber Demand:	$QD = QD_{th} + QD_{ex}$
QD	
2.1 Local Rubber Demand	
QD _{th} : Quantity of local rubber used (thousand tons)	1) PP: Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) POPTHAI: Number of Thai population (thousand) 3) THA: Gross domestic product in Thailand (billion US dollars)
2.2 Exported Rubber Demand	
QD _{ex} : Quantity of exported unsmoked rubber sheets, Grade 3 (thousand tons)	1) PP: Unsmoked rubber sheets, Grade 3, sold by farmers (baht per kg) 2) QW: Quantity of global natural rubber used (thousand tons)

Following the estimate of coefficient of factors affecting the demand and supply, the equation of the demand and supply is as follows:

$$\begin{aligned} \ln Q_s &= -16.1183 + 0.0000135 \ln PP + 0.99999^{***} \ln AH + 1.00002^{***} \ln YIELD \\ &\quad (0.000306) \quad (9.90E-06) \quad (1.83E-05) \quad (2.10E-05) \\ \ln QD_{th} &= -87.9595 - 0.09689^{***} \ln PP + 8.38446^{***} \ln POPTHAI + 0.2223^{***} \ln THA + 0.25754 \\ &\quad AR1 \\ &\quad (3.557181) \quad (3.557181) \quad (0.337463) \quad (0.044051) \\ \ln QD_{ex} &= -4.8998 - 0.28105^{***} \ln PP + 1.49614^{***} \ln QW + 0.5665 AR1 \\ &\quad (1.700423) \quad (0.093277) \quad (0.216908) \end{aligned}$$

The figures in parenthesis mean standard errors.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.2.2 Social Welfare Measurement

The implementation of policies is aimed at contributing to better changes to society comprising producers, consumers and the public sector in accordance with the concept of social welfare using the public budget as a policy cost. The efficiency of policies can measure social welfare to assess the efficiency arising from the spending of the public budget.

The study of rubber price stabilization policies is based on the concept of social welfare measurement arising from producer surplus, consumer surplus, the public income and the public expenditure. The calculation of producer surplus and consumer surplus varies according to the models of project operation. The results of social welfare caused by the implementation of policies during different periods are as follows:

5.2.2.1 Thai Rubber Market Intervention Project from 1992 to 2002

Social welfare of the Thai Rubber Market Intervention Project was measured by estimating annual social welfare values using the price-level information before intervention (P_1) and the intervened price (P_2). In addition, the average annual market price (P_3) was compared to consider whether the intervention could make the market price higher than the intervened price or not.

The results of the study indicate that Thai rubber market intervention in the past ten years of project operation had the following results due to price and market policies:

1) The market price is higher than the intervened price. ($P_3 > P_2$) in 1994, 1995, 1996, 2000 and 2012. After rubber had been purchased at the target price, the market price eventually increased higher than the intervened price. The results of the policies are shown in Figure 5.1.

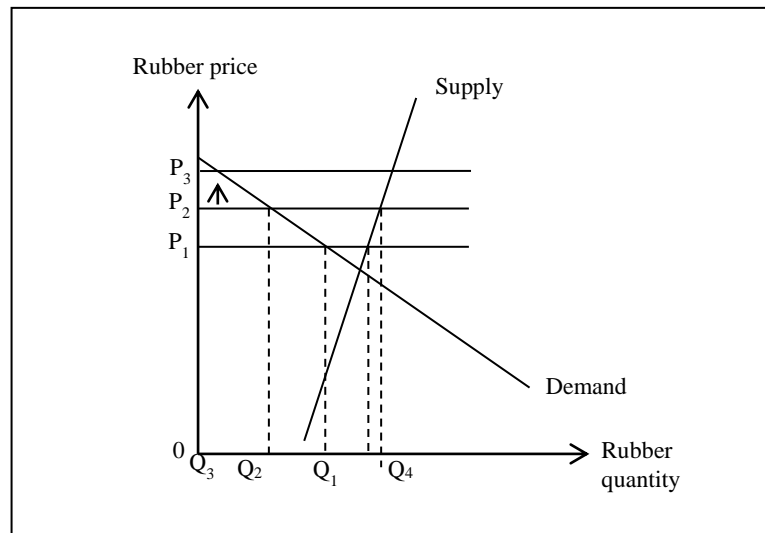


Figure 5.1 The market price is higher than the intervened price ($P_3 > P_2$)

2) The market price is lower than the intervened price ($P_3 < P_2$) in 1993, 1997, 1998, 1999 and 2001. After rubber had been purchased at the target price, the market price did not eventually increase higher than the intervened or target price. The results of the policies are shown in Figure 5.2.

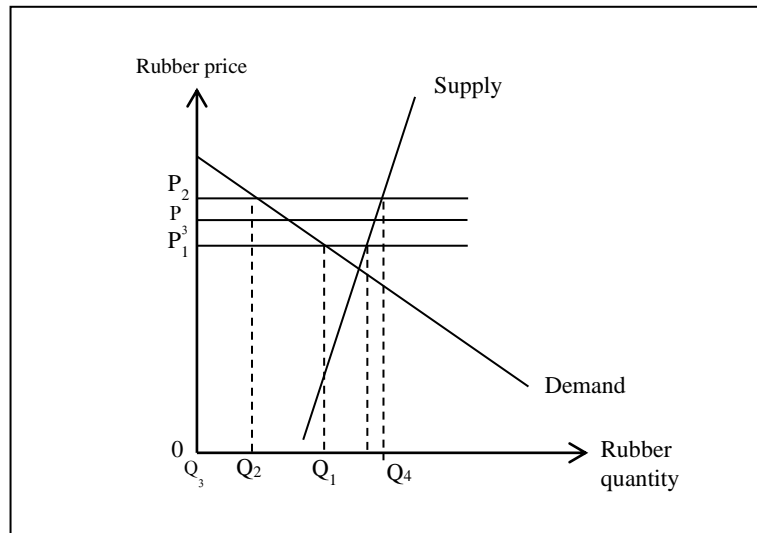


Figure 5.2 The market price is lower than the intervened price ($P_3 < P_2$).

3) The market price is equal to the intervened price ($P_3 = P_2$) in 1992, during which the intervention policy started. After rubber had been purchased at the target price, the market price eventually increased to be the same as that of the project intervened price. However, the average price received by farmers was below the balanced price caused by the estimate of demand and supply curves. The results of the policies are shown in Figure 5.3.

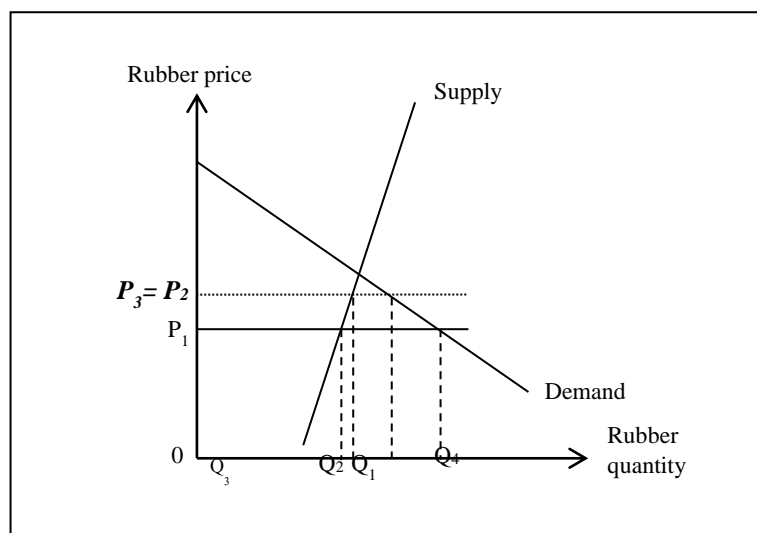


Figure 5.3 The market price is equal to the intervened price ($P_3 = P_2$)

The calculation of social welfare is based on the areas below the graph of demand curve of consumers, who bought rubber and the supply curve of producers or farmers.

$$\text{Consumer surplus} = [(P_1 - P_2) \times Q_2] + 1/2[(P_1 - P_2) \times (Q_1 - Q_2)]$$

$$\text{Producer surplus} = [(P_2 - P_1) \times Q_3] + 1/2[(P_2 - P_1) \times (Q_4 - Q_3)]$$

$$\text{Public expenditure} = \text{budget for operation excluding loans for the operation}$$

$$\text{Public income} = \text{profits or loss from the operation}$$

The measurement of social welfare from the Rubber Market Intervention Project revealed that the total social welfare amounted to -19,332,064,846.29 baht resulting from the decreasing consumer surplus caused by the rubber purchase at higher prices (-65,849,090,400.97 baht), the higher producer surplus (62,326,525,554.68 baht) and the project loss (15,809,500,000.00 baht).

5.2.2.2 Farmers' Institute Support Scheme in Rubber Processing to Add Value and to Solve Low Rubber Prices from 2009 to 2010

The project lasted for two years. The objective was to delay the release of product onto the market. Credits were offered as a revolving fund to buy rubber from members so that rubber could be processed to be stocked and wait for an appropriate time for sale in order to provide profits to farmers' institutes.

Social welfare is based on the average rubber price (59.46 baht per kg) before the project started in 2009. After the project's operation in 2010, which was the project completion year, the average price of unsmoked rubber sheets, Grade 3, was 82.88 baht per kg, which was higher than the project target price (80 baht per kg). Thus, social welfare arising from increasing prices was partly caused by the policy's implementation. However, the rubber price increased in mid-2010, as a result, farmers' institutes could buy less rubber than the project target. At the same time, rubber prices increased as a result of external factors. The Farmers' Institute Support Scheme is illustrated in Figure 5.4.

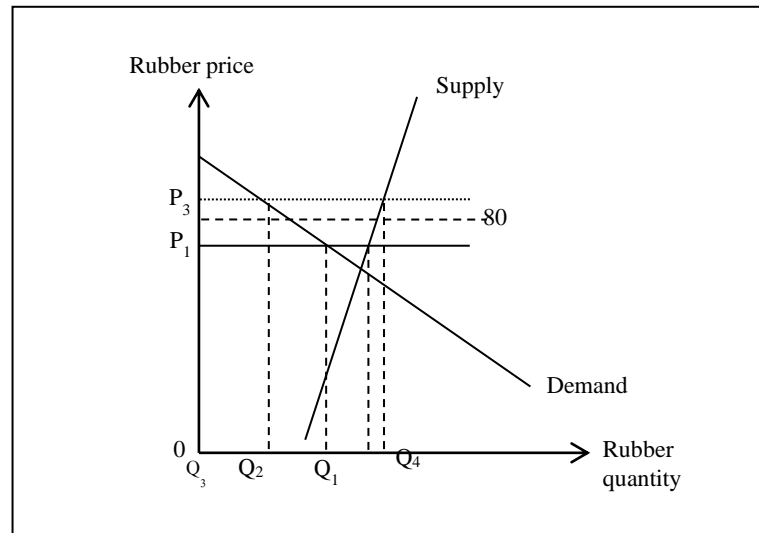


Figure 5.4 The Farmers' Institute Support Scheme Contributing to Higher Market Price than the Target Price ($P_3 > 80$)

The calculation of social welfare is based on the areas below the graph of demand curve of consumers, who bought rubber and the supply curve of producers or farmers.

$$\text{Consumer surplus} = [(P_1 - P_3) \times Q_2] + 1/2[(P_1 - P_3) \times (Q_1 - Q_2)]$$

$$\text{Producer surplus} = [(P_3 - P_1) \times Q_4] + 1/2[(P_3 - P_1) \times (Q_4 - Q_3)]$$

$$\text{Public expenditure} = \text{budget for operation excluding loans for the operation}$$

$$\text{Public income} = \text{profits from the rubber sale}$$

The measurement of social welfare from the Farmers' Institute Support Scheme revealed that the total social welfare amounted to 4,136,485,791.53 baht resulting from the decreasing consumer surplus caused by the rubber purchase at higher prices (-61,337,632,612.26 baht), the higher producer surplus (62,326,525,554.68 baht) and the project rubber sale (17,000,000 baht).

5.2.2.3 Farmers' Institute Potential Development Scheme to Stabilize Rubber Prices in 2012

The guidelines for project operation include the funding of loans to farmers' institutes to buy field latex, unsmoked rubber sheets or cup lumps to be

processed or collected to be sold to the Rubber Estate Organization. Rubber was processed into concentrated latex, ribbed smoked sheet bales and standard Thai rubber. As a result, farmers' institutes could stock rubber to be sold after the project's completion or when rubber prices were suitable.

Social welfare is based on the average price (81.15 baht per kg) before the project started in 2012. The price was targeted to rise to 120 baht per kg. The government made an announcement to buy unsmoked rubber sheets, Grade 3, at 92 baht per kg. However, after project operation, the average price of unsmoked rubber sheets, Grade 3, received by farmers in 2012 and 2013 was 81.15 and 74.75 baht per kg, respectively. Therefore, the project operation could not increase the market price as targeted. The results of the policies are shown in Figure 5.5.

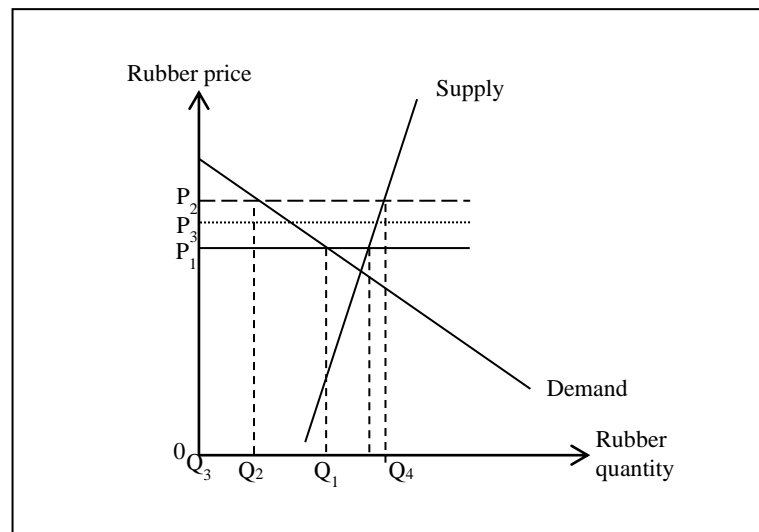


Figure 5.5 Farmers' Institute Potential Development Scheme Not Contributing to Higher Market Prices ($P_3 < P_2$)

The calculation of social welfare is based on the areas below the graph of demand curve of consumers, who bought rubber and the supply curve of producers or farmers.

Consumer surplus	=	$[(P_1 - P_2) \times Q_2] + 1/2[(P_1 - P_2) \times (Q_1 - Q_2)]$
Producer surplus	=	$[(P_2 - P_1) \times Q_3] + 1/2[(P_2 - P_1) \times (Q_4 - Q_3)]$
Public expenditure	=	budget for the operation, warehouse rent fees and insurance fees excluding loans for the operation
Public income	=	no definite project income information

The measurement of social welfare from the Farmers' Institute Potential Development Scheme revealed that the total social welfare amounted to -442,375,231.39 baht resulting from the decreasing consumer surplus caused by the rubber purchase at higher prices (-31,441,191,077.89 baht), the higher producer surplus (31,227,870,846.50 baht) and the project operation cost (229,055,000.00 baht).

5.2.2.4 Buffer Product Project to Stabilize Rubber Prices

This involved a public operation to solve low rubber prices in 2014. The Rubber Estate Organization used loans from the Bank for Agriculture and Agricultural Cooperatives to buy rubber at a price of 60 baht per kg to lead the market (smoked rubber sheets, Grade 3) in the loan amount of 6 billion baht for six months.

Social welfare was based on the average price (50.22 baht per kg) before the project started in 2014. The price was targeted to rise to 60 baht per kg. It was found that the average price of unsmoked rubber sheets, Grade 3, received by farmers in 2015 was 50.02 per kg. Therefore, the project operation could not increase the market price as targeted. The results of the policies are shown in Figure 5.6.

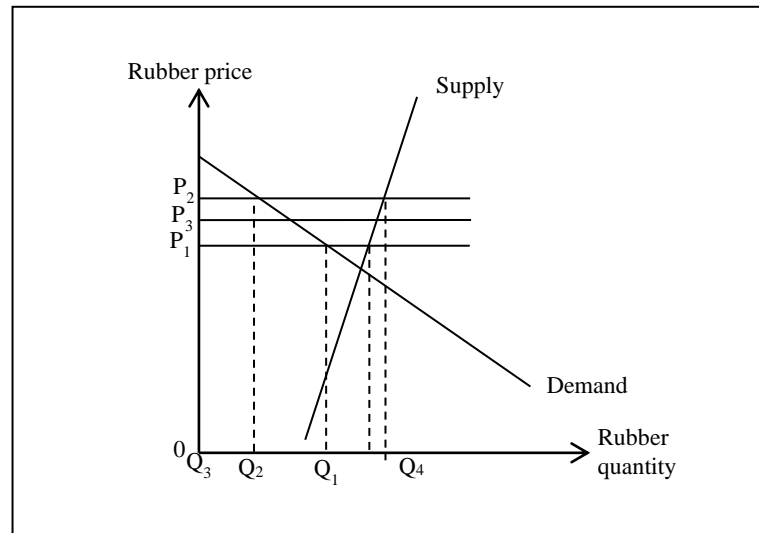


Figure 5.6 Buffer Product Project to Stabilize Rubber Prices Not Contributing to Higher Market Prices ($P_3 < P_2$)

The calculation of social welfare is based on the areas below the graph of demand curve of consumers, who bought rubber and the supply curve of producers or farmers.

$$\text{Consumer surplus} = [(P_1 - P_2) \times Q_2] + \frac{1}{2}[(P_1 - P_2) \times (Q_1 - Q_2)]$$

$$\text{Producer surplus} = [(P_2 - P_1) \times Q_3] + \frac{1}{2}[(P_2 - P_1) \times (Q_4 - Q_3)]$$

Public expenditure = budget for the operation, warehouse rent fees and insurance fees. Stock was managed together with the Farmers' Institute Potential Development Scheme excluding loans for the operation

Public income = no definite project income information

The measurement of social welfare from the Buffer Product Project to Stabilize Rubber Prices revealed that total social welfare amounted to -898,058,895.04 baht resulting from the decreasing consumer surplus caused by the rubber purchase at higher prices (-38,653,158,411.85 baht), the higher producer surplus (37,984,154,516.81 baht) and the project operation cost (229,055,000.00 baht).

5.2.2.5 Rubber Purchase under the Public Sector's Rubber Utilization Promotion Project

About 100,000 tons of rubber was purchased from small-scale farmers. Each farmer was eligible for 150 kg. Unsmoked rubber sheets, Grade 3, were bought at prices not exceeding 45 baht per kg between the 25th of January and the 30th of June 2016.

Social welfare was based on the average price (36.93 baht per kg) before the project started in January 2015. Unsmoked rubber sheets, Grade 3, were bought at 45 baht per kg. The average price of unsmoked rubber sheets, Grade 3, received by farmers for six months in accordance with the project period in 2015 was 47.96 baht per kg. Therefore, the project operation contributed to an increase in the rubber price. The results of the policies are shown in Figure 5.7.

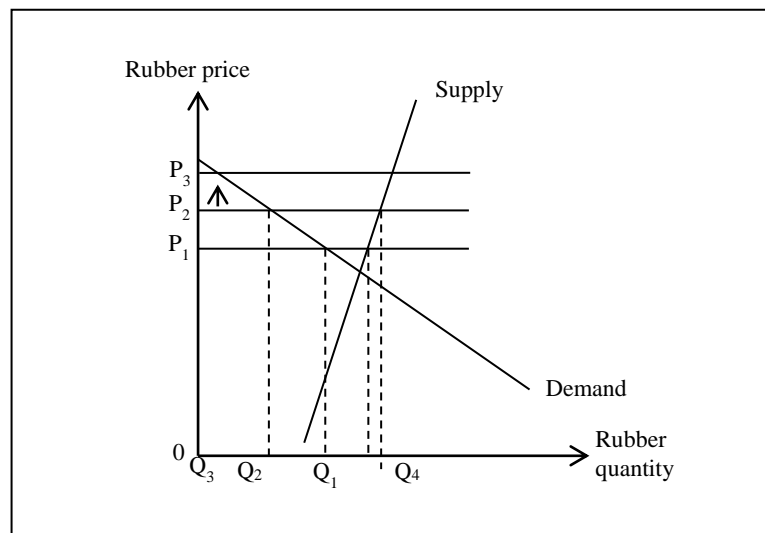


Figure 5.7 Rubber Purchase under the Public Sector's Rubber Utilization Promotion Project Contributing to Higher Market Prices ($P_3 > P_2$)

The calculation of social welfare is based on the areas below the graph of demand curve of consumers, who bought rubber and the supply curve of producers or farmers.

$$\begin{aligned} \text{Consumer surplus} &= [(P_1-P_2) \times Q_2] + 1/2[(P_1-P_2) \times (Q_1-Q_2)] \\ \text{Producer surplus} &= [(P_2-P_1) \times Q_3] + 1/2[(P_2-P_1) \times (Q_4-Q_3)] \\ \text{Public expenditure} &= \text{budget for the operation and rubber purchase costs} \\ \text{Public income} &= \text{no definite project income information} \end{aligned}$$

The measurement of social welfare from the Public Sector's Rubber Utilization Promotion Project revealed that the total social welfare amounted to -7,437,455,582.05 baht resulting from the decreasing consumer surplus caused by the rubber purchase at higher prices (-33,874,221,867.06 baht), the higher producer surplus (3 0,936,766,285.00 baht) and the project operation cost (4,500,000,000.00 baht).

Thai rubber price stabilization policies provide benefits to producers, who are farmers and farmers' institutes, so that they receive product prices as required or as claimed each time when problems occur. The results of the study indicate that benefits to farmers were lower than the decreasing consumer surplus. However, all rubber farmers could not join the operation, and as a result, the total social welfare was negative. Overall, society lost the benefits of producers and the public budget, as summarized in Table 5.3.

Table 5.3 Social Welfare from Price Stabilization Policies between 1992 and 2016 (million bath)

Project	Consumer Surplus	Producer Surplus	Budget	Loss/Profits	Social Welfare
1) Thai Rubber Market Intervention Scheme	-65,849.09	62,326.53	-	-15,809.50	-19,332.06
2) Farmers' Institute Supporting Project	-61,337.63	65,727.12	-270.00	17.00	4,136.49

Table 5.3 (Continued)

Project	Consumer Surplus	Producer Surplus	Budget	Loss/Profits	Social Welfare
3) Farmers' Institute Potential Development Project	- 31,441.19	31,227.87	- 229.06	NA	- 442.38
4) Buffer Product Project	- 38,653.16	37,984.15	- 229.06	NA	- 898.06
5) The Public Sector's Rubber Utilization Promotion Project	- 33,874.22	30,936.77	- 4,500.00	NA	- 7,437.46
Total	- 231,155.29	228,202.44	- 5,228.11	- 15,792.50	- 23,973.47

5.3 Options for Rubber Price Policies Affecting the Economic System

Based on the results of the study of five rubber price stabilization policies from 1992 to 2016, the policies were different in terms of major goals and operational methods. The implementation of those policies has been caused by the following three key factors:

(1) Rubber amount is higher than the demand. Due to the continuous support of production expansion in terms of quantity and quality, the amount of rubber is increasing to exceed the global demand. Therefore, the production amount and global rubber stock tend to increase. Thus, a large number of products are one major reason for formulating price policies.

(2) Factors affecting prices are external factors. Prices and the demand of Thai rubber depend mainly on external markets. Farmers, therefore, have to face fluctuation risks, while the public sector carries out the policies to solve problem in order that farmers receive higher prices.

(3) Policies have been used as a political tool. The improvement of farmer's quality of life is a key target for country management. The response to

farmers' demands is an approach used as a political tool. However, long-term impacts, which may arise, may not be taken into consideration.

Following the causes of policy formulation, along with the study results of rubber price stabilization policy efficiency based on social welfare measurements, the options for rubber price stabilization policies have been suggested as follows:

5.3.1 Production policies: As the surplus supply is one of the major problems of low rubber prices, productivity control is one of policy options. However, the decreasing rubber plantation area policy is still carried out through forest reforestation measures, aid fund for cutting rubber trees and planting palm trees instead, as well as selection of suitable plantation areas. This may be because of the previous increasing rubber plantation area policies. Thus, the rubber plantation promotion policy should not be adopted again despite higher rubber prices in the future.

5.3.2 Farmer Strengthening Support: The results of the study of rubber price stabilization policy efficiency based on social welfare measurement indicate that the government's projects that directly buy rubber from farmers provide the maximum loss to society, such as the Thai Rubber Market Intervention Scheme and the Public Sector's Rubber Utilization Promotion Project. On the contrary, the projects driven by farmers' institutes lose fewer benefits. Therefore, farmers' potential should be supported to drive price policies. In addition, knowledge and options should be always provided to farmers to reduce risks pertaining to rubber prices.

5.3.3 Public Role Change: Due to the loss of the Price Stabilization Project and the social welfare loss of the projects implemented by the public sector, this implies that the public sector should not carry out commercial policies through the government's mechanism. However, the public sector should change its role from the operator to the director. Expert independent agencies, which can be hardly intervened on by political agencies, should operate the projects.

In brief, rubber price stabilization policies are policies that affect many people, e.g., farmers, farmers' institutes, business operators and politicians. To bring about benefits to all relevant groups and the country, the public role should not be intervened on by politics. Policies that actually provide national benefits should be focused on. However, if those who have the tools and policies, such as policy formulation, implementation and evaluation, still think of the benefits only to themselves and their parties, rather than the nation, a loss can still take place at all steps of policy implementation. As a result, this leads to chronic problems for rubber markets.

CHAPTER 6

RESEARCH CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions of Research

6.1.1 Thai Rubber Policies

Previous Thai rubber policies up to the current ones have emphasized upstream products as a first priority. When rubber prices were low, the policies were developed toward marketing and price, then they moved on to value adding and proactive marketing policies.

6.1.1.1 Upstream Policies

Upstream policies involve rubber farmers and rubber production as upstream raw materials, which are the major types of Thai rubber products. Upstream policies can be classified into three types, as follows:

1) Production policies, which are aimed at increasing rubber productivity in terms of quantity and quality, as follows:

(1) Plantation Area Increasing Policies: At the beginning of the promotion of rubber as a national key product.

(2) Output per Rai Increasing Policy involves the promotion of good varieties of rubber to produce a large volume of product.

(3) Small-scale Farmer Assistance Policies help rubber farmers after the rubber has been bought to be stocked, without affecting the market price.

2) Local Marketing Policies: Upstream rubber products of Thai farmers that were sold in both domestic and international markets. During a low rubber price period, the government bought rubber from farmers in order to lead an

increase in the price and reduce the rubber supply in the market. Local marketing policies were implemented chronologically as follows:

(1) Central rubber market was established to purchase rubber and to announce the reference price to buyers and sellers in different areas.

(2) Rubber purchasing, processing and stocking was a policy to reduce the market supply, expecting the price to be higher when the amount decreased.

(3) Funding for buying rubber was a policy to provide zero-interest or low interest loans as a revolving fund through processing or stocking rubber to be sold at an appropriate time.

(4) Buffer products to stabilize rubber prices involve a short-term measure to buy rubber and to lead the market price using loans as a revolving fund.

6.1.1.2 Midstream Policies are designed to promote rubber processing by adding value to products so that they can be kept longer and solve low upstream rubber price problems. The following midstream policies were adopted by the government:

1) Constructing processing factories was aimed at reducing the rubber amount in order to increase rubber quality to suit stocks for sale.

2) Policy implementation involves the formulation of policies so that state agencies can request cooperation in buying rubber for their use.

3) Research and development involves policies assigned by the government to state agencies to study guidelines and techniques for processing rubber in a wide variety of forms. Competition opportunities should also be considered.

4) Supporting business operators to promote processing: Zero- or low-interest loans were provided to farmers' institutes and rubber processing business operators to add rubber value.

6.1.1.3 Downstream Policies

1) International Cooperation and Trade Policy: Rubber producers were encouraged to cooperate in developing the rubber business to bring about more overall benefit.

2) Local Rubber Utilization Promotion Policy is aimed at promoting domestic rubber utilization by both public and private agencies.

In brief, Thai rubber policies have been developed in line with problems and value chain movements. They are comprised of upstream policies concerning production and local markets; midstream policies concerning construction of processing factories, policy statements, funding support, as well as research and development; and downstream policies concerning international cooperation and trade, as well as local rubber use promotion. The implementation of policies is consistent with the development of rubber value chains.

6.1.2 Thai Rubber Price Stabilization Policy Efficiency

Based on the social welfare measurement, it is evident that Thai rubber price stabilization policies provide benefits to producers, comprised of farmers and farmers' institutes, so that they receive product prices as required or as claimed each time when problems occur, as summarized in Table 6.1.

Table 6.1 Social Welfare from Price Stabilization Policies between 1992 and 2016

Project	Consumer Surplus	Producer Surplus	Budget	Loss/Profits	Social Welfare	Impacts on price
1) Thai Rubber Market Intervention Scheme	-65,849.09	62,326.53	-	-15,809.50	-19,332.06	Higher prices Five-year prices
2) Farmers' Institute Supporting Project	-61,337.63	65,727.12	-270.00	17.00	4,136.49	Prices higher than the target price

Table 6.1 (Continued)

Project	Consumer Surplus	Producer Surplus	Budget	Loss/Profits	Social Welfare	Impacts on price
3) Farmers' Institute Potential Development Project	- 31,441.19	31,227.87	- 229.06	NA	- 442.38	No impacts on prices
4) Buffer Product Project	- 38,653.16	37,984.15	- 229.06	NA	- 898.06	No impacts on prices
5) The Public Sector's Rubber Utilization Promotion Project	- 33,874.22	30,936.77	- 4,500.00	NA	- 7,437.46	No impacts on higher prices
Total	- 231,155.29	228,202.44	- 5,228.11	- 15,792.50	- 23,973.47	

6.1.3 Options for Rubber Price Policies Affecting the Economic System

Based on the results of the study of five rubber price stabilization policies from 1992 to 2016, the policies were different in terms of major goals and operational methods. Following the causes of policy formulation, along with the study results of rubber price stabilization policy efficiency based on social welfare measurements, the options for rubber price stabilization policies have been suggested as follows:

- 1) Production policies: Surplus supply is reduced by decreasing plantation areas and increasing product value.
- 2) Farmer Strengthening Support serves as a driving mechanism for policy implementation and helps farmers solve problems themselves.
- 3) Public Role Change from the director to the operator, in particular regarding commercial policies. Expert agencies should operate the projects.

In brief, rubber price stabilization policies are policies that affect many people. To bring about benefits to all relevant groups and the country, the public role should not be intervened on by politics. Policies that actually provide national benefits should be focused on. However, if those who have the tools and policies, such as policy formulation, implementation and evaluation, still think of the benefits only to themselves and their parties, rather than the nation, a loss can still take place at all steps of policy implementation. As a result, this leads to chronic problems for rubber markets.

6.2 Recommendations

6.2.1 Rubber Database: Due to major limitations in this study, Thailand's rubber databases for the same data set are not consistent. To enable the policy planning that requires information to efficiently identify problems and consider policy options, there should be agencies that collect beneficial and accessible data.

6.2.2 Dynamics of Rubber Markets: The demand for rubber products is diverse and changes according to economic conditions and technology. This study has emphasized primary products or unsmoked rubber sheets, Grade 3 and prices received by farmers. During the end period of policies, rubber price intervention in the form of other products has greatly changed. However, the operational results have not been disseminated or evaluated in order to be used for the study.

6.2.3 Project Performance: As for those projects that cannot access project performance data, if the performance of rubber sales could be used for further study, it would help the study be clearer.

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