RSPO MODEL COMPLIANCE PROMOTION OF OIL PALM SMALLHOLDER FARMER IN CHUMPHON

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A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Philosophy (Environmental Management)
The Graduate School of Environmental Development Administration
National Institute of Development Administration
2021

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ABSTRACT

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Year	2021

This study aimed to study Knowledge and understanding, attitude, motivation and acceptance of RSPO standard for small oil palm farmers in Chumphon Province, to study factors affecting oil palm farmers to be certified by RSPO and to propose a practical model to promote RSPO among farmers. The study was conducted with qualitative and quantitative research methods. Questionnaires were collected from 390 small oil palm farmers who have not been certified by RSPO. The collected data was used for descriptive statistics, correlation analysis and multiple regression analysis Moreover, different interviews were done with corresponding officers.

The results showed that farmers knowledge and understanding, and attitude were in high level score with an average score of 0.88 and 4.17, respectively. The farmers motivation and acceptance for RSPO standard were in very high level score with and average score of 4.32 and 4.5, respectively. The factors that relate and influence the compliance of the RSPO requirements of smallholder oil palm farmers were knowledge and understanding of RSPO, motivation to comply with RSPO and acceptance of RSPO. These three factors were able to predict the variance of compliance of the RSPO standard with a step-by-step multiple regression of 43.7 percent. The study also propose a practical model to promote RSPO standard among small oil palm farmers in Chumphon Province by using collected data and different principles; participation in promotion incentive creation, farmer aggregation with good structure, networking for common practices, knowledge and experience exchange and trainings.

ACKNOWLEDGEMENTS

The study on the model for promoting RSPO compliance among smallholder oil palm farmers in Chumphon was successfully completed due to supports from Assistant Professor Dr. Karika Kunta, Professor Dr. Wisakha Phoochinda and Dr. Krit Iamthanon gave valuable guidelines and useful comments, including correcting shortcomings of this study.

Many thanks go to my school, Faculty of Environmental Development Administration, and all staffs who always give me pleasant advice and technical guidelines. Also, I would like to thank all my friends, brothers and sisters who have supported and encouraged me in different situations.

Finally, I would like to thank the family's support for their continuous support in education and educational institution that has given me educational opportunities.

I do expect that this study would be beneficial for oil palm farmers, relevant agencies in both the public and private sectors.

Sirisuda Noothimthong

October 2021

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

1.1 Background and Significance of the Study

Oil palm is an important oil crop as it gives high yields per area compared to other oil crops. It also has low production costs with quick yields of approximately 3-4 years after cultivation and can continue to give yields as long as 25 years. Oil palm can be used and processed in numerous industries notably in food industry. As the compounds to produce biodiesel, it can efficiently replace other vegetable oil. It is therefore in global demand as it assumes an important role in consumption and production of energy due to the increased global demand of palm oil, both palm oil and biodiesel, and the expansion of the areas for oil palm cultivation. Despite its highly economic benefit, cultivation of oil palm has negative impacts on society, environment, and local communities especially problems in big producers such as Indonesia and Malaysia which are the world major producers of oil palm. There is concern that the production of oil palm will not be sustainable as development of new oil palm plantations will threaten the richness of biodiversity especially destruction of orangutans' habitats as they are near extinction. The expansion of plantations into forests impacts environment and leads to numerous results including violation of workers' rights, conflict in land use, environmental destruction, global warming, and negative image of the oil palm industry. There are many oppositions to palm oil and palm oil-based products in many countries especially European Union so that oil palm and oil palm-based products cannot be exported to European Union.

Many countries especially in European Union have campaigned against the use of palm oil to end the problems. Therefore, in order to promote sustainable oil palm cultivation, all stakeholders from sectors namely farmers, industrial entrepreneurs, traders, producers, investors, and nongovernmental organizations (NGOs) in the fields of society and environment have jointly set up the Roundtable on

Sustainable Palm Oil (RSPO) which is the standard that supports sustainable oil palm production, by providing knowledge on good management to farmers in order to upgrade oil palm production throughout the production chain, focusing on CSR from upstream to downstream industries, as well as capacity building of farmers for sustainable oil palm production.

RSPO is international voluntary standard which is established to promote and support sustainable palm oil production and consumption, produce oil palm for economic and financial stability, without environmental degradation and without social impacts. There are regulations for oil palm growers, oil palm crushing mills, and oil palm refinery plants. Each activity has different regulations. RSPO standard consists of eight major regulations (Theerapong Jantaraniyom, 2013) to serve as the framework for sustainable palm oil production. It covers management, legal proceedings, economic feasibility, appropriateness, environmental impact, and social benefit. RSPO standard benefits sustainable oil palm development as it enables higher yields and enhances safety of farmers' lives. In Thailand, National Bureau of Agricultural Commodity and Food Standards sets the standards of agricultural goods on the principles of sustainable oil palm and palm oil production to serve as the environmental-friendly guideline of sustainable production management based on CSR, forge economic security to oil palm industry in the entire system, as well as serve as the guideline to develop production and evaluation, ensuring recognition in international trade arena. This standard is set up by Thai National Interpretation Working Group on Indicators and Guidance under the framework of RSPO 2015: sustainable palm oil production according to the RSPO principles and criteria of Thailand (TH-NI).

In Thailand, there are 5.8 million rais of planted areas of oil palm. The planted areas that yield output are 5.3 million rais with 15.5 million tons of oil palm output (Office of Agricultural Economics, 2019). Most oil palm plantations are situated in the south or 86.4 percent of the total planted areas of oil palm in the country, especially in Surat Thani, Krabi, and Chumphon. The remaining 13.6 percent are scattered in the north, the central plains, and the northeast (Office of Agricultural Economics, 2019). In 2019, the palm oil industry faced the problems of continuous over supply. The demand of palm oil was less than the supply. Moreover, with the

favorable atmospheric conditions and the continuous expansion of plantations as a result of the government's policy to promote the expansion of the plantations but while demand remained the same, the prices plunged continuously. At the same time, in the global market the demand of palm oil was less than production, increasing the global palm oil stock. Moreover, India which was the world number one importer increased the import tariff from 15 percent to 44 percent so the world large producers exported less. As the global palm oil stock increased, the prices of the global crude palm oil decreased (Office of Agricultural Economics, 2018a).

Thailand is the producer and exporter of palm oil and palm oil products. Therefore, the upgrading of the oil palm industry towards the highly competitive trade arena is therefore crucial especially the production of oil palm with the qualifications that can meet the demand of the global market and can compete on prices. One way to develop oil palm production is to produce oil palm that is certified with the RSPO standard from upstream to downstream industries. The RSPO standard has the process that goes in the same direction as the development strategies of the oil palm production in Thailand which ensures the country's foundation of efficient and sustainable oil palm production.

Chumphon is the country's third largest area of oil palm cultivation, following Surat Thani and Krabi. In 2018, the areas of oil palm cultivation in Chumphon were over 1,000,000 rais. Therefore, oil palm was considered Chumphon's economic crop. Most oil palm growers in Chumphon were smallholder farmers not yet certified with the RSPO standard but had been in the profession for a long time. Most palm trees aged over 20 years and they were planted at the same time after Typhoon Gay caused great havoc in 1989. So, it was nearly time to cut them down. If the cutting was at the same time, the oil palm yield would decrease because Chumphon had the oil palm output of 18 percent of the country's output. As a consequence, there might be shortage of palm oil as well as shortage of seeds and seedlings, and the competition to acquire palm seeds might ensue. Not only did farmers have problems with the increased prices of palm seeds, they might also be duped into buying palm seeds that did not meet the standard (Chomchuan Chouchor, 2015). If the problems were not solved, they would have direct impact on the farmers' oil palm production, economic security, and their financial situations.

The certification of the RSPO standard is to ensure sustainable oil palm production, creating best practice in oil palm plantations, sustainable care and management of oil palm plantations; farmers have proper knowledge on the operation in oil palm plantations for higher yields and higher production efficiency; awareness of social impact such as evaluation on social impact and laws relevant to oil palm plantation to ensure better environment, including the maintenance of ecosystem, creation of good quality of life, and security to the farmers, as well as increased export volume of palm oil and oil palm products. The promotion of smallholder farmers to comply with the regulations of the RSPO standard is the "RSPO Model Compliance of oil Palm Smallholder Farmer in Chumphon" in its application to enhance benefit, increase efficiency, and reduce costs of oil palm production. So, farmers and oil palm producers can compete in international arena. This study is to construct the RSPO model compliance appropriate to oil palm smallholder farmer in Chumphon and to serve as the guideline to promote the compliance with the regulations of the RSPO standard that are different from the project to establish farmer group of sustainable palm oil producers and create management system to ensure production in accordance with the RSPO standard and development of oil palm production for smallholder farmers towards the RSPO standard, as well as forge cooperation between farmer institutions, oil palm crushing mills, and farmers to produce oil palm in accordance with the RSPO standard.

1.2 Objectives

1.2.1 Study knowledge, understanding, attitude, motivation, acceptation, and problems in the RSPO compliance of oil palm smallholder farmers in Chumphon.

1.2.2 Study the factors that are related to and have impact on the RSPO compliance of oil palm smallholder farmers in Chumphon.

1.2.3 Recommend the RSPO model compliance of oil palm smallholder farmers in Chumphon.

1.3 Expected Benefits

1.3.1 Obtain the model to promote the sustainable oil palm production according to the RSPO standard for oil palm smallholder farmers in Chumphon.

1.3.2 Relevant agencies both public and private to be able to use the model to promote sustainable oil palm production according to the RSPO standard to encourage oil palm growers to produce sustainable oil palm.

1.3.3 Farmers are certified with the RSPO standard and can sustainably produce oil palm.

1.3.4 Positive economic, social, and environmental impact from farmers' sustainable oil palm production.

1.4 Research Scope

1.4.1 Content

Study the policies, plans, and strategies of oil palm, and agencies responsible for operation of oil palm growers and oil palm smallholder farmers in order to know the promotion of the farmers' sustainable oil palm production according to the RSPO standard, feasibility, problems and obstacles, guideline to solve potential problems in the promotion, study the factors impacting and in relation to the RSPO compliance of oil palm smallholder farmers, and study the development of the model to promote and develop agriculture.

1.4.2 Area and Population

The data was compiled from the agencies related to oil palm industry, Univanich-Plaipraya Community Enterprise Group in Krabi, and Community Enterprise for Sustainable oil Palm Producer Group (Surat Thani), the group already certified with the sustainable oil palm production standard, and farmer group not yet certified with the sustainable oil palm production standard in Chumphon. The study findings were used as the guideline to design the model to promote sustainable oil palm production according to the RSPO standard of oil palm smallholder farmers in Chumphon.

1.4.3 Duration

The study duration was from October 2018 to September 2020.

1.5 Definitions

This Study Set the Definitions with the Following Details

1.5.1 Smallholder farmer means farmer with land of 31-40 rais or less for oil palm cultivation with sales of output to oil palm courtyards and cooperatives.

1.5.2 Farmer group in the form of cooperative of oil palm growers means oil farm growers by profession who gather together and register as juristic person with clear management structure, and with the objective of engaging members in common activities, and assistance to one another to mitigate their troubles.

1.5.3 Oil palm industrial entrepreneur means owner of business or establishment related to oil palm and palm oil such as oil palm crushing mills, palm oil refineries with own business operation, and acceptance of potential risks for profits from the business operation.

1.5.4 Model to promote sustainable oil palm production according to the RSPO standard means the guideline or method to promote farmers in sustainable oil palm production according to the regulations of the RSPO standard.

CHAPTER 2

LITERATURE REVIEW

For the study of the RSPO Model Compliance of oil Palm Smallholder Farmers in Chumphon, the following literature review was conducted

2.1 Policies and Strategies Relevant to oil Palm

2.2 Areas Appropriate to oil Palm Cultivation

2.3 Change of Land Use for oil Palm Cultivation

2.4 Management of oil Palm Plantation

2.5 Thailand's oil Palm and Palm oil Industries

2.6 Standards Relevant to oil Palm Production

2.7 Project Evaluation

2.8 Model Development

2.9 Concepts and Theories Relevant to Knowledge, Understanding, Attitude, Motivation, and Adoption

2.10 Concepts of Agricultural Promotion and Development

2.11 Social Return on Investment

2.12 Relevant Research

2.1 Policies and Strategies Relevant to Oil Palm

This study conducted review of policies and strategies relevant to oil palm to study the requirements of policies and strategies in the promotion of sustainable oil palm production. The details of the relevant policies and strategies consisted of the following

2.1.1 The 20 Year Strategies for Reforming the Whole Systems of Oil Palm and Palm Oil (2017-2036)

The National oil Palm Policy Committee has approved strategies for reforming the whole systems of oil palm and palm oil by specifying the vision of "Developing oil palm and palm oil to the “Oleochemical Industry for a competition in doing business in ASEAN". The 20-Year reformation period is divided into a period of 5 years (from 2017-2036) , consisting of 6 areas, namely production, innovation, standards, energy, marketing, and management. (Department of Internal Trade, 2017) Details are as following;

2.1.1.1 Production:

It will be increased by 2.5-2.75 tons per rai in 2017-2021 and 2.75-3 tons per rai in 2022-2026. In 2027-2031, the production will be increased by 3-3.5 tons per rai and 3.25-3.50 tons per rai in 2032-2036. At the same time, the planting areas will be increased from 4.81-5.23 million rai to 6.06-7.23 million rai in the year 2036 as well. This also can help reduce production costs, increase the percentage of oil in oil palm fruits to 22% within 5 years or within 2021. Currently, the percentage of oil in oil palm fruits is at 17-18%. This will enable farmers to sell at a better price and will plan the production in the appropriate planting areas. In addition, farmers will be encouraged to plant other crops instead in an inappropriate area, promoting the use of organic fertilizer and technology transfer.

2.1.1.2 Innovation:

Thailand's palm oil industry will be developed to the oleochemical industry from upstream to downstream with more added values, such as vitamin E, biodiesel industry, etc. Currently, most of the palm oil is produced for only consumption, such as palm oil, soap, skin care creams, and cosmetics, etc.

2.1.1.3 The standard:

The certification of palm oil in accordance with GAP standards will be pushed in order for “Lan the” or miller of oil palm to register including the development and promotion of oil percentage (in oil palm fruits) measurement, standard development for oil palm mills by improving the efficiency for the standard of the oil palm mills and lifting the production standards to the international standards.

2.1.1.4 Energy:

The demand of renewable energy consumption must be increased. The proportion of crude palm oil used for biodiesel production will be increased and developed into B10 by 2026 and B20 in 2036.

2.1.1.5 Marketing:

From the increase in yields per rai and the planting areas, therefore, it is expected that Thailand will have crude palm oil of 2.26-2.29 million tons in 2017-2021 and it will be increased to 2.49-2.82 million tons in 2022-2026. In addition, it will be increased to 2.86-3.36 million tons in 2027-2031 and 3.78-6.31 million tons in 2032-2036. The stock of oil palm will be managed more efficiently. The market intervention for palm oil will be cancelled from the year 2022 onwards, including the floating price that will be applied for bottled palm oil, in order to comply with the market mechanism in which currently, the ceiling price is set at the maximum price of 42 baht per bottle/liter. At the same time, the palm oil-based products will be exported to CLMV (Cambodia, Laos, Myanmar and Vietnam). The exports of crude palm oil will also be expanded including innovative products as well.

2.1.1.6 Management:

In 2017, the National Oil Palm Policy Committee proposed the Cabinet to approve the draft of Palm Oil and Palm Oil Act in which the National Farmers Council had drafted and proposed to the Ministry of Agriculture and Cooperatives for consideration by the National Legislative Assembly (NIA) which already came into force in 2018.

2.1.2 Oil Palm and Palm Oil Industry Development Plan B.E. 2556-2560 (2013-2017)

The vision of the Oil Palm and Palm Oil Industry Development Plan B.E. 2556-2560 (2013-2017) was to construct the network of sustainable production of oil palm and products in the entire system with the following goals 1) Promote oil palm cultivation in the areas appropriate to oil palm cultivation based on the Notification of Ministry of Agriculture and Cooperatives 2) Oil palm cultivation in new areas with 200,000 rais a year in total 1million rais, replanting to replace old oil palm plantations with 100,000 rais a year in total 500,000 rais, and rehabilitation of old oil palm

plantations 3) Increase production efficiency with yields of 3.0-3.5 tons/rai/year, with 18.5% of oil rate, and with quality on a par with international standards 4) Promote and develop the sustainable and environmental-friendly production of oil palm and palm oil products. The Development Plan (Ministry of Agriculture and Cooperative, 2013) consisted of the following strategies:

2.1.2.1 Strategy to Increase Production and Value of Oil Palm and Products

1) Increase the areas of oil palm cultivation in the areas appropriate to oil palm cultivation according to the Notification of Ministry of Agriculture and Cooperatives through analysis of soil and advice on soil and fertilizer management.

2) Accelerate and campaign for improvement and rehabilitation of old oil palm plantations through replanting with good species and proper production management, as well as determination of oil Palm Plantation Fund.

3) Support the restructuring of oil palm and palm oil industries towards efficient production sector based on good knowledge and management to ensure the maximum use of production resources and competitiveness under the free trade system.

4) Support the integration of production and marketing based on the potential and strength of farmers, farmer institutions, as well as linkage with the private sector to change work behavior from working alone to working in group.

5) Formulate measures and requirements with farmers, oil palm bunch collection centers, and factories to increase the percentage of the oil.

2.1.2.2 Strategy to Increase Marketing Efficiency

1) Flexible energy policy as mechanism to maintain stability of marketing and prices.

2) Promote the marketing policy of palm oil and products in line with the market mechanism to foster competition and distribute fair benefit to all stakeholders.

3) Establish and enforce the standards of oil palm based on the system of international standards, and enforce compulsory measures of GMP, oil palm bunch collection centers, oil palm crushing mills and palm oil refineries.

4) Determine the policy of incentives for investors in oil palm industry.

2.1.2.3 Strategy to Use Renewable Energy and Alternative Energy

1) Continuously and clearly support the production of renewable energy and alternative energy in accordance with the potential of oil palm and palm oil production such as biodiesel, biomass energy and bioenergy.

2) Determine severe and stringent penalty, as well as supervise and control the reuse of used petrol for alternative energy only, as well as with clearly supporting market.

3) Promote the development of engine system to accommodate B100.

2.1.2.4 Strategy of Targeted Research and Development

1) Policy research on systematic oil palm management and dissemination to cover all farmers.

2) Concretely and continuously enhance on research to produce new products, technology, and production process of high valued products (utilization of palm tree).

3) Research to evaluate and reduce environmental impact as well as acquire technology that can be implemented.

4) Research and determine the standards of quality and management in each process such as palm oil quality tester, utilization of old oil palm trees.

5) Research and development on personnel to produce and support the process of personnel development in research and development of oil palm and palm oil, including continuously create the process of technology transfer of oil palm by focusing on knowledge transfer at the level of farmers themselves and focusing on knowledge transfer of model farmers to farmers.

6) Research and development of palm seeds for higher yields.

2.1.2.5 Strategy of Management and Administration

1) Establish Oil Palm and Palm Oil Act as national agenda, reform laws, rules and regulations on oil palm and palm oil to ensure unity and congruence and farmers' engagement in all processes.

2) Establish organization and oil palm and palm oil development fund to ensure maximum efficiency and competitiveness in the management and development of the industry in its entire system.

3) Promote the development of agricultural logistic system (especially rail transport).

4) Set up database of the entire system such as GPS, palm plots, oil palm bunch collection centers, mills, etc.

The formulation of oil palm and palm oil industry development plan is to ensure efficient and continuous operation and serve as framework and direction to the stakeholders to operate and implement the development of oil palm industry and continuous industries generating sustainable income.

2.1.3 Oil Palm and Palm Oil Industry Development Plan B.E. 2551-2555 (2008-2012)

The Oil Palm and Palm Oil Industry Development Plan B.E. 2551–2555 (2008-2012) was approved on December 25, 2007, with the goal to expand the areas for oil palm cultivation of 2.5 million rais, replanting with good species of oil palm 500,000rais, increasing yields from 3tons per rai per year to 3.50 tons per rai per year, oil rate from 17% to 18.5%, with five dimensions of development strategy (Regional Office of Agricultural Economics 8, 2008) as follows:

2.1.3.1 Strategy to Increase Productivity and Value of Palm and Products

1) Increase area for oil palm cultivation in appropriate zone, improve old oil palm plantations by replanting with good species of oil palm with proper production management.

2) Support restructuring of production of oil palm and palm oil industries towards efficient manufacturing sector.

3) Support the integration of production, and marketing on the basis of potential and strength of farmers.

2.1.3.2 Strategy to Increase Market Efficiency

1) Energy policy as the main mechanism to maintain the stability of market and prices, and production restructuring.

2) Promote the marketing policy of palm oil and products to ensure fair competition and fair benefit distribution to all relevant sectors.

2.1.3.3 Strategy to Use Renewable Energy

1) Continuously and clearly support the production and consumption of biodiesel and in accordance with the potential of raw material in the production of the country's biodiesel.

2) Supervise, control, and penalize the reuse of used oil for consumption.

2.1.3.4 Strategy of Research and Development of Personnel

1) Research and development of oil palm with high quality in response to the market demand.

2) Research and development to produce products with high value.

3) Promote and support the process of personnel development in research and development of oil palm and palm oil.

4) Create the continuous process of technology transfer of oil palm to farmers among themselves.

2.1.3.5 Strategy of Management and Administration

1) Reform laws, rules, and regulations relevant to oil palm and palm oil to ensure unity and consistency.

2) Set up public organization and oil palm and palm oil development fund.

2.1.4 Agricultural Development Plan under the Twelfth National Economic and Social Development Plan B.E. 2560-2564 (2017-2021)

The formulation of the conceptual framework and direction of the development of Agricultural Development Plan under the 12th National Economic and Social Development Plan B.E. 2560–2564 (2017-2021) placed importance on the development of farmers as the center of balanced development, group formation as farmer institutions in communities to drive the self-reliant agricultural business, applying the Self Sufficiency Philosophy of H.M. the late King Bhumibol Adulyadej with continuous enhancement of the philosophy. The agricultural development in the next phase consisted of the national development from the old agricultural practice to modern agricultural management using technology and innovation to support the production of agricultural products and the national development under the policy of Thailand 4.0 (Ministry of Agriculture and Cooperatives, 2016) with the following strategies:

2.1.4.1 Strategy 1:

Strengthen farmers and farmer institutions to ensure self-reliance, security and pride in agricultural profession, and develop the potential of farmers and farmer institutions to be entrepreneurs of agricultural business based on the principles of Self Sufficiency Philosophy continuously since the Agricultural Development Plan under the 8th-10th Development Plans focusing on the enhancement of agricultural practice based on the principles of Self Sufficiency Philosophy to instill pride and security in agricultural profession, create and develop the new generation of farmers to enter the agricultural sector, create welfare system and debt restructuring for farmers, promote sustainable agriculture for concrete implementation especially integrated farming system, New Theory Agriculture, and organic farming with farmers' increased income, as well as promote the development of farmers' knowledge towards professional farmers to be able to manage integrated farming, including production, processing, marketing, formation of strong farmer groups, and efficient network linkage with farmers and farmer institutions.

2.1.4.2 Strategy 2:

Increase the efficiency of agricultural product management in the entire supply chain to reduce production costs and foster opportunities for agricultural products to compete, use marketing to lead production by promoting agricultural production in the form of large plots with joint management between the public sector, farmers, and the private sector to ensure that agricultural products meet the standards in response to market demand, promote management of agricultural product supply chain, support knowledge on the logistics and the supply chain of agricultural products to farmers, farmer institutions, and entrepreneurs of agricultural business, promote value added of agricultural products by referring to local wisdom to create the Story of agricultural products and communities to serve as selling point, create identity and uniqueness of agricultural products, support the establishment of the center and development of central market system for agricultural products, promote sustainable food security, as well as support risk management that will impact agricultural crops. The operation should focus on cooperation between the private and public sectors and farmers. Border trade, development of special economic zones, and international cooperation will support and create common benefit in the regional development.

2.1.4.3 Strategy 3:

Increase agricultural competitiveness with technology and innovation to ensure potential of the country's agricultural development in order to keep abreast with the global changes by continuously promoting and supporting research, technology, and innovation on agriculture, focusing on cooperation between the public and the private sectors in investment in research and development, by determining the research framework and innovation in accordance with the demand of the areas, develop agricultural IT, and systematically link data, as well as promote utilization of research, technology, and innovation, focusing on access to agricultural technology of smallholder farmers and farmer groups to drive the development of the agricultural sector in line with the sustainable national development.

2.1.4.4 Strategy 4:

Balanced and sustainable management of agricultural resources and environment as an important issue of agricultural development on the basis of limited agricultural resource management by focusing on rehabilitation and conservation of agricultural resources for biodiversity, supporting eco-farming to maintain the balance of natural resources, promoting environmental-friendly agriculture, managing water resources and agricultural land, and forging agricultural immunity against climate change.

2.1.4.5 Strategy 5:

Development of public management system to modify the working process within Ministry of Agriculture and Cooperatives in order to increase efficiency in performing tasks, develop government officials and continuous working process to ensure the organization's transparency and accountability based on good governance, as well as development of new laws and amendment of existing laws to ensure up-to-date laws in accordance with the changing economic and social conditions. The development of public management system will ensure agility in performing work and prepare the organization to be ready to adapt itself and efficiently work in integration with external agencies.

The policies and strategies of oil palm and palm oil were formulated to develop oil palm and palm oil industries in the entire system to increase efficiency in production of oil palm and palm oil, acquire quality yields, in response to national demand, and with efficiency and competitiveness on a par with other countries.

2.2 Areas Appropriate to Oil Palm Cultivation

The determination of the areas appropriate to oil palm cultivation was to increase efficiency and reduce costs of oil palm production so that farmers and oil palm producers could compete with external markets. The determination of the areas would also serve as the basic information to systematically plan oil palm cultivation and forecast yields in line with market demand. Therefore, the determination of the areas appropriate to oil palm cultivation was important to increase the potential

agricultural products for competition and sustainably manage natural resources and environment (Division of Land Use Planning and Policy, 2013).

2.2.1 Determine the Criteria of Appropriate Areas for Oil Palm Cultivation

The criteria used to determine the appropriate areas for oil palm cultivation were as follows:

1) The Areas Must Be Outside the Forest Land According to the Law and Under the prohibition of land use for agriculture according to the cabinet resolutions in the south, the east, and the central plains (Pathum Thani, Saraburi, Nakhon Nayok, Phetchaburi, and Prachuap Khiri Khan).

2) Consider the current areas of oil palm cultivation jointly with the appropriateness of the land (soil, area management, weather such as rainfall and relative humidity) at various levels of oil palm in each area in the south, the east, and the central plains.

3) Consider potential areas to accommodate the expansion of the areas for oil palm cultivation jointly with the appropriate land at high and fair levels by considering specifically in lowland areas where rubber was currently cultivated in the south which risked floods and might damage rubber trees.

4) Zoning of land use by determining the six zones of land use as follows:

(1) Very appropriate area: It was the zone of oil palm cultivation in the areas with the appropriate land at high and fair levels. The appropriateness at high level had no physical and chemical limitations that might hinder the growth of the crop. The appropriateness at fair level was the area that was appropriate land at fair level. It was found that some physical factors hindered the growth of the crop at fair level but could be easily rectified such as benefit of nutrient, and toxic substance. This zone was found only in upland areas.

(2) Very appropriate area (area management): It was the zone for oil palm cultivation in the areas which were appropriate land at high and fair levels. The appropriateness at high level had no physical and chemical limitations that hindered the growth of the crop. The appropriateness at fair level was the areas with

appropriate land at fair level. It was found that some chemical factors hindered the growth of the crop at fair level but could be easily rectified such as benefit of nutrient, and toxic substance. This zone was found in the lowland areas only. In the past, people might make use of land for paddy rice farming or abandoned areas depending on conditions of the areas but were now managed such as ridging to solve the problems of water drainage of soil as in generally there would be waterlogged areas during the rainy season.

(3) Fairly appropriate area was an appropriate area of land at low level. Some physical factors were found to limit the growth of crop much more seriously than the appropriate area. It was more difficult to solve the problems than the appropriateness at high and fair levels such as depth of soil, inclination. This zone was found in upland areas only.

(4) Fairly appropriate area (area management): It was the zone of oil palm cultivation in the areas which were appropriate land at low level. It was found that some physical and chemical factors hindered the growth of the crop much more seriously than the appropriate area and was more difficult to rectify than the appropriateness at fair level such as depth of soil, water drainage of soil, or waterlogged areas. The zone was found in lowland areas only. In the past, people might make use of paddy rice farming or abandoned areas depending on conditions of the areas but with area management such as ridging to solve the problems of water drainage of soil due to the normal waterlogged conditions during the rainy season.

(5) Not very appropriate area: It was the zone of oil palm cultivation in the areas with appropriateness of land at inappropriate level. It was found that some physical factors hindered the growth of the crop much more seriously than the very appropriate area or the areas with the land at the inappropriate level. It was found that some physical factors hindered the growth of the crop which was difficult to rectify such as very shallow soil, upland soil with very high inclination, and very low amount of water and relative humidity. This zone considered the upland and lowland areas. The lowland areas in the past made use of paddy rice farming or abandoned areas. But the landowner modified the conditions of land use for oil palm cultivation. But area management was required through ridging to solve the problems

of water drainage of soil because in normal condition there would be waterlogged areas for a long time during the rainy season.

(6) Potential zone to accommodate the expansion of the areas for oil palm cultivation (Zone to be Promoted) was determined in the south only. It was lowland areas which were appropriate for the oil palm cultivation at high and fair levels. At present, there was no oil palm cultivation except rubber cultivation in the areas. The areas in this zone had good area management especially water drainage of soil to prevent waterlogged conditions. As the old area was lowland, the old land use consisted of paddy rice farming or simply abandoned areas. According to the principles of botany, oil palm was the crop requiring a lot of water and humidity for growth, with yields in high quantity, and with more resistance to waterlogged conditions than rubber.

2.2.2 Appropriate Zones for Oil Palm Cultivation

As oil palm required intensive care and growers must have skills in good care, it mainly depended on natural water. Additional water management from various sources might not be sufficient to respond to the demand. As mentioned earlier, weather highly impacted growth and oil palm yields. In particular, based on the analysis of physical, economic, and social features to prepare the zoning of land use of economic crop such as oil palm, it was found that the potential areas for oil palm cultivation were in the 14 provinces in the south, seven provinces in the east, five provinces in the central plains, in total 26 provinces due to the physical appropriateness especially resources, soil, and climate as follows:

The south determined the zone of land use for oil palm totaled 4,964,389 rais in 14 provinces. The zone of land use with most areas in the south was the zone of land use, which was appropriate at high level, followed by the zone of land use which was appropriate at fair level.

The east determined the zone of land use for oil palm totaled 231,434 rais in seven provinces. The zone of land use with most areas of the east was the zone of land use, which was appropriate at fair level, followed by the zone of land use which was appropriate at low level.

The central plains determined the zone of land use for oil palm totaled 158,639 raisin the target areas of five provinces namely Prachuap Khiri Khan, Phetchaburi, Saraburi, Nakhon Nayok, and Pathum Thani. The zone of land use was appropriate at fair level, followed by the zone of land use which was appropriate at fair level (area management).

The areas that determined the land use for oil palm were mostly in the south and the east. They were physically appropriate as the sources buying yields especially oil palm bunch collection centers and factories were scattered everywhere and in short distance from cultivation areas. Moreover, farmers have long had skills, knowledge, and understanding of cultivation and good management of oil palm. Some areas in the central plains especially in Rangsit fields used to cultivate oranges in the past. Farmers managed the areas by ridging. At the same time, in the areas there was good water management with irrigation projects such as South Rangsit Operation and Maintenance Project, North Rangsit Project, and Phraya Bunloe Operation and Maintenance Project. Moreover, in lower central plains, in Prachuap Khiri Khan, it was found that there was area of oil palm cultivation in Pranburi Operation and Maintenance Project. There were also many reservoirs such as Yang Chum reservoir. Therefore, it could be indicator that the areas had potential in oil palm cultivation.

The determination of the areas appropriate to oil palm cultivation was to increase efficiency and reduce costs for oil palm production, serve as basic information to plan oil palm cultivation and forecast of yields in accordance with market demand. The determination of the areas appropriate to oil palm cultivation was important to increase potential of yields for competition and sustainably manage natural resources and environment.

2.3 Change of Land Use for Oil Palm Cultivation

There were definitions of land use which were similar. It could be summarized as follows: Land use was the use of land to respond to the demands of people (Sathit Wacharakitti, 1982). Therefore, it varied according to human demands, technology, economic situations, and changed topography. National Research Council of Thailand (1991) proposed four factors of land use namely 1) Terrain types 2) Climatic

condition 3) Soil condition and 4) Other infrastructure. Moreover, land use could be classified in accordance with the classification of land use of Land Development Department for the same standards and correct understanding.

Land Development Department classified land use into three levels as follows:

2.3.1 Level 1 Divided into Five Main Types Namely

1) Urban and built-up land (U)
2) Agricultural land (A)
3) Forest land (F)
4) Water body (W) and
5) Miscellaneous land (M)

2.3.2 Level 2 Was Subdivided into Small Groups from the Big Groups in Level 1 as Follows:

1) Urban and built-up land (U) classified into commercial areas (U1), villages (U2), government offices **(**U3), transport stations (U4), industrial areas (U5), and others (U6).

2) Agricultural land (A) classified into paddy fields (A1), field crops (A2), perennial trees (A3), fruit trees (A4), garden plants (A5), rotated crop fields (A6), pastureland (A7), aquaculture stations (A9), agroforestry (A0).

3) Forest land (F) classified into evergreen forest (F1), deciduous forest, wood lot (F2), agroforestry (F4).

4) Water body (W) classified into natural water sources (W1) and man-made water sources (W2).

5) Miscellaneous land (M) classified into rangeland (M1), wetland (M2), mines (M3), and others (M4).

2.3.3 Level 3 Classified into the Types of Clearly Specific Crops or Areas and Separate from Level 2 Such as:

1) Villages (U2) classified into land allocation projects (U2 00), villages (U201), hilltribe villages (U202), etc.

2) Transport stations (U4) classified into airports (U4 01), railway stations (U402), etc.

3) Paddy fields (A1) classified into abandoned paddy fields (A1 00), transplanting rice fields (A101), paddy-sown field (A102), etc.

4) Field crops (A2) classified into abandoned crop fields (A2 00), mixed field crops (A201), corn (A202), sugarcane (A203), tapioca (A204), pineapple (A205), etc.

5) Perennial trees (A3) classified into abandoned perennial trees (A3 00), mixed perennial trees (A3 01), rubber (A3 02), oil palm (A3 03), eucalyptus (A304), teak (A305), etc.

6) Fruit trees (A4) classified into abandoned fruit trees (A400), mixed fruit trees (A4 01), oranges (A4 02), durians (A4 03), rambutans (A4 04), coconuts (A405), lychees (A406), mangoes (A407), tamarinds (A412), etc.

7) Garden plants (A5) classified into mixed garden plants (A5 01), grapes (A504), pepper (A505), etc.

8) Pasture/animal rearing houses (A7) classified into pasture land (A701), poultry house (A703), swine house (A704), etc.

9) Aquaculture stations (A9) classified into abandoned aquaculture stations (A9 00), mixed aquaculture stations (A9 01), fish farming station (A9 02), shrimp farming station (A903), etc.

10) Natural water sources (W1) classified into rivers and canals (W101), lakes and swamps (W102)

11) Man-made water sources (W2) classified into reservoir (W2 01), field pond (W202)

12) Mines (M3) classified into old/abandoned mines (M300), ore mines (M301), laterite ponds (M302), sand pit (M303), etc.

13) Natural pasture (M1) classified into pasture (M01), shrubs (M102), bamboo (M103), etc.

14) Others (M4) classified into salt field (M401), outcrop (M403), etc.

2.3.4 Oil Palm Cultivated Areas in Thailand and Chumphon

Oil palm was Thailand's important economic crop. The south was the country's main oil palm cultivation mostly in Surat Thani, Krabi, Chumphon, and Nakhon Si Thammarat covering the areas of 1,306,973 rais, 1,138,323 rais, 1,026,000 rais, and 607,583 rais respectively. Moreover, oil palm cultivation was also found in Chon Buri, Trat, and Sa Kaeo. The details are in Table 2.1

Table 2.1 Areas of Oil Palm Cultivation in Thailand in 2018 (Perennial Areas, Fruit Giving Areas, Yields, and Yields Per Rai)

Provinces	**Perennial Trees (rais)**	**Fruit Trees (rais)**	**Yields (tons)**	**Yields Per rai (kg.)**
Nationwide	5,878,127	5,352,641	15,534,984	2,902
North	88,753	75,975	97,353	1,281
Northeast	203,694	167,247	257,966	1,542
Central plains	516,691	487,720	1,218,748	2,499
South	5,068,989	4,621,699	13,960,917	3,021
Chiang Rai	12,479	11,835	18,588	1,571
Phayao	3,152	2,937	4,232	1,441
Lampang	2,000	2,000	2,104	1,052
Lamphun	1,203	1,203	1,385	1,151
Chiang Mai	1,359	1,359	1,166	858
Mae Hong Son	209	209	-	-
Tak	2,217	1,639	1,547	944
Kamphaeng Phet	7,507	6,890	9,157	1,329
Sukhothai	9,231	6,853	4,944	721
Phrae	1,833	1,450	606	418
Nan	4,215	3,447	2,593	752
Uttaradit	4,287	4,011	3,452	861
Phitsanulok	16,055	12,565	21,933	1,746

Provinces	Perennial Trees (rais)	Fruit Trees (rais)	Yields (tons)	Yields Per rai (kg.)
Phichit	414	287	394	1,373
Nakhon Sawan	2,745	2,043	2,130	1,043
Uthai Thani	9,669	9,103	12,414	1,364
Phetchabun	10,178	8,144	10,708	1,315
Loei	20,572	16,541	31,827	1,924
Nong Bua Lam Phu	6,783	5,934	5,226	881
Udon Thani	24,857	24,171	30,700	1,270
Nong Khai	19,430	17,285	25,896	1,498
Bueng Kan	27,052	21,579	42,774	1,982
Sakon Nakhon	22,823	16,082	17,495	1,088
Nakhon Phanom	6,932	5,777	6,301	1,091
Mukdahan	3,525	2,412	3,508	1,454
Yasothon	3,530	3,493	4,364	1,249
Amnat Charoen	5,383	5,244	7,239	1,380
Ubon Ratchathani	20,631	16,216	27,197	1,677
Si Sa Ket	8,308	5,951	9,017	1,515
Surin	5,695	2,980	4,523	1,518
Buri Ram	7,427	5,130	9,933	1,936
Maha Sarakham	173	173	121	699
Roi Et	1,627	1,529	2,583	1,689
Kalasin	5,396	5,217	6,830	1,309
Khon Kaen	1,827	1,813	2,437	1,344
Chaiyaphum	3,872	3,789	7,506	1,981
Nakhon Ratchasima	7,851	5,931	12,489	2,106
Saraburi	7,196	6,921	22,571	3,261
Lop Buri	2,982	2,815	4,189	1,488
Sing Buri	29	29	83	2,862
Chai Nat	1,376	1,295	1,576	1,217
SuphanBuri	1,453	1,429	2,595	1,816
Pathum Thani	8,154	8,066	30,072	3,728
Nakhon Nayok	4,443	2,680	5,931	2,213

Provinces	**Perennial Trees (rais)**	**Fruit Trees (rais)**	**Yields (tons)**	**Yields Per rai (kg.)**
PrachinBuri	16,304	14,610	27,255	1,866
Chachoengsao	28,969	23,356	50,635	50,635
Sa Kaeo	41,316	39,153	80,108	2,046
Chanthaburi	24,735	24,382	52,058	2,135
Trat	63,141	61,629	170,223	170,223
Rayong	32,194	29,629	74,812	2,525
Chon Buri	109,559	108,040	308,655	2,857
SamutPrakan	84	77	150	1,948
Kanchanaburi	15,369	14,742	23,369	1,585
Ratchaburi	9,879	9,413	14,411	1,531
Phetchaburi	13,147	12,966	27,640	2,132
Prachuap Khiri Khan	136,361	126,488	322,415	2,549
Chumphon	1,026,000	971,251	3,008,153	3,097
Ranong	147,386	119,055	366,956	3,082
Surat Thani	1,306,973	1,179,458	3,640,097	3,086
Phangnga	261,668	234,566	701,746	2,992
Phuket	2,035	1,774	4,593	2,589
Krabi	1,138,323	1,086,190	3,383,122	3,115
Trang	230,439	191,989	556,291	2,898
Nakhon Si Thammarat	607,583	530,058	1,553,088	2,930
Phatthalung	72,449	57,997	148,996	2,569
Songkhla	70,371	62,530	156,546	2,504
Satun	115,775	108,266	276,557	2,554
Pattani	24,455	18,273	45,772	2,505
Yala	7,303	6,728	10,574	1,572
Narathiwat	58,229	53,564	108,426	2,024

Source: Office of Agricultural Economics (2018a)

In Chumphon, there were 3,755,630 rais of land. In 2018, the areas of land use included the following details: Agricultural land, forest land, urban and built-up land, miscellaneous land, and water body covering the areas of 2,564,597 rais, 965,684 rais, 124,615 rais, 66,721 rais, and 34,013 rais or 68.29%, 25.71%, 3.32%, 1.78%, and 0.90% respectively. The areas for oil palm cultivation constituted 1,146,775 rais or 30.55%. Most areas of oil palm cultivation were situated in ThaSae, Phathio, Sawi, and Lang Suan Districts covering the areas of 313,718 rais, 159,694 rais, 129,073 rais, and 121,275 rais respectively.

Table 2.2 Areas of Oil Palm Cultivation in Each District in Chumphon in 2018

Province/District	**Cultivated Areas/Oil Palm Yields**			
	Perennial Trees (rais)	**Fruit Trees (rais)**	**Yields (kg/rai)**	**Yields Per rai (kg/rai)**
Chumphon	1,026,000	971,251	3,008,153	3,097
Mueang Chumphon	109,470	103,006	295,524	2,869
ThaSae	313,718	305,612	1,015,549	3,323
Phathio	159,694	148,924	479,237	3,218
Phato	63,020	60,596	176,456	2,912
Sawi	129,073	117,282	376,241	3,208
Lang Suan	121,275	115,526	319,314	2,764
Lamae	89,500	80,644	233,948	2,901
Thung Tako	40,250	39,661	111,884	2,821

Source: Office of Agricultural Economics (2018b)

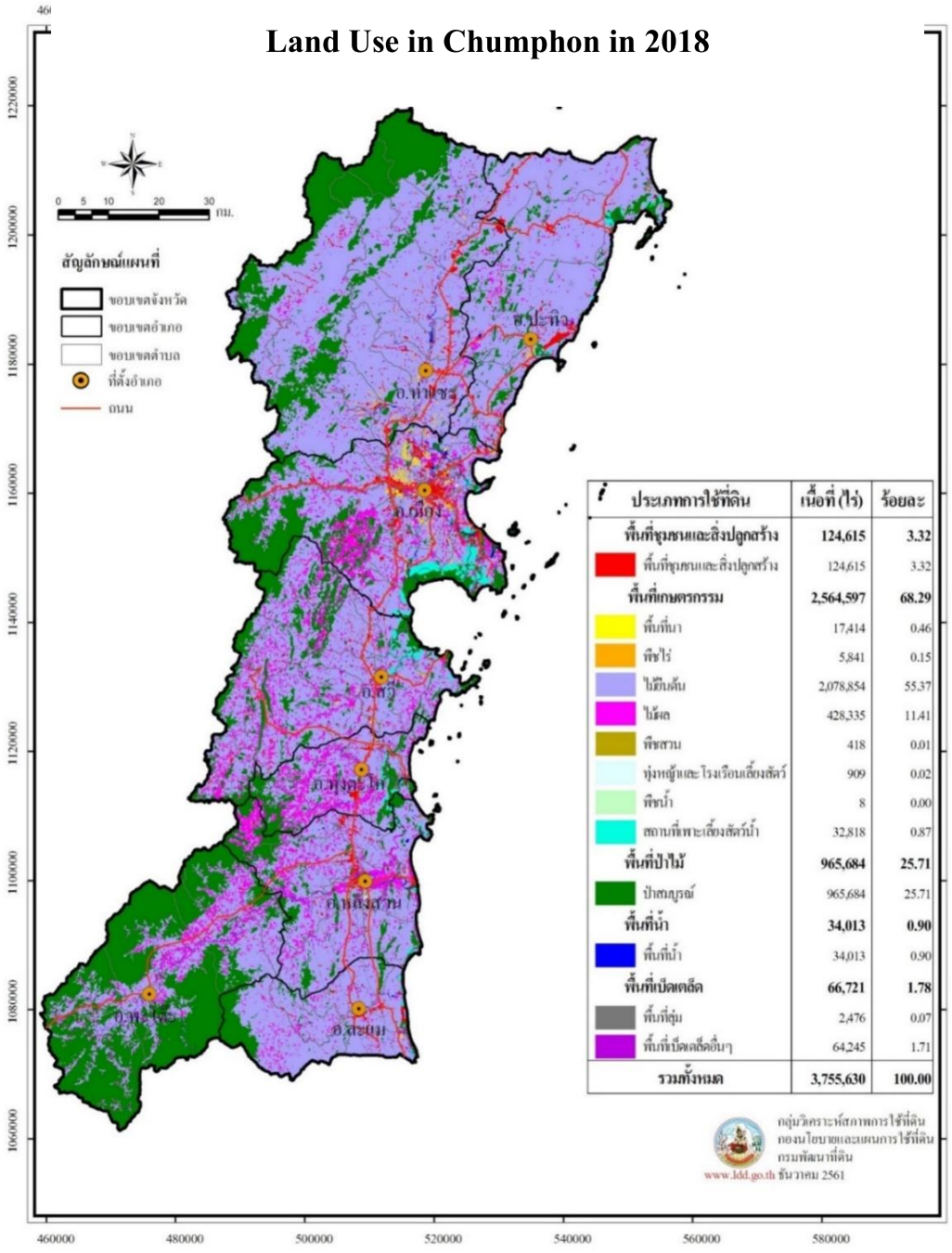

Figure 2.1 Land Use in Chumphon in 2018

Source: Division of Land Use Planning and Policy (2018)

2.3.5 Change of Land Use

There were changes of land use with economic, social, and population changes in the areas or natural changes such as disasters, etc. At present, human activities constituted the major change in land use. The increased population entailed the increased land use. It resulted in various forms of land use in the areas such as changes in types of farmers' cultivation, changes from agricultural land to residential area, etc. The changes in land use that were not appropriate to the potential of the land would impact the community's way of life, natural resources, and environment in local areas. The changes in land use could apply the Geographic Information System (GIS) in order to compare the land use of interest. The methods could be used to compare different land uses such as change matrix (Kanchaya Maosew & Jaruntorn Boonyanuphap, 2014; Sunee Lamsa & Karika Kunta, 2018), etc. The GIS could ensure that those who studied understood the changes of land use. They would know what type of land use changed to other type of land use both in quantity and area base. So, they could well study the causes and impact on the changes of land use.

The areas for palm cultivation in Thailand increased rapidly due to increased demand of energy from petrol. More alternative energy was used to replace petroleum especially biodiesel which was energy with highest efficiency that could replace petroleum in the future. As a consequence, there was expansion of oil palm cultivation in the inappropriate areas or areas of conservation which impacted the eco-system, as well as the use of agricultural resources for oil palm such as Kuan Krengpeat forest, Cha-Uat District and Chian Yai District, Nakhon Si Thammarat (Piyawan Nuengmatcha, Ed Sarobol, Vipak Jintana, & Krittayakan Dechdee, 2017; Piyawan Nuengmatcha & Prawit Nuengmatcha, 2018). As for the areas of oil palm cultivation in Chonburi between 2002-2013, it was found that the most increased areas were for palm cultivation by changing from the most areas of sugarcane cultivation (Panupong Buntaotook, 2014) The study of the change of land use of oil palm was therefore important to reduce impact on natural resources and environment, as well as efficiently determine the measures relevant to oil palm at the area level.

2.4 Management of Oil Palm Plantation

At present, farmers faced the problems of yields due to inefficient and inappropriate management from the process of cultivation, harvest, and transport resulting in low yields without quality. Farmers faced many limitations in terms of income from sales of oil palm which forced them to harvest earlier to earn income as expected. The farmers also had to provide laborers by themselves for the harvest probably partly from their families. But they mostly hired almost all laborers. Sometimes, there was shortage of labor force both for cutting and gathering palm especially during the period of high yields. A lot of palm was left and not transported to factories causing the higher percentage of Free Fatty Acid (FFA) in the palm resulting in lower quality of fresh palm and the palm would be undersold. Sometimes the farmers faced the problems of harvest whereby laborers cut and brought crude palm for sale. So, farmers had to select and discard the yields and lost income from harvest of crude palm (Agricultural Research Development Agency (Agricultural Research Development Agency (Public Organization), 2018a).

2.4.1 Guideline to Increase Efficiency of Quality Oil Palm Production

1) Farmers should form groups for cultivation, harvest, and transport of oil palm to meet quality and standards.

2) Farmer institutions or oil palm crushing mills should serve as centers in providing efficient services on harvest and transport for smallholder farmers especially allocation of labor force, arrangement of schedule for labor force, as well as schedule of trucks transporting oil palm to be used in the activities of harvest and transport. Farmers who were group members could also participate in the group labor force to harvest palm for the other group members.

3) Up-to-date database should be put in place to show the basic information of the determination of efficient system of harvest and transport especially information on the plot with year of cultivation, age of palm trees, first year of flowering, first year of sales, positions and codes of the palm trees, etc.

4) IT system should be put in place for schedule arrangements of harvest and transport as decision making tool in providing farmers with services on harvest and transport.

5) Knowledge should be transferred to palm growers and stakeholders in the palm oil industry such as community crushing mills on correct methods of palm harvest, preparation of information on the plot, as well as arrangement of schedules for harvest and transport.

6) Determine the management model by focusing on participation of stakeholders in the supply chain system such as farmers, laborers, community oil palm crushing mills, farmer members, etc.

7) Coaching should be set up for farmer institutions or oil palm crushing mills to serve as centers of services for harvest and transport.

2.4.2 Database System for Management of Oil Palm Plantation

Every year, the farmers' expansion of areas for oil palm cultivation depended on many factors such as yield prices, and policies of the public cultivation promotion, etc. Consequently, the oil palm cultivated in Thailand had different ages of palm trees due to different times of cultivation causing obstacles in efficient management of oil palm yields in the country. It was therefore necessary to develop the database system of oil palm production.

2.4.2.1 Database of the areas of oil palm cultivation was an important data to analyze and assess the potential of oil palm yields in each area in order to chart the map of the areas of oil palm cultivation in Thailand using the Geo-Information Technology and field survey.

2.4.2.2 The advantages of the database were to collect the data on the distribution of the areas of oil palm cultivation in each soil group, inclination, classification of the appropriateness of the areas, as well as data of yields, species, age of palm trees, oil palm bunch yields/rai/year, types of fertilizer, consumption rate, and management of oil palm plantation, etc.

2.4.2.3 Utilize the database of the areas of oil palm cultivation consisting of 1) Formulate the policy on management of oil palm plantation 2) Forecast of oil palm yields 3) Consider the areas of oil palm replanting and 4) Monitor the changes in the areas of oil palm cultivation.

The management of oil palm plantation would reduce the problems of oil palm production, and enhance efficient and appropriate production from the process of cultivation, maintenance, harvest, and transport resulting in yields with quality, sales for good prices, impacting income or oil palm farmers and producers.

2.5 Thailand's Oil Palm and Palm Oil Industries

2.5.1 Supply Chain of Oil Palm and Palm Oil Industries

The supply chain of oil palm and palm oil industries consisted of four main compositions namely oil palm growers, fresh fruit bunch processors, crude palm Oil processors, and processors of continuous industries (Agricultural Research Development Agency (Public Organization), 2018b).

2.5.1.1 Oil palm growers (upstream production) were divided into three main groups namely 1) Private companies who were palm growers with business management. Most were the other business of oil palm crushing mills with their own palm plantations, with good management and high average yield per rai 2) Smallholder farmers with the average cultivated areas of 10–20 rais per farmer. The farmers in this group were numerous and diverse. The areas of palm plantation were scattered with the average low yield per rai of approximately 2–2.5 tones/rai. The model of sales of yield of this group of farmers would be done by selling oil palm bunch to local merchants, or to oil palm bunch collection centers, and selling directly to oil palm crushing mills and 3) Farmer groups in the form of cooperatives of oil palm growers with the combined cultivated areas clearly in big plots with high negotiating power due to work based on group system, with executive director, manager with production efficiency at fair level.

2.5.1.2 Fresh fruit bunch processors (upstream product processing industry) such as oil palm crushing mills. At present, there were over 80 oil palm crushing mills situated in the areas of palm plantation. Most oil palm crushing mills produced crude palm oil and sold it to virgin palm oil refineries or other industries to produce biodiesel. Oil palm crushing millers were formed as associations of oil palm crushing mills.

2.5.1.3 Crude palm oil processors (midstream product processing industry) such as virgin palm oil refineries. The entrepreneurs in this group either purchased crude palm oil from oil palm crushing mills to refine or purchased palm to crush in their factories before sending crude palm oil to refineries or had their own palm plantations to sufficiently manage raw materials into factories since upstream industry.

2.5.1.4 Processors of continuous industries (downstream product processing industry) such as production of biodiesel. At present, there were 12 producers of biodiesel in Thailand with approval from Department of Energy Business (October 2018) with main raw materials form oil palm industry such as crude palm oil (CPO), Refine Bleaching Palm oil (RBDPO), Palm stearin, and used vegetable oil.

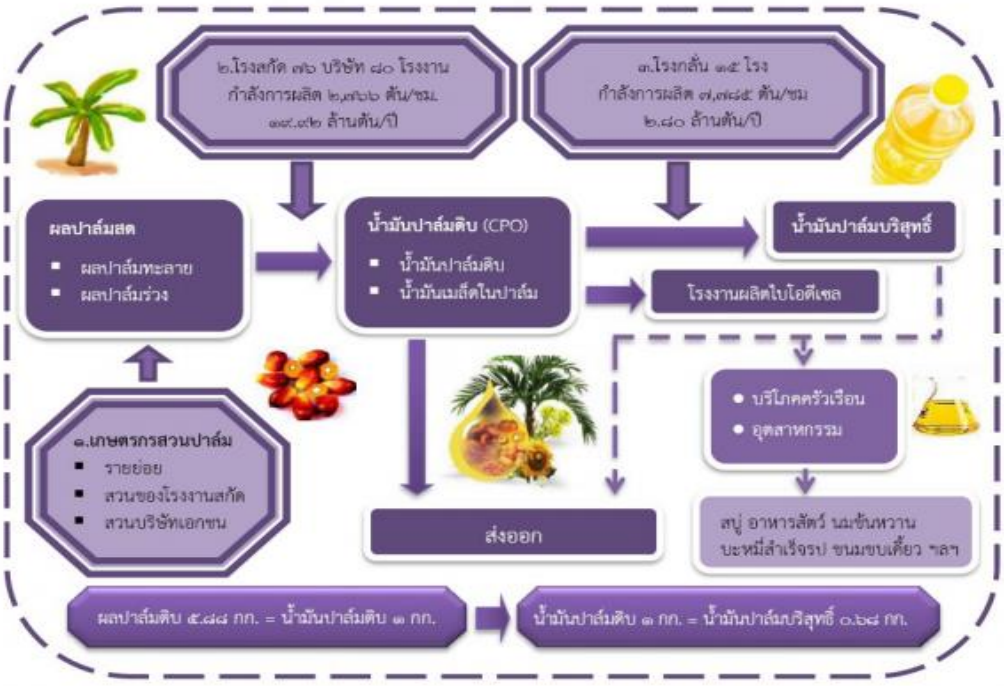

Figure 2.2 Supply Chain of Oil Palm and Palm Oil Industries
Source: Agricultural Research Development Agency (Public Organization) (2018b)

2.5.2 Oil Palm Processing

There are 2 types of mill processing processes for palm oil, namely normal standard (separate oil pressing process) and mixed oil pressing process. The oil palm processing in accordance with standard will give grade A quality oil yields due to the separation of palm oil types. The mixed oil pressing standard will give the oil yields obtained a mixture of palm oil from the shells and the palm kernel, by-products, and waste or industrial waste namely, Crude Palm Oil, Palm Kernel Oil, Empty Bunch, Fiber, Palm Shell, Wastewater, and Cake Decanter, etc.

2.5.3 Palm Oil Production Process

There are 4 palm oil production processes as shown in Figure 2.6, which are;

2.5.3.1 Sterilization; by baking at a temperature of 130 to 135 degrees Celsius with a pressure of 2.5 to 3 bars for a period of 50 to 75 minutes. The sterilization will stop the lipolysis reaction that produces free fatty acids in the palm fruits and helps the palm fruits to easily be removed from the bunch.

2.5.3.2 Stripping; it is to deliver the palm bunch into a sorting machine to separate the palm fruits from the bunch. Then, the empty bunch will be separated. After that, the palm fruits will be grinded by the granulator. So that the palm shells will be separated from the palm kernels.

2.5.3.3 Oil Extraction; it is a process of baking the palm shells at a temperature of 90 to 100 degrees Celsius for a period of 20 to 30 minutes. After that, it will pass through the double spirals pressing machine until obtaining crude palm oil with the composites of oil at 66%, water at 24%, and solids at 10%.

2.5.3.4 Clarification; it is a process of delivering crude palm oil to the filter tank to separate water and solids. Then it will be delivered to a centrifuge for cleaning again to remove water and dry. Finally, it will be sent to the oil storage tank for refinery or further distribution.

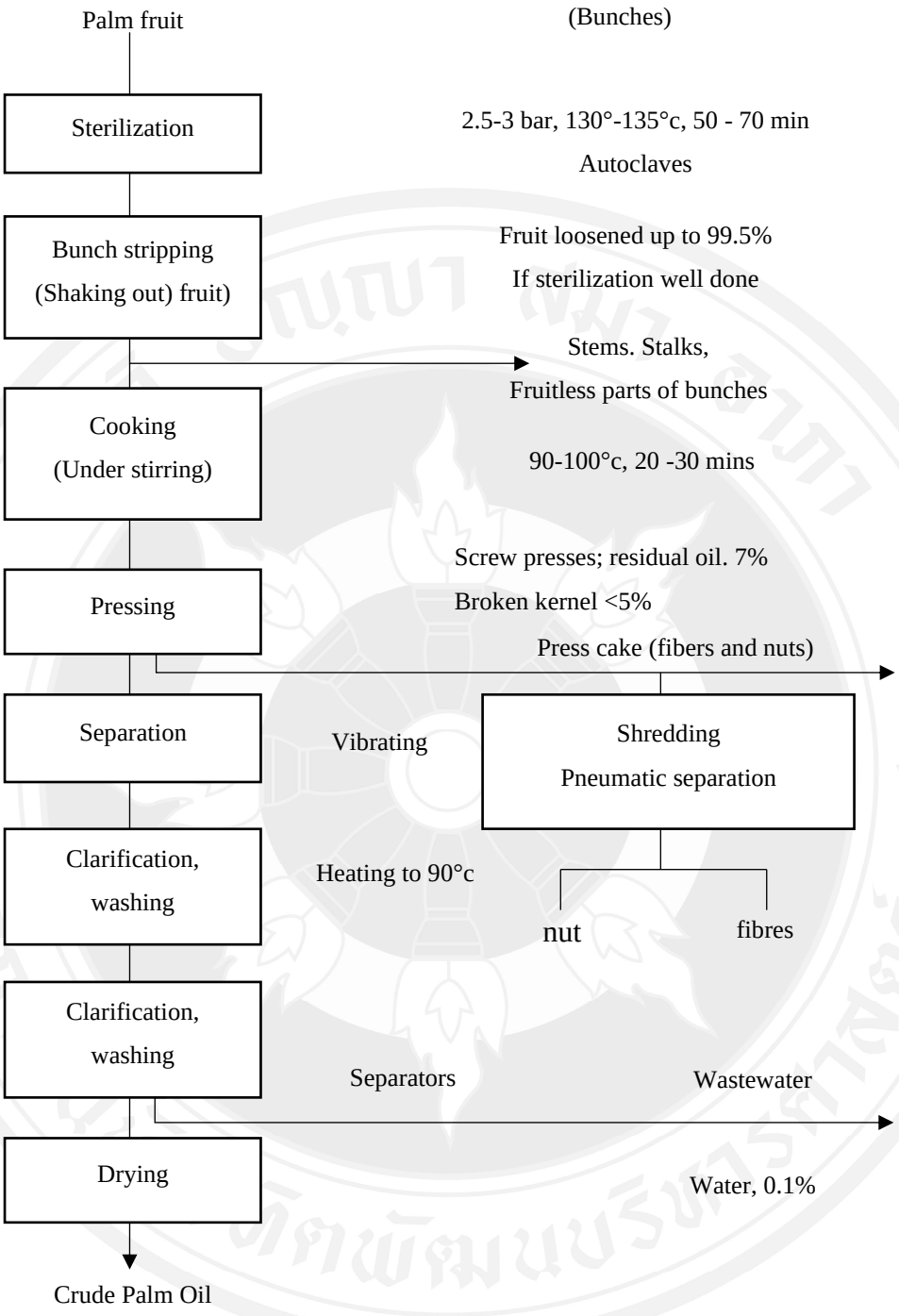

Figure 2.3 Palm Oil Production Process

Source: Agricultural Research Development Agency (Public Organization) (n.d.)

2.5.4 Refine Processing

It is a process that makes crude palm oil and crude palm kernel oil into pure palm oil and pure palm kernel oil, ready for consumption. The refine processing can be divided into 2 methods, which are; (Agricultural Research Development Agency (Public Organization), n.d.), as shown in Figure 2.7.

2.5.4.1 Physical or Steam Refining; it is the process of removing free fatty acids by passing steam into hot oil, then it will be distilled to separate the free fatty acid and odor-causing substances to be evaporated. Therefore, the odor will be eliminated and the palm oil will be neutralized at the same time. The process of Physical or Steam Refining can be done by preparing crude palm oil or crude palm kernel oil without phospholipids that has been eliminated with water, then reacted with phosphoric acid at a concentration of 80-85%. Later, 0.05-0.2% of crude palm oil will be mixed with palm oil at a temperature of 90 to 100 degrees Celsius for a period of 15 to 30 minutes, then the bleaching powder (Bleaching Earth) will be added about 0.8-2.0% of crude palm oil and bleached under the vacuum conditions at a temperature of 95 to 100 degrees Celsius for a period of 30 to 45 minutes. After that, the palm oil will be passed into the filter and the non-phospholipid oil will be obtained. After that, it will be passed to a process of distillation with the steam at the oil temperature of 240 to 270 degrees Celsius for a period of 1 to 2 hours under the vacuum conditions. Finally, the “Refined Bleached and Deodorized Palm Oil, RBD PO” or “Refined Bleached and Deodorized Palm Kernel Oil, RBD PKO” are obtained.

2.5.4.2 Chemical Refining; it is a process to remove free fatty acids by using a popular chemicals which is the solution of sodium hydroxide or sodium carbonate, reacted with free fatty acids in the palm oil, generating soap. Then, soap is separated by using a centrifuge method. The concentration of alkalis used in this method will vary with the amount of free fatty acids in palm oil. Refining palm oil with alkaline solutions begins with heating crude palm oil at a temperature of 80 to 90 degrees Celsius, then adding phosphoric acid at concentrations of 80-85% in the quantities of 0.05-0.2%. The alkaline solutions will be added and the soap is obtained. After that, the soap will be separated by a centrifuge and washed by water. Later, the palm oil will be heated to remove water by evaporation, followed by being bleached

and odor elimination with steam, then the “Neutralized Bleached and Deodorized Palm Oil” are obtained. They will be refined and separated into two parts, namely the bottom part that is greasy and the top part is oily, with a light yellow to dark yellow color. It’s because this refined oil obtains some chemical and physical properties and unsuitable for a production of some certain products. Therefore, the modification of the properties of palm oil are studied by applying various processes in order to be able to be used for a production of a wider variety of products. And there is also an important by-product from this process which is a Palm Fatty Acid Distillated (PFAD). It is commonly used as a raw material for making animal feeds, soaps, and as a precursor for extracting various fatty acids or extracting vitamin E in the food industry (Oleochemicals Industry).

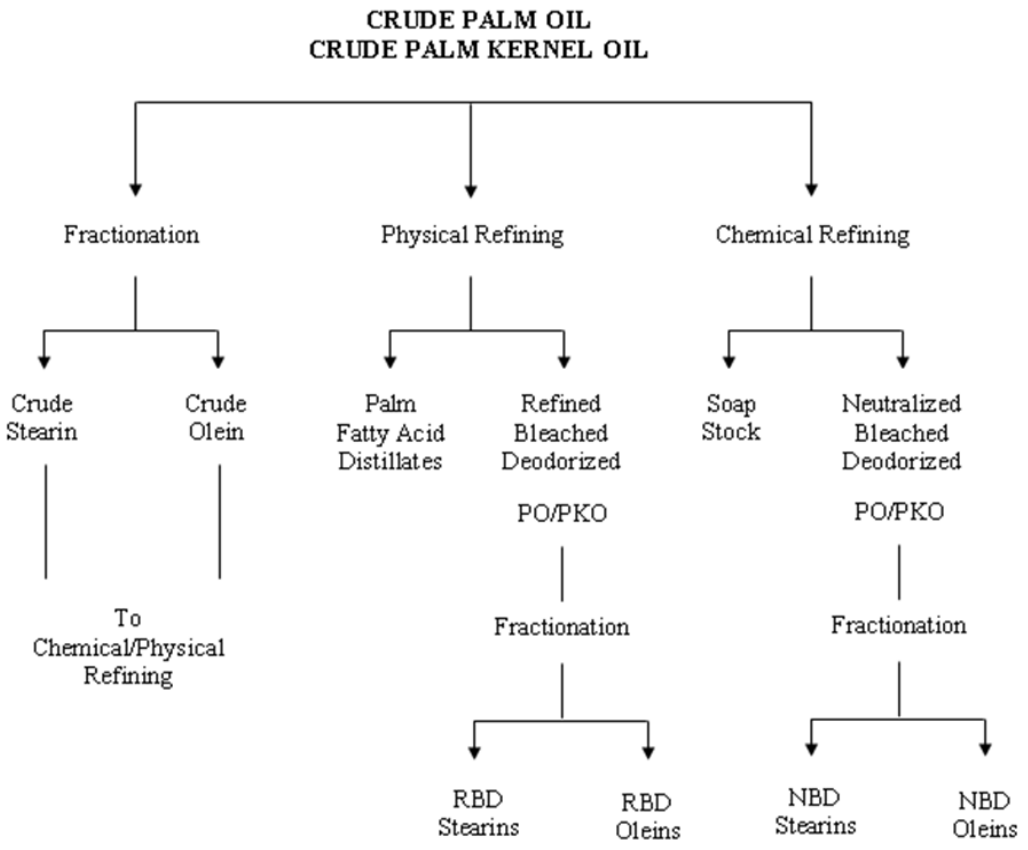

Figure 2.4 Fractionation and Refining of Crude Palm Oil and Palm Kernel Oil
Source: Agricultural Research Development Agency (Public Organization) (n.d.)

2.5.5 Downstream Industry

Palm oil and biomass energy; Oil palm waste obtained from the extraction process of crude palm oil both fibers, palm shells, and the empty palm bunch can be used as fuel, called "biomass". The biomass energy is an energy that is accumulated by plants. The plants will convert the sunlight into the energy and store in various parts, such as palm oil trees. The energy will be accumulated and stored in all parts, since the palm fruits, fibers, palm shells, and empty palm bunches. So, the waste of oil palm trees can be used as fuel, called "biomass energy".

Biogas from wastewater; it's considered as another renewable energy. Biogas is a liquid biomass, generated by a fermentation process of organic substances, such as wastewater from crude palm oil extraction, animal manure or fresh waste. These can be fermented in a closed system resulting in methane which is a clean energy and very useful, such as a substitution of LPG, as fuel or as an energy for electricity generation.

2.5.6 The Utilization of Palm Oil

Palm oil can be processed into various industrial products with various utilization as shown in Figure 2.8, namely

2.5.6.1 CPO Crude Palm Oil; it is a product obtained from the process of extracting fresh oil palm fruit bunches.

2.5.6.2 KO Crude Palm Kernel Oil; it is a product obtained from the process of extracting oil palm kernel.

2.5.6.3 RKO RBD Palm Kernel Oil: it is a product obtained from the refine processing process of palm kernel oil (KO) to obtain refined palm kernel oil. It's normally used as a raw material in the soap manufacturing industry, food industry, such as a sweetened condensed milk, ice cream, white butter, etc.

2.5.6.4 RPO RBD Palm Oil: it is a product obtained from the refine processing process of crude palm oil (CPO) to obtain refined palm oil. It's normally used as raw materials in the food industry, such as instant noodles, margarine, ice cream, sweetened condensed milk, soap, etc.

2.5.6.5 ROL RBD Palm Oil; it is a product obtained from the extraction process of refined palm fat out of refined palm oil (RPO) to obtain palm olein. It's commonly used as a raw material in all types of food industry relevant to frying, such as snacks, instant fried food, and consumption in households.

2.5.6.6 PHST RBD Palm Stearin; it is a product obtained from the extraction process of refined palm fat out of refined palm oil (RPO) to obtain refined palm oil. It's commonly used as a raw material in the food industry, such as the manufactures of margarine, white butter, topping cream, and the Oleochemicals soap manufacturing industry.

2.5.6.7 PFAD Palm Fatty Acid Distillate; it is a product obtained after refining Crude Palm Oil (CPO) in order to obtain Palm Fatty Acid. It's normally used as a raw material in the soap manufacturing industry, Oleochemicals industry, Vitamin E production, including biodiesel production industry.

2.5.6.8 KFAD Palm Kernel Fatty Acid Distillate; it's a product obtained after refining palm kernel oil (KO) to obtain palm kernel fatty acids. It's normally used as a raw material in the soap manufacturing industry, Oleochemicals industry including the biodiesel production industry.

2.5.6.9 KM Kernel Meal; it's a product obtained after the extraction process of palm oil out of palm kernel to obtain palm kernel waste. It's normally used as a raw material in the animal feeds industry.

2.6 Standards Relevant to Oil Palm Production

There were many standards relevant to oil palm production in Thailand depending on farmers, area features, and others. In this study, Roundtable on Sustainable Palm Oil (RSPO), Good Agriculture Practices (GAP), the standards of agricultural products, the principles of sustainable oil palm and palm oil production would be discussed.

2.6.1 Roundtable on Sustainable Palm Oil (RSPO) Standard

Roundtable on Sustainable Palm Oil meant sustainable oil palm production covering the sustainable dimension of economy, society, and environment. Stakeholders from many sectors initiated the guideline to support wider sustainable oil palm production with members which included oil palm growers, palm oil producers, traders, producers of consumer products, retailers, investors, NGOs in the fields of society and environment.

2.6.1.1 Background and Significance of Sustainable Oil Palm Production:

Due to the increased demand of the oil palm in countries around the world at present especially the consumption of oil palm as alternative energy, there was widespread expansion of the areas for oil palm cultivation, causing the problems of deforestation, impact on environment and biodiversity, as well as exploitation of labor force and smallholder farmers, which had direct and indirect impact on society and local communities, so that there were protests of palm oil and palm oil products in many countries especially in the EU. Therefore, the stakeholders from all sectors consisted of groups of oil palm growers, industrial entrepreneurs who were oil palm crushing millers, traders, producers, investors, and NGOs in the fields of society and environment initiated the project of Roundtable on Sustainable Palm Oil or RSPO. The main objectives were to support sustainable oil palm production in countries worldwide by determining criteria methods, and practical guideline for farmers and oil palm crushing mills to follow. However, as each country had its own social and economic contexts with different processes of oil palm production, the RSPO provided the opportunity for each country to determine its own criteria and indicators under the framework of RSPO. The international RSPO standard stipulated eight Principles to serve as the framework of sustainable palm oil production covering management, legal operation, economic feasibility, appropriateness, impact on environment, and benefit to society.

To ensure reliability of sustainable oil palm production, all RSPO members with legal ownership and sustainable production or management of oil palm products needed to be certified by RSPO. Importantly for this process, there were the principles and criteria of RSPO.

The certified oil palm producers went through the inspection of production process based on the stringent principles and criteria of RSPO for sustainable oil palm production. The certified organization could have their certification revoked all the time in case of violation of rules and standards. All certified organizations in the supply chain with sustainable oil palm products from RSPO must be inspected to prevent the mixing of sustainable oil palm with uncertified products. An organization could request to use the logo of RSPO on its packaging once it was certified with sustainable oil palm products.

There were three standards of sustainable oil palm production namely the standards of sustainable oil palm production for large growers, standards of sustainable oil palm production in the supply chain, and standards of sustainable oil palm production for smallholder farmers. Moreover, there were regulations of RSPO – RED to accord with the regulations of alternative energy of EU which was designed to be complimentary to the RSPO standard based on the voluntary basis, as well as RSPONEXT whereby the certified farmers must not practice the following activities: deforestation, burning, cultivation on peatland, reduction of GHGs, respect of human rights, and transparency.

2.6.1.2 Standards of Sustainable Oil Palm Production for Smallholder Farmers

The standards of sustainable oil palm production for smallholder farmers determined the regulations of management system according to the RSPO standard and the guideline to certify the groups. For fresh palm fruit, it was first announced in 2016 with the first improvement in 2018 and the second improvement in April 2019.There were three regulations of the group and eight regulations of the group members as follows:

2.6.1.3 Commitment to transparency and accountability such as in the case of smallholder farmers in the project must enter into contract with agreement and documents that must be disclosed, documents on land ownership, and action plans on health and safety.

2.6.1.4 Compliance with law and regulations at local, national, and ratified international levels. For example, compliance with the regulations on land tenure, rights of land use to prevent palm growers from trespassing, environmental laws to prevent environmental destruction, or labor laws to ensure correct use of labor.

2.6.1.5 Commitment of long term economic and financial security. Therefore, there must be management plan with the goal of economic and financial security such as plan to use palm seeds with high quality, and training plan to transfer knowledge to members to ensure increased palm yield on a continuous basis.

2.6.1.6 The best practice of oil palm growers and oil palm crushing mills consisted in the operation process with appropriate model, implementation, and regular monitoring of operation performance. For example, in farmer groups, members must operate to maintain the soil fertility, recording of the use of fertilizers, management strategies of land with problems such as sandy soil, highly acid soil, recording of the use of chemicals, and integrated pest management.

2.6.1.7 Responsibilities towards environment, preservation of natural resources, and biodiversity: Impact must be notified on the environment that could take place from the management of palm plantation and oil palm crushing mills. For example, the environmental management system was established (ISO 14001) with identification of plants and animals with high conservation value in the palm plantation and with conservation. For factories, they must reduce waste, recycle waste, and manage waste showing CSR.

2.6.1.8 Responsibilities towards employees, people, and communities affected by oil palm growers and mills. In practice, if any palm plantation or mill conducted any activity, there must be participatory process from the communities affected by the activity. There was management of complaints with fair compensation, legal employment, respect of rights of employees/temporary staff, etc.

2.6.1.9 Responsible development of oil palm cultivation in new areas. In the case of expansion of the cultivated areas, the evaluation was conducted on the appropriate impact on society and environment. There was to be no palm cultivation in primary forests or the zones with high conservation value.

2.6.1.10 Commitment to continuously improve the main activities. In operation, regular monitoring and review of activities were required. The action plan must also be formulated to show the continuous improvement of main operations.

2.6.1.11 Situations of compliance with the RSPO standard in Thailand

The RSPO standard was used in many countries and translated into many languages. In Thailand, the RSPO standard was translated into Thai. The formation of groups and compliance to the regulations required the transfer of knowledge on the practical guideline of the sustainable oil palm production based on the RSPO standard to farmers through cooperation of all relevant sectors including public agencies, farmer groups, entrepreneurs of oil palm bunch collection centers, and oil palm crushing mills.

Ministry of Agriculture and Cooperatives in collaboration with Office of Agricultural Economics and Germany's international cooperation agency or GIZ operated the project of oil palm and palm oil production for sustainable bioenergy to drive Thailand's policy of sustainable oil palm production according to the RSPO standard which was based on the economic, social, and environmental criteria, and support local factories and farmer groups to operate according to the RSPO standard focusing on the ability to increase yield, develop quality, develop sustainable system, and produce practical handbook on the RSPO standard for smallholder farmers, as well as the plan of knowledge on the integrated pest management, preservation of soil, water, and resources, as well as what constituted high conservation value to farmers.

In 2018, there were 14 groups of farmers who formed groups to produce oil palm in accordance with the RSPO standard with 3,302 members and with the areas of oil palm cultivation of 127,518 rais or only 2.56% of the total areas of oil palm cultivation in the country. The problems of expanding the areas of oil palm cultivation under the RSPO standard included the adaptation of the farmers to gain access to the

RSPO standard such as joint management, information collection, and compliance with the eight criteria of the RSPO standard.

Following the promotion of farmer groups to reach the standard by supporting the farmers to register as members of RSPO and receive certification, there were 15 groups of smallholder farmers who joined membership of RSPO as shown in Table 2.3

Table 2.3 Smallholder Farmer Groups as Members of RSPO

Ranking	**Name of Group**	**Year of Membership**
1	Sustainable Oil Palm Smallholders Production Univanich- Plaipraya Community Enterprise Group.	2012
2	Nuea Khlong –Khao Phanom Community Enterprise.	2012
3	Surat Thani Sustainable Oil Palm Production Community Enterprise.	2012
4	Sai Kueng-Bang Sawan Sustainable Oil Palm Production Community Enterprise.	2013
5	Tapi-I pan Sustainable Oil Palm Production Community Enterprise.	2013
6	Cooperative Sustainable Oil Palm Production Community Enterprise.	2012
7	Sri Charern Sustainable Oil Palm Production Community Enterprise.	2013
8	Sikao-Wang Wiset Sustainable Smallholding Oil Palm Production Community Enterprise.	2013
9	Trang Sustainable Palm Oil Grower Community Enterprise Network.	2015
10	Sichon Palm Yangyuen Community Enterprise Group.	2015
11	Lumnam Kadae Pattana Oil Palm Community	2015

Ranking	Name of Group	Year of Membership
	Enterprise.	
12	Thappitak Community Enterprise Group.	2017
13	Phanom Settlement Coop. Ltd.	2018
14	Green Isan Palm Community Enterprise.	2018

2.6.2 Good Agriculture Practices (GAP)

Good Agriculture Practices means agricultural practices for good quality products that meet the specified standards, together with productivity, good value for investment, and the production process must be safe for farmers and consumers. The resources are consumed effectively, creating the agricultural sustainability and not causing pollution to the environment. This principle has been established by the Food and Agriculture Organization of the United Nations (FAO). Thailand has adopted GAP guidelines in which the Department of Agriculture, the Ministry of Agriculture and Cooperatives is an agency that is responsible for inspecting and managing the quality management system. The Auditing rules and methods are specified in accordance with GAP principles according to the international principles. It's used as a standard for crops production at the national farm level, including the establishment of a cultivation guidebook according to GAP that aims to create a safe production process that is free from pests, with the satisfied quality by consumers. It consists of regulations on water sources, planting areas, the use of chemical pesticides, storage, transfer of products within the planting areas, data recording system, safe production from pests, production process management to get quality products, harvesting, and post-harvesting practices.

GAP certification is divided into 3 levels which are;

1) The production process that produces safe products.

2) The production processes that are safe and free from pests.

3) The production process that produces safe products, free from pests, and the quality is satisfactory for consumers.

Criteria, requirements, and auditing procedures for all 3 levels of GAP certification, consisting of the following information:

Table 2.4 Criteria, Requirements, and Auditing Procedures for GAP Certification

Requirements	**Criteria**	**Auditing Procedures**
1. Water source	- The water must be obtained from an environment that does not cause harmful substances and microbes.	- Visual inspection of the environment, if at risk, check and analyze water quality.
2. Planting areas	- Must be an area that does not contain harmful substances and microbes that will cause residue or contaminate the products.	- Examining the environment. If at risk, check and analyze soil quality.
3. The use of chemical pesticides.	- If chemicals are used in the production process, applying the instructions or reference according to the recommendations of the Department of Agriculture or according to the labels registered with the Department of Agriculture, the Ministry of Agriculture and Cooperatives. - Must use chemicals in accordance with the program. - Do not use the hazardous substance specified in the prohibited list of agricultural hazardous substance registration.	- Inspect the storage location of pesticides. -Chemicals used by trading partner countries; the data on the use of pesticides must be recorded. In case of doubts, the product samplings must be analyzed for toxic residues.
4. Storage and product transfer within the field	- The location of storage must be clean, well ventilated, and able to prevent contamination of foreign objects, hazardous	- Visual inspection of locations, equipment, containers, including procedures and methods

Requirements	Criteria	Auditing Procedures
	materials, and disease carrier animals. - Transport equipment and carriers must be clean and free from contaminations that affect the safety of consumers. - The products must be carefully transported.	of product transportation.
5. Data record	- There must be a record of information relating to the use of pesticides in agriculture. - Records of surveys and pest control must be recorded. - Management records must be kept in order to obtain quality produce.	- Check the farmers' records according to the record form.
6. Production safe from pests.	- No pests on harvested products. If found, it must be stored separately.	- check the record of pests survey and prevention methods. - Visual inspection on the results of product separation.
7. Production process management to ensure quality products	- Operations and management according to the production control plan - Sorting out inferior products	- Check records of operations and management for the quality products. - Visual inspection of the results of product separation.

Requirements	Criteria	Auditing Procedures
8. Harvesting and post-harvesting practices	- Harvesting at an appropriate stage according to criteria in the production control plan. - Equipment for harvesting; containers and methods of harvesting must be clean and not cause any dangers to product quality. It must not be contaminated with hazardous substances that affect food safety.	- Check the records of harvesting and post-harvesting practices. - Visual inspection of equipment, containers, harvesting procedures and methods.

Source: Office of Agricultural Economics (n.d.)

2.6.3 Standards of Agricultural Products, Principles of Sustainable Oil Palm and Palm Oil Production

As palm oil production used in consumption and alternative energy as well as in oleochemical continuous industry resulted in the expansion of the areas of oil palm plantation, National Bureau of Agricultural Commodity and Food Standards therefore established the standards of agricultural products on the principles of sustainable oil palm and palm oil production to acquire the guideline of sustainable, environmental-friendly, CSR production management, creating economic security to the oil palm industry in the entire system, including the guideline to develop production and assessment to ensure recognition in international trade. This standard was established by the Thai National Interpretation Working Group on Indicators and Guidance under the framework of RSPO 2015, RSPO Principles and Criteria for Sustainable Palm Oil Production in Thailand (TH-NI) with the scope and the eight requirements as follows:

Scope of standard

1) This standard of agricultural products covers the principles and criteria of management of sustainable oil palm and palm oil production in Thailand, taking into account economic, social, and environmental impact.

2) This standard of agricultural goods covers the palm plantation with the areas of oil palm cultivation not less than 312.5 rais (50 hectares) or palm plantations of millers.

Requirements of standard

Principle 1: Commitment to transparency

1) Oil palm growers and millers provide adequate information to other stakeholders on environmental, social, and legal issues relevant to the RSPO criteria, in appropriate languages and forms to allow for effective participation in decision making.

2) Management documents are publicly available, except where this is prevented by commercial confidentiality or where disclosure of information would result in negative environmental or social outcomes.

3) Oil palm growers and millers were committed to ethical business operation and transaction based on the policy of morals and integrity in business operation and transaction with the documents and communication to employees and temporary staff at all levels.

Principle 2: Compliance with applicable laws and regulations

1) There is compliance with all applicable local, national and ratified international laws and regulations.

2) The right to use the land can be demonstrated, and is not legitimately contested by local communities with demonstrable rights.

3) Use of the land for oil palm does not diminish the legal rights, or customary rights, of other users, without their free, prior and informed consent.

Principle 3: Commitment to long term economic and financial viability

1) There is an implemented management plan that aims to achieve long term economic and financial viability.

Principle 4: Use of appropriate best practices by growers and millers

1) Operating procedures are appropriately documented and consistently implemented and monitored.

2) Practices maintain soil fertility or, where possible, improve soil fertility to a level that ensures optimal and sustained yield.

3) Practices minimize and control erosion and degradation of soils.

4) Practices maintain the quality and availability of surface and ground water.

5) Pests, diseases, weeds, and invasive introduced species are effectively managed using appropriate Integrated Pest Management (IPM) techniques.

6) Agrochemicals are used in a way that does not endanger health or the environment.

7) An occupational health and safety plan is documented, effectively communicated and implemented.

8) All employees, workers, and contractors are appropriately trained.

Principle 5: Environmental responsibility and conservation of natural resources and biodiversity

1) Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented, and monitored, to demonstrate continuous improvement.

2) The status of rare, threatened, or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations.

3) Waste is reduced, recycled, re-used, and disposed of in an environmentally and socially responsible manner.

4) Efficiency of energy use and use of renewable energy is maximized.

5) Use of fire for waste disposal and for preparing land for replanting is avoided except in specific situations, as identified in the ASEAN guidelines or other regional best practice.

6) Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored.

Principle 6: Responsible consideration of employees, workers, individuals, and communities affected by growers and mills

1) Aspects of plantation and mill management, including replanting, that have social impacts are identified in a participatory way, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continuous improvement.

2) There are open and transparent methods for communication and consultation between growers and/or millers, local communities and other affected or interested parties.

3) There is a mutually agreed and documented system for dealing with complaints and grievances, which is implemented and accepted by all parties.

4) Any negotiations concerning compensation for loss of legal or customary rights are dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions.

5) Pay and conditions for employees and for employees of contractors always meet at least legal or industry minimum standards and are sufficient to provide decent living wages.

6) The employer respects the right of all personnel to form and join trade unions of their choice and to bargain collectively. Where the right to freedom of association and collective bargaining are restricted under law, the employer facilitates parallel means of independent and free association and bargaining for all such personnel.

7) Child labor must be legal.

8) Any form of discrimination based on race, caste, national origin, religion, disability, gender, sexual orientation, union membership, political affiliation is prohibited.

9) No sexual harassment or inappropriate behavior in working place and protection of rights to have family and take care of children.

10) Growers and millers deal fairly and transparently with smallholder farmers and other local businesses.

11) Growers and millers contribute to local sustainable development wherever appropriate.

12) No forced labor or human trafficking.

13) Oil palm growers and millers must respect human rights.

Principle 7: Responsible development of new plantings

1) A comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations.

2) Soil surveys and topographic information are used for site planning in the establishment of new plantings, and the results are incorporated into plans and operations.

3) New plantings have not replaced primary forest or any area required to maintain or enhance one or more high conservation values.

4) Extensive planting on steep terrain, and/or on marginal and fragile soils, is avoided.

5) No new plantings are established on local peoples' land without their free, prior and informed consent, dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions.

6) Local people are compensated for any agreed land acquisitions and relinquishment of rights, subject to their free, prior and informed consent and negotiated agreements.

7) Use of fire in the preparation of new plantings is avoided other than in specific situations, as identified in the ASEAN guidelines or other regional best practice.

8) Development of oil palm plantations in new plantings must be designed to reduce net emission of greenhouse gas as much as possible.

Principle 8: Commitment to continuous improvement in key areas of activity

1) Growers and millers regularly monitor and review their activities and develop and implement action plans that allow demonstrable continuous improvement in key operations.

The standards of oil palm production included Roundtable on Sustainable Palm Oil (RSPO), Good Agriculture Practices (GAP), and standards of agricultural products. The three standards of the principles of sustainable oil palm and palm oil production had regulations for oil palm production with good quality appropriate to the demand of market and consumers. They also contributed to economy, society, and environment by determining criteria, methods, and practical guideline of oil palm producers for implementation. The three standards could be summarized as shown in Table 2.5.

Table 2.5 Main Points of Standards of Oil Palm Production

Names of Standards	**Main Points**
1. Roundtable on Sustainable Palm Oil (RSPO)	RSPO covered management, legal operation, economic feasibility, appropriateness, reduced impact on environment, and social benefit.
2. Good Agriculture Practices (GAP)	Production with safe yield, safe from pests, and quality as desired by consumers. Regulations on water sources, areas of cultivation, use of agricultural hazardous substances, storage and transport of yield within plots, information recording, pest free production, management of production process to ensure yield with quality, harvest, and post-harvest.

Names of Standards	Main Points
3. Standards of agricultural products, principles of sustainable oil palm and palm oil production.	Guideline of sustainable, environmental-friendly production management with CSR, economic security to oil palm industry in the entire system, including guideline of production development, and evaluation to ensure acceptance in international trade.

Table 2.6 Comparison between Regulations of RSPO Standard and GAP Standard Relevant to Operation to Receive Standard Certification

Issues	RSPO Standard	GAP Standard
1. Information management towards standards	- Farmers must prepare the information according to the requirements and ready for disclosure.	- There must be recording of the information on the use of hazardous materials, survey, prevention, and limitation of pesticides, and management information to ensure quality yield.
2. Document showing land ownership	- Compliance with laws, rules, and regulations, in possession of ownership certificate, and the land use of oil palm cultivation that did not cause troubles to others.	- The areas used in the cultivation must comply with relevant laws.
3. Use of agricultural chemicals and hazardous materials	- Use of pesticides must not be harmful to the health of employees, families, communities, or environment. - Management of pests,	- Use of chemicals must follow instruction or labels and it was prohibited to use hazardous substances identified in the prohibited list of agricultural hazardous materials.

Issues	RSPO Standard	GAP Standard
	diseases, weeds, and invading foreign species with appropriate methods or integrated pest management. - Use of chemicals that were not harmful to health and environment.	- The cultivated areas must not contain hazardous materials or microbes which could be residue or contaminated in the yield. - Refrain from using agricultural hazardous materials before harvest according to the time as specified on the label accompanying the use of each type of agricultural hazardous material or in accordance with the recommendations of the government.
4. Harvest	- Inappropriate harvest, harvest that did not destroy natural resources and environment.	- Harvest during the appropriate time as specified in the criteria of production and use clean harvest equipment and container without being harmful to the quality of the yield.
5. Yield management	- Process of practice and system of monitoring and traceability of fresh palm produce. - Recording and operation based on the system of monitoring and traceability of fresh palm produce.	- Harvested yield must not have pests on it. If found, it had to be separated and discarded. - Clean premise to store the yield with good air ventilation with ability to prevent contamination of hazardous materials. Clean equipment and vehicle used for transfer. Caution must be exercised in moving the yield.
6. Management	- Management for long term economic and financial security.	- Production management to ensure yield with quality and in compliance with the production control plan.

Issues	RSPO Standard	GAP Standard
7. Operation	- Regular monitoring of operation and continuous improvement of operation.	-Review of operation of GAP or review the information recording at least once a year to ensure that production process and improvement of operation process were in accordance with the objectives, as well as recording of information on review and rectifications.
8. Monitoring and inspection	- Regular monitoring of operation and continuous improvement of operation.	- Review of operation of GAP or review the information recording at least once a year for confidence in production process and improve the operation process in line with the objectives, as well as recording of information on review and rectifications.

2.7 Project Evaluation

2.7.1 Meaning of Evaluation

Evaluation means the process of evaluating the value of something by using information or the results from the measurement to compare with the specified criteria (Pitsanu Fongsri, 2006).

Somkid Promjui (2009) described the evaluation as checking the progress of a project or plan, as well as considering the achievement level of that project. Evaluation is a process that indicates the value of a project. In other words, the project has already been implemented, whether it is effective according to the objectives of the project, whether it can do the evaluations before starting project, during the project execution, and after the project has been completed.

Somwang Phithiyanuwat (2010) has given the definition of project evaluation as the process of obtaining information regarding the progress of the project and the success of the project which is an indicator of the project's value. So, it can be said that this is an indicator to show the progress of project whether it meets the objectives of the project, as well as what future plan should be, being as a consideration of value by applying the previous results, including a consideration of the potentials and alternatives for future operations.

Evaluation is an operation for improvement and development, not for fault finding. The hierarchy of the goals and objectives of the evaluation, both at the plan level and the project level are for the purpose of evaluating the efficiency, effectiveness, and impacts, being as a basis for reward and punishment, with care in a process of data collection in order to obtain the most accurate and reliable information. (Wathana Wongkiatirat & Suriya Wirawong, 2002).

Objectives of Evaluations

1) To determine whether the project is able to meet the objectives, goals, or needs of the organization, and society.

2) To determine whether it is appropriate for all limited resources.

3 To assess the impacts of various project activities on the environment and society, therefore, it’s needed to be evaluated to find a solution.

4) To consider and select the most suitable project in case of many proposals with the same objectives.

Therefore, it can be concluded that Project Evaluation refers to the data analysis process that the data has been applied for analysis to find the relationship of causes and effects towards the environment, including the inputs, processes, and products whether it meets the objectives, in order to apply the results for a judgment in finding a suitable solution for improving and adjusting the project to be more efficient and effective.

2.7.2 Concepts Regarding Evaluation

Table 2.7 Concepts Regarding Assessment

What to be Evaluated	Evaluation	
	Measurement	**Judgment**
- Objectives	- Assessment tools	- Starting
- Indicators	- Data collection	- Improving
	- Data Analysis	- Concluding

Source: The Office of Educational Standards, Office of Rajabhat Institutes Council, Ministry of Education Office of Higher Education Standards, and Ministry of University Affairs (2002)

From Table 2.7, it was found that the evaluations are relevant to the measurements and the judgment in what to be evaluated. Details are as follows;

2.7.2.1 What to be evaluated; in the process of evaluating any of things, the evaluator must determine what to be evaluated, namely the purpose and indicators that are clear. The purpose of the evaluation will indicate the goals and what to be evaluated. The indicators for evaluation will specify the criteria for deciding the value of what to be evaluated according to the objectives specified. What to be evaluated can be defined in various forms according to the methods of evaluation. If the evaluation is in the form of CIPP, what to be evaluated will include the Context, Input, Process, and Product, or some evaluators might want to evaluate the impacts on the economy, society, and the environment. The clear specification of what to be evaluated will lead to the effective results for entering the process of measurement of both the creation of tools and the design of data collection.

2.7.2.2 Measurement; after determining what to be measured clearly, then it will be entered into the process of measurement. Two important processes include the creation of tools and the design of data collection. The created tools must be consistent and suitable for what to be measured and it must be exactly measured for what to be measured. The required tools and method are different for the measurement of quantitative data and qualitative data. The observation and interviews are commonly applied for measurement of qualitative data and a variety of tools is applied for the measurement of quantitative data. Generally, there are 2 approaches of measurement.

1) Objective Base Measurement; it is an approach that can measure exactly for what to be measured. Regardless of whose determination, the results will be the same, such as measurement of external behavior by the approach of the objective base measurement, namely the frequency measurement of behavior, measurement of time-spending, measurement of weight, measurement of distance, and measurement of income, etc.

2) Subjective Base Measurement; it is an approach that requires feelings as a measurement criterion for what to be measured, namely measurement of internal behaviors, such as attitude, opinions, generosity, and honesty, etc.

The information obtained from the process of measurement will be an information for further process of judgment. Before entering the process of judgment, the results of measurement will be applied and interpreted into an information that is more meaningful and useful for a further process of judgment.

2.7.2.3 Judgment; when results from the measurements are analyzed and interpreted into the value of what to be evaluated, compared to the measurable results with the criteria or indicators for the specified objectives in judgment, it must be consistent with what to be evaluated.

Project evaluations are usually done in forms of three characteristics, namely the evaluation for starting the project, the evaluation of the execution process, and the evaluation of the project's results.

The evaluation for starting project; it will be resulted from the context evaluation that whether the project needs to be implemented, and the results of the preliminary evaluation of each factor are the data for consideration of whether it is sufficient for achieving the project implementation. If the inputs are not sufficient, the project may be delayed.

The evaluation of the execution process; it is an evaluation for the audit and improvement of the project to achieve its goals.

The evaluation of the project's results; it is an evaluation for concluding whether the project should be continued or terminated.

2.7.3 Evaluation Model

Evaluation model refers to a framework, outline, in the form of connection, relation and continuality that are systematic, or an overview of issues of what to be evaluated, being as a guideline for the evaluation of project. (Ratana Buosonte, 1997).

There are various evaluation models according to the ideas of the individual experts who have presented the concepts by connecting ideas with one's own experiences. Therefore, the selection of an evaluation model, applying as a guideline for project evaluation, the suitability or the consistent with the environment, and objectives of the project should be considered. The experts on project evaluation have classified three evaluation models according to the project's objectives (The Office of Educational Standards et al., 2002) as follows;

2.7.3.1 Objective Base Evaluation Model

It is an evaluation model that focuses on checking whether the expected results are happened by examining the results specified in the objectives or whether the results of the project's execution have been achieved according to the objectives.

2.7.3.2 The Decision Oriented Evaluation Model

It is an evaluation model that contains the systematic evaluation principles that the execution's procedures have been specified for obtaining the information, being applied for the consideration of an appropriate judgment.

2.7.3.3 The Value-Oriented Evaluation Model

It is an evaluation model based on the principles that the evaluation is a determination of value or revaluation of what to be evaluated, as well as paying attention to all of the project's outputs, applying a systematic evaluation process, integrated with the Naturalistic Approach.

There are various evaluation models that can be appropriately selected to apply for project evaluation as follows

1) Tyler's Model; it is an evaluation of the project based on Tyler's concept that is simple, focusing on the evaluation of instruction as a major consideration, namely the results evaluation of instruction for getting to know whether the prepared instruction in that time causes learners to behave according to the behavioral objectives by considering the information obtained from the pre and post measurements of the instructions, then being compared to one another. If the results of post exam are greater than the results of pre-exam, then it shows that learners have learned in what they required. If it is like that, therefore, the instructors will select the next sequence of behavioral objectives and prepare the instructions for achieving the behavioral objectives respectively.

2) Cronbach's Model; this model is similar to Tyler's model that is a part of the instruction process. But the consideration of the various issues are added to the exam in order to obtain more information for evaluation.

3) The Stake's Model; this evaluation model is done by submitting the benchmark or matrix proposal for the judgment of the project's values in forms of both the descriptive matrix and the value judgment matrix of a project. It consists of 3 elements, namely Antecedence, Transactions, and Outcomes of the project. The three elements will be considered for the vertical evaluation, called the rational consistency evaluation, and the horizontal evaluation that is called the empirical consistency evaluation.

4) Provus's Model; This evaluation Model has presented the concept regarding project evaluation as a means of gathering data for judgment in the inconsistency between each element of the actual project and the benchmark project. These two projects are consisted of sub-elements respectively. The sub-elements will be collected according to the sequences of actual projects to compare with the

benchmark project. If the results of comparison are not consistent, the project will be improved by adjusting the elements of the benchmarks project, or adjusting each element of the actual project. So, it means that the improvement of the benchmark project caused by the set criteria that is too high or it is too idealistic for the project to achieve (To get the criteria in each project element, the benchmark criteria can be both absolute benchmark and relative benchmark) If so, then the criteria must be adjusted to be lower, but if it's thought that criteria are well and appropriately considered, the criteria should be adjusted at the actual project. It is more suitable (Ratana Buosonte, 1997).

5) Stufflebeam's Model; this model is called the CIPP model. It is an evaluation with a continuous process, importantly focusing on a conjunction with project management, in order to find an information for a continuous judgment at all time. The evaluation objectives are to provide an information for judgment. The term of CIPP is derived from acronyms for various elements of the project being evaluated. Stufflebeam provides a meaning that the evaluation is a process of lecturing, data collection, data and news analysis in order to apply these information for the judgment of the right choice. There are four aspects for evaluation in order to obtain important information, namely Context Evaluation, Input Evaluation, Process Evaluation, and Product Evaluation (Somkid Promjui, 2009).

(1) Context Evaluation; it means an evaluation regarding the important factors that help define the project's objectives. It is something that is outside the project but it affects the success or failure of the project, including the needs of the community or target group that will receive services from the project, population, social and political trends, economic conditions, and community problems, as well as policies of the organizations at top-level and relevant organizations for helping determine the project objectives and project feasibility. This is a preparation to answer various questions, such as;

(1.1) Is a project responsive to a problem or truly needed?

(1.2) Are a project's objectives clear, appropriate, and consistent with the organization's policy or the policy of the higher level?

(1.3) Is a project possible in terms of opportunities to receive supports from different organizations?

(2) Input Evaluation; this evaluation means the evaluation of the needed resources for implementing the project, manpower, a required number of people, budget and funding sources, various materials, buildings, tools and equipment, etc. The input evaluation will help determine whether the project is appropriate and practical in achieving the project's objectives. And it will also help plan the appropriate activities of the project. This will be a preparation to answer the various questions, such as

(2.1) Are the factors specified in the project appropriate and sufficient?

(2.2) Are the selected activities / designs / options specified in the project feasible and appropriate?

(3) Process Evaluation; it is an evaluation regarding the approaches of project's activities, the application of inputs whether they are appropriate and according to the procedures, whether the organized activities lead to the achievement of the project's objectives, whether there are some obstacles for project implementation. The results of evaluations are applied for improving the operational processes to be more concise and effective. It's a preparation to answer the various questions, such as;

(3.1) Is the operation in accordance with the plan? What activities can be implemented or cannot be implemented? Why?

(3.2) What are problems and obstacles?

(3.3) What are the solutions?

(4) Product Evaluation; it is an evaluation of all the results obtained from the implementation of the project on how much they are effective, whether it is in accordance with the set objectives. The product evaluation will be compared with the established benchmark. This will be an indicator of the success or

failure of the project. The product evaluation aims for judgement in project's improvements and further expansion or to terminate the project. It is a preparation to answer the various questions, such as;

(4.1) Does the project provide the results according to the project's objectives?

(4.2) How is the quality of the results?

(4.3) What are other impacts?

The CIPP Evaluation Model was adjusted by adding the Impact Evaluation (I). Therefore, it later became a CIPPI model.

Impact Evaluation; it means the continuous evaluation on the project's outputs or the project's outputs lead to other consequences. These other results are not defined or specified in the project objectives. Therefore, the impacts of the project can be both positive and negative. (Ratana Buosonte, 1997).

2.7.4 Evaluation Based on IPO Model

The evaluation based on IPO Model consisted of 1) Input to design project 2) Process to evaluate the process of project operation and 3) Output to evaluate the accomplishment of the project (Somwang Phithiyanuwat, 2001). The details of the evaluation in various dimensions were as follows:

2.7.4.1 Input Evaluation: It was to acquire information to be used in decision-making of the appropriateness of the action plans, to see if the information would assist in reaching the goals of the project or not. The evaluation was usually done in many dimensions namely ability of agency or representative in managing the project, strategies used to accomplish the objectives of the project, assistance received in many fields which would ensure the continuation of the project such as assisting agencies, time, fund, building, equipment.

2.7.4.2 Process Evaluation: When the action plan received approval and started operation, the process evaluation needed to be prepared to provide the feedback to those responsible and those who operated in every process. The process evaluation consisted of three main objectives namely to find and forecast mistakes of the process or operation according to the determined process, to collect information for decision makers of plans, and to serve as accumulated reports of the operations.

2.7.4.3 Output & Product Evaluation: It aimed to measure and translate the meaning of success. Not only specifically the end of the project but it was also necessary during the operation of the project. The general practices of the output evaluation would incorporate these issues. That is, to see if the determination of objectives could be used, what was the measurement criteria that related to the objectives of activities, comparison of measured results, the earlier determined Absolute Criteria or Relative Criteria, and translation of the meaning of the cause of what happened, relying on the context, input, and process evaluation as well.

The evaluation offered the meaning in terms of the evaluation of output only. Although there were other types of evaluation that were different from the evaluation of output, these evaluations had very similar relationships. Both the context evaluation and the output evaluation would systematically evaluate if the existing issue accomplished what goal. The context evaluation would holistically consider the system. The output evaluation considered changes in the system. Therefore, the context evaluation showed the specificity that the output evaluation could use later.

The input evaluation and the output evaluation could be easily divided. For the input evaluation, it would take place prior to the changes of the project. Whereas for the context evaluation, specificity was determined for the output evaluation. The input evaluation also showed the specificity for the process evaluation.

The product evaluation would evaluate of it reached the objective or it was going to reach the objective. But the process evaluation would evaluate if the process was done according to the intention or not. The two types of evaluation would write the information of traceability to control and develop the changes of the practice in the process. The process evaluation could conclude if the practice really met the objective. Both types of information would strongly show the causes of more than any one cause by itself to decide if the practice should continue or not, with rectification or whether it had to start all over from the beginning. Although there was additional duty of control of the project, both types of evaluation would still accommodate and explain the results of the project.

This study used the IPO Model for evaluation because it considered the operation of the project of public and private agencies to promote farmers for sustainable oil palm production. The results would be used to develop the RSPO model compliance of oil palm smallholder farmers in Chumphon.

2.8 Model Development

2.8.1 Meaning of Model; There is a Definition of the Model as Follows

Utumporn Jamornmann (1998) gave the definition of the model that “Model” refers to the structure of the relevance of different units or variables. Therefore, the model should have more than one dimension and many variables. And various variables are related to each other in terms of both relationship and rationales.

Thisana Khaemmanee (2008) has stated that the Model is a concrete form of abstract thinking, in which a person shows in a certain way, such as a description, diagram, and a schematic diagram to help himself and others understand more precisely. Model is a thought tool that people use to look up the answers, knowledge and understanding of various phenomena.

Ratana Buosonte (2009) gives the meaning of the Model by dividing into 3 meanings which are 1) Diagram or sketch of one thing that is not complete as the real thing. The Model in this sense are often transliterated in Thai as "model" such as home models, car models, shirt models, etc., 2) The relationship pattern of variables or mathematical equations known as "Mathematical Model", and 3) a diagram that shows the working elements of something. A Model in this sense is sometimes called thumbnails of theories or concepts in a particular subject, such as, instruction model, management model, evaluation model, etc.

Therefore, it can be concluded that Model refers to the conceptual framework, the approaches of implementation, and various criteria of the system that can be adhered as a guideline to achieve the objectives.

2.8.2 Types of Model

Smith and others (1980) classify the models into 2 types which are;

2.8.2.1. Physical Model; It is Divided Into;

1) Iconic model; it's similar to real objects, such as a plane model, a scarecrow model, etc.

2) Analog model; it is similar to a real phenomenon, such as a chemical experiment in the laboratory before the experiment, the Modeled flying planes or flight Simulator, etc. This type of model is closer to reality than the first one.

2.8.2.2 Symbolic Model; It is Divided Into;

1) Verbal model or Qualitative Model; it is the use of plain text in the brief explanations, such as job descriptions, course outlines, etc.

2) Mathematical Model or Quantitative Model, such as equations and linear programs, etc.

Steiner (1988) The model can be divided into 2 types, which are; 1) Prectcal Model or Model-of. This type of model is a physical model, such as car model, plane model, and images, 2) Theoretical Model or Model-of; it is a model based on a theoretical framework as basis. The theory itself is not a pattern or model, but it helps to create models with various related structures.

2.8.3 The Elements of the Model; There are Ideas Regarding the Elements of the Models as Follows.

Somboon Sirisunhirun (2004) developed the model for the Dean's leadership. It was found that the model consisted of 4 elements which are; 1) Dean's leadership characteristics that need to be developed 2) The Principles and Conceptual Guidelines Model and the general objectives of the model 3) Dean's leadership development process, consisting of procedures, the contents of development, the methods, and the activities for development on behavioral objectives, and the expected results, and 4) guidelines for applying the models, the conditions of success, and an indicator of success models.

Chanoknart Chuenchei (2007) has developed a model of continuing education in private higher education institutions. It was found that the model consisted of 9 elements, which are; 1) philosophy and principles of continuing education 2) target groups of continuing education 3) objectives of continuing education 4) The administrative system structure of continuing education 5) Curriculum of continuing education 6) Method of continuing education 7) Educational media and sources of continuing education 8) Monitoring and evaluation of Continuing education, and 9) the grade comparison and the transfer of grades.

Amporn Pongkangsananant (2007) has developed a Model of non-formal education in basic education institutions to promote lifelong education. It was found that the model consisted of 8 elements, which are; 1) Philosophy and educational management principles, 2) Curriculum, 3) Learning management, 4) Evaluation of learning, 5) Comparisons & Transfers of knowledge & experiences and education levels, 6) Educational administration and management, 7) Target groups, and 8) Participation from parents and community.

Therefore, it can be concluded that what elements should be included in models, how structure and relationship are related to each other, it depends on the factors or various variables that are needed to be studied, being designed according to the concepts, theories, research, and basic principles to determine the models.

2.8.4 Model Development

The model development is divided into 2 steps, namely, 1) creating or developing the model, and 2) testing the accuracy of the model. Details of each step are as follows

Step 1: Creating or developing models. For this step, the researcher will create or develop the models first as the hypothesis model by studying the concepts, theories, and relevant research results. In addition, the researcher may study by the case (case study) of the organization that operates on this matter well. The results of the study will be used to define the various elements or variables within the model, including the characteristics of relationship between those elements or variables or prioritization of each element in the models. Therefore, the model

development at this stage must be based on the principle of rationales as important basis. In general, the studies in this process will have the following sub-procedures.

1) Study of relevant documents and research to apply the information for being analyzed and translated into a research framework.

2) Study from the actual context. At this stage, it may be implemented in many methods as follows;

(1) Study of current conditions and problems, implemented by the organizations by studying the opinions from relevant people (Stakeholders). The method of study may be the interview, questionnaire, survey, group discussion, etc.

(2) Case study or multi-case studies of a successful organization or the organizations that have good practices in the matters studied in order to apply as an important information in the model development.

(3) Study of the information from experts. The methods of study can be an interview, focus group discussion, etc.

3) Preparation of Models. For this step, the information from Item no.1 and no.2 will be analyzed and translated into a research framework for creating the models.

However, in addition to studying the said procedures, it may be further studied by applying the research process of Delphi Technique or Focus Group Discussion in model development.

Step 2: Testing the accuracy of the model after the model has been developed at the first stage, it is necessary to test the accuracy of the model. It’s because the model that was developed, though the development was based on the theory, the conceptual models of other people, and previous research results, but it's just a model based on hypothesis. It is necessary to test the accuracy of the model to see whether it is appropriate, whether the model is effective as intended. The data collection in real-life situations or the experiments with real-life models, will help the researchers to understand the influences or importance of various sub-elements or variables in the model. The researcher may improve the new model by eliminating the elements or variables found not to have any influence or less importance from the model, making the models more suitable.

The model testing consists of 4 characteristics as follows

1) Testing a model with the evaluations in accordance with specified standards. The evaluation was developed by The Joint Committee on Standards of Educational Evaluation based on the implementation of Stufflebeam and his colleagues. The principles of evaluation have been presented as the norm for the model testing activities, consisting of 4 standards (Suwimon Wongwanich, 2006) as follows;

(1) Feasibility standards; they are the evaluations of feasibility that can take into practice.

(2) Utility standards; they are the evaluations of the responses towards user's needs of the models.

(3) Propriety standards; they are the evaluations of suitability in terms of both law and morality.

(4) Accuracy standards: they are the evaluations of reliability, with a complete and comprehensive information that truly meets the needs.

2) Testing a model with evaluation by experts. The model testing on some matters cannot be performed by the empirical data, the evaluation of the parameters of the model, or the statistical methods. The model testing or model evaluation by using the experts are as the following concepts;

(1) Evaluation by experts; it will focus on a deep analysis and criticism on the particular issues that are being considered. It does not have to be related to the objectives or those involved in the process of judgment, but it may be together combined with various factors in consideration according to the discretion of the experts to get a conclusion regarding the quality data, the efficiency, and the appropriateness of the evaluations.

(2) Evaluation models that are specialized (Specialization) in the matter of what to be evaluated by developing from the art criticism that is delicate and profound and requires a high level of experts to diagnose. Since, it is a measurement of values that cannot be evaluated by any measurements, the true knowledge of the evaluators are required.

(3) Personal models that the experts are required as tools for evaluations by giving credibility that the experts are fair and perform with good discretion. In this regard, the various standards and criteria are based on the experiences and expertise of the experts.

(4) A model that allows the flexibility in the working process of experts according to one's own discretion and aptitude, since determining the important issues to be considered, identifying the required data, data collection, data analysis, as well as methods of presentation.

3) Model testing by surveying opinions of relevant personnel. The model development is usually applied with Delphi techniques. When the model applied to the Delphi technique has already been developed, together with the final model that is developed into a questionnaire with the Rating Scale, the survey will be implemented for obtaining the opinions of relevant parties regarding the suitability and the possibility of the model.

4) Model testing by applying the trial of model, the researcher will bring the developed model to the real test with the target group, with a complete implementation according to the set activity. The findings from the evaluation will be applied to improve the model further.

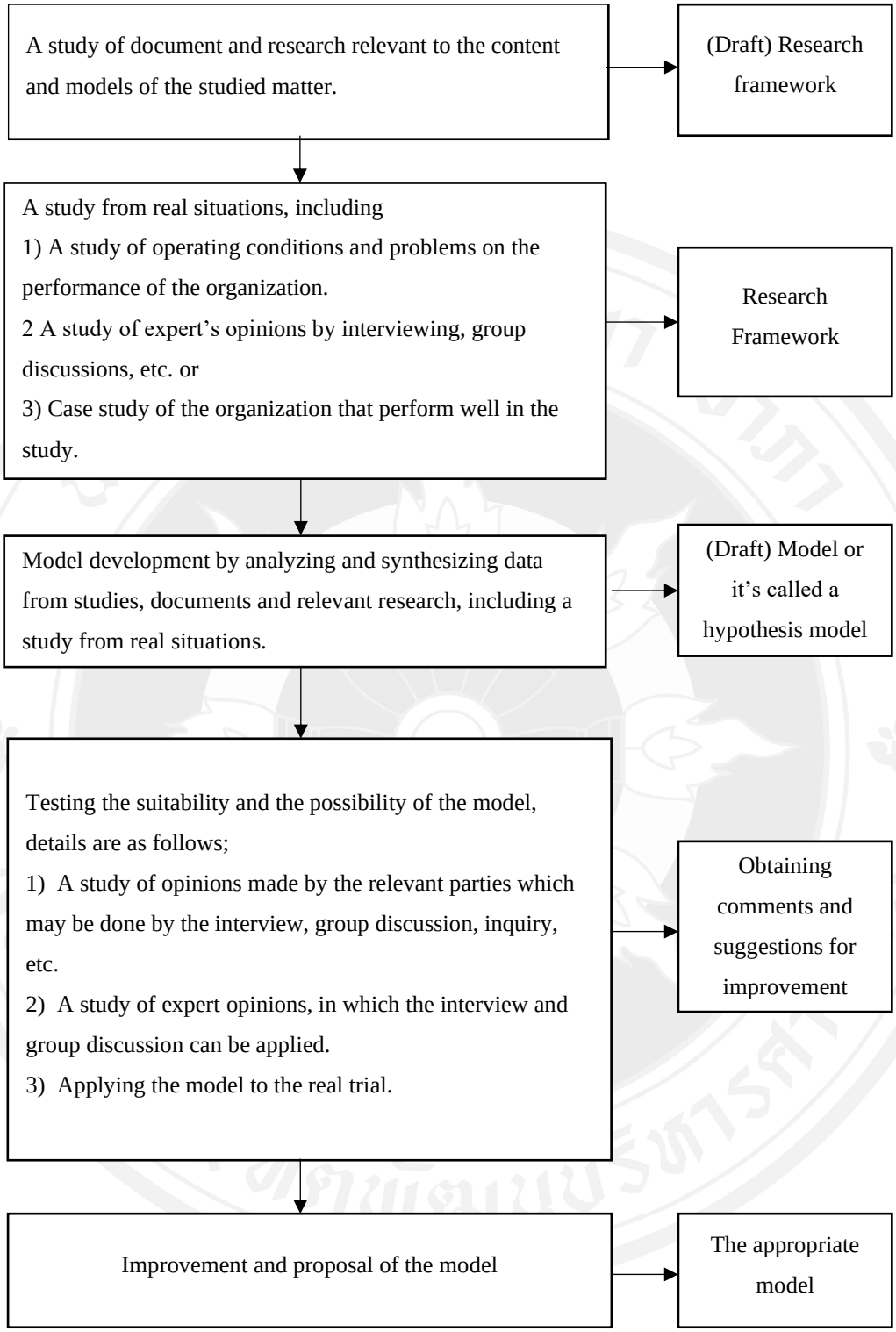

Figure 2.5 The Procedures of Model Research & Development

Source: Waro Phengsawat (2010)

2.9 Concepts and Theories Relevant to Knowledge, Understanding, Attitude, Motivation, and Adoption

2.9.1 Concepts of Knowledge and Understanding

Knowledge was given definition by many people. The definition according to the dictionary of education by Good (1973) was that knowledge was fact, criteria, and details that people received and collected. Kasem Watthanachai (2001) gave the definition of knowledge as the collection of people's thoughts that were classified and congruent compiled content that was utilized. Prapapen Suwan (1999) gave the definition that knowledge was basic behavior that the learner memorized either from recollection, seeing, hearing, or memorizing.

From the definitions of knowledge, it could be summarized that knowledge meant acknowledgement of facts, criteria, places, objects, or people derived from experience both direct and indirect. The acknowledgement of facts must be clear by Bloom (as cited in Aksorn Sawatdee, 1999, pp. 26-28). domain was divided into six levels from the knowledge of low level to the knowledge of higher level as follows:

2.9.1.1 Knowledge meant learning that focused on memory and recollection of thoughts, objects, or phenomena which were memory starting from easy things that were free from one another to memory of complicated things that were interrelated.

2.9.1.2 Comprehension was the ability of intellect to reasonably expand wider knowledge and memory, expression of behavior when faced with meaning indicator, and ability to translate meaning, summary, or explanation of anything.

2.9.1.3 Application was the ability to use knowledge, understanding, or comprehension on any existing issue to solve the novel problems of such issue by using knowledge especially methods and comprehension combined with the ability to translate meaning, summary, or enhancement of the particular issue.

2.9.1.4 Analysis was the ability and skills that were higher than understanding and application. It divided the issue under consideration into minor parts which were interrelated. It also sought the relationship of different parts to see if

the minor compositions were compatible which would truly lead to understanding of anything.

2.9.1.5 Synthesis was the ability to compile minor or major compositions into one story. Synthesis was the process to compile content of stories to first construct model or structure that was not yet clear which was the process that required creativity within the scope of determined object.

2.9.1.6 Evaluation was the ability to decide on thoughts, norm, performance, answers, methods and content to reach some objectives by determining the criteria as the basis to consider the decision. Evaluation was the highest process of characteristics of cognitive domain requiring knowledge and understanding, application, analysis, and synthesis for consideration to evaluate anything.

Comprehension was the next process from knowledge. It was the process that required the ability of brain and skills at higher level until it reached the level of communication of meaning. It might be possible through oral, written methods, language, or use of symbols. It usually happened after people received news from listening, seeing, hearing, or writing, and expressed in the form of the use of skills or translation of meanings such as elaboration of news that was heard by one's own words, or translation of the meaning of one language to the next while maintaining the old meaning or expression of opinions, or summary, or estimation.

2.9.2 Concepts of Attitude

The attitude of people was the mental feeling towards any object of the people which was highly influential to the people's behavior and impacted the society. It involved all dimensions of activities in all societies. People gave numerous definitions of attitude as follows:

Laksana Stawetin (1999) defined attitude asmanner, feeling, mood, trend, or mental inclination of any reaction towards environment whether it was liked or not.

Fishlein (as cited in Daranee Phanthong Phalusuk & Surasek Honghanayuth, 2005) gave the definition of attitude as feeling with inclination of approving or non-approving reaction or no reaction of things that happened in society.

Pongsan Srisomsap and Piyanuch Ngeonklai (2007) summarized the definition and explained about attitude as mental feeling as a result of learning, experience, thoughts, and belief of each person. Mental feeling of each person on any issue had different levels from the level of satisfaction to the level of dissatisfaction, from the level of considered experience to the level of implementation. Attitude of people was therefore the stimulation for people to have thought and behavior in any direction.

Jirawat Wongsawasdiwat (1992) summarized the characteristics of attitude in six forms as follows:

1) Attitude derived from learning and not something that came with birth. Experience had much influence on attitude. The accumulated experience both direct and indirect through the process of interaction with various objects in society would have direct impact on attitude.

2) Evaluative nature: Attitude came from the evaluation of thought or belief that people had towards objects, other people, or event that served as medium to create reaction. The nature of attitude was evaluation of thought or belief with hidden feeling whether some had attitude towards something depended on evaluation of knowledge, thought, or belief of that thing which would cause the assessor to have positive or negative feeling towards the object. The results of the evaluation might be different depending on the experience of each person. The attitude towards the same object might be different depending on gender, age, or profession.

3) Quality and intensity of attitude would serve as the indicator of the differences of the attitude that each person had towards objects. When people evaluated something, they might have positive or negative attitude towards the object. It created the condition of readiness to go to or avoid the object. The intensity would signify the attitude of high or low positive or negative attitude or identify the level of evaluation such as like at high level, like at fair level, and like at low level.

4) Permanence meant the deeply embedded attitude as the evaluated object was clear, accurate, and certain, or experience accumulated on the object through sufficient learning. In this case, the learning of new things or behavior that was regularly forced might not impact the existing attitude not to change.

5) Attitude object meant attitude towards what? Towards people, object, or situation?

6) Attitude had the nature of relationship, attitude showing relationship between people and object with other people, or situation and relationship which constituted motivation affect.

The attitude of people had three compositions namely knowledge and understanding, feeling, and behavior. Moreover, attitude was also divided into positive, negative, and neutral. The response to what we learned that was called attitude had numerous models namely attitude towards feeling, attitude towards understanding, and attitude towards action. The three models did not always have to happen in the same direction.

2.9.3 Concepts of Motivation

Motivation came from the Latin word movere which meant “move”. Therefore, motivation had various definitions as follows:

Poonsuk Sangrung (2007) provided the definition of motivation as people expressed the needs of any action using the various factors such as arousal, expectancy, incentives, and punishment as driving force for people to behave with direction to reach the objective or the desired condition.

Pimonchan Namwat (2001) discussed motivation as the action that caused people’s behavior in an organization to work as desired with the process to create stimulating force that engaged people to be willing to use their ability and persuade people to choose to behave in the direction towards accomplishment of the goals as desired by the organization.

Siriwan Serirat (1998) provided the definition of motivation as people were roused to behave in various activities with force, value, and clear direction, reflecting the attention, willingness, attempt, or internal force, as well as enhanced ability to dedicate to work to accomplish the objectives according to the needs and create maximum satisfaction.

It could be summarized that motivation meant action of behavior of an individual that was roused by stimulation or motivation that was expressed. The demand to do anything would drive the action to reach the set objective. Once successful, it would contribute to pride which would affect efficiency, effectiveness, and further success.

2.9.3.1 Process of Motivation

1) Motivation: It was an important process that enabled human to have motivation. Academics divided motivation into 2 characteristics namely physical motivation and mental motivation.

2) Drive: Motivation would result into two characteristics namely.

(1) Physical motivation would result into drive which was considered demand.

(2) Mental motivation would result in motive which was considered desire.

3) The drive or the motive derived from motivation whether natural or man-made, physical or mental, would drive people to determine the goals leading to action or behavior to accomplish the goals and the goals would result in the accomplishment. For example, hunger was physical drive that would create demand and the demand from hunger would determine the goals. The goal was no longer hungry or full. But inthe case where people might use the objective to determine the goals of action or behavior which was finding food, once food was found according to the objective, it would be eaten until the goal was reached. In case of desire to be honored, it would motivate the person to set the desire as the objective for example being honored by society and use the objective to set the goal to acquire the honor plaque or symbol which represented the honor as the set objective.

2.9.3.2 Classification and Measurement of Motivation

The classification and measurement of motivation were as follows:

1) Expression of motivation was different from culture and from individuals in the same culture. So, individual expression was different accordingly. Expression of motivation came from learning and experience such as expression of love in western and eastern cultures.

2) Same motivation might cause people to behave differently such as satisfaction. Some might express themselves by cooperation. Some might only give words of encouragement.

3) Different motivations might cause people to behave similarly such as hurrying home after work because some were responsible for their families while some might want to avoid work.

4) Some motivation might appear in the form of concealment or expression which was contrary to true feeling such as for happiness, some might clearly show through their facial expression while some might conceal their feeling.

5) Expressed behavior might be motivated by many motivations such as initiatives of new projects might come from many needs such as seeking fame, wanting to do good deeds, or wanting to be rich, etc.

2.9.4 Concepts of Adoption

The adoption of people was a kind of changed behavior. Adoption meant people were knowledgeable through the education system and they could explain through the process of acknowledgement. The adoption would take place following own learning. The effective learning also depended on that people tried to practice until they were certain that the action was useful. Adoption was individual behavior. It constituted adoption of anything that the individual thought would be better both concrete and abstract and they implemented with satisfaction. Adoption would take place through the process of learning and testing with the duration of the decision to adopt particular thing which could take years. Adoption was the process of decision on novelty and took place in ones' brain through processes from the process of the knowledge of novelty to the process to confirm the made decision. It was special decision with processed changes and clear duration (Preecha Wandee, 2002).

The adoption process of people for any uses according to the concept of Rogers (1962) must go through the adoption process. Adoption Process consisted of five stages as follows:

1) Awareness Stage was the stage where people were aware and perceptive through observation, listening, and seeing, without knowing details.

2) Interest Stagewas the stage where people started to be interested in seeking additional news, details on the novelty. This stage was different from the first stage. It was the behavior of intention and thinking process more than the first stage.

3) Evaluation Stagewas the stage that started to consider the assessment of the value of novelty through comparison of cost-benefit. This stage was different from other stages in that it was the decision to use or try the noverlty.

4) Trial Stagewas the stage where people used the novelty to test with their own situations to see the feasibility of use and results of the use before actual acceptance.

5) Adoption Stagewas the stage when people accepted novelty and seriously and completely used it in their establishments. This stage derived from the testing until benefit was known for the users. The experience would be the most influential.

Apart from the factors of the process of adoption, the personal factors of those who adopted could be divided into two types as follows:

1) Factors of personal characteristics consisted of personal status such as economic status, income, asset, specific knowledge and ability, including age and education level.

2) Factors of communication behavior consisted of follow-up of news both formal and informal, news from outside the communities, and follow-up closely of news.

2.10 Concepts of Agricultural Promotion and Development

There were diverse definitions of the agricultural promotion and development which were similar. It could be summarized that agricultural promotion meant the use of new agricultural knowledge, methods, and techniques to disseminate to farmers, follow up and give advice until the farmers reached success. At the same time, problems were analyzed to find solutions (Sukhothai Thammathirat Open University, n.d.).

Agricultural development meant the use of knowledge, technology for improvement and rectification, land use, labor, production costs, agricultural betterment and appropriateness, leading to production in the form of business with high profit (Chalong Toyabutr, 2008).

2.10.1 Significance of Agricultural Promotion and Development

The significance of agricultural promotion and development consisted of the following:

1) Agricultural promotion provided education on new techniques and knowledge.

2) In terms of agricultural development, increased types and amount of agricultural yields.

3) Formulation of policies, plans, projects on both crops and animals in accordance with the country's economy.

4) Agricultural promotion provided assistance to farmers and those involved to work and use both community resources and natural resources for maximum benefit.

5) Agricultural promotion was the process of providing knowledge not specific to agricultural techniques.

6) Agricultural promotion would inspire and motivate the demand for better changes.

It could be summarized that agricultural promotion and development were important in terms of development of knowledge to farmers, development of income, development of lives of farmers and families, natural resource and environmental development, and national development. Especially in terms of more dimension of agricultural development in Thailand, there would be development of agricultural profession which was the basic of ways of life of Thais towards prosperity and efficiency.

2.10.2 Scope of Agricultural Promotion and Development

The scope of agricultural promotion and development involved the development of agricultural efficiency and production quality, development of resources for production, management of yield and provision of necessary resources for production, arrangement for agriculture and dwelling system, development of quality of agricultural personnel. It consisted of farmers, farmers' wives and children, or young farmers, and development of farmer institutions. Moreover, the scope of agricultural promotion involved target groups, knowledge and technology promoting the system of knowledge and innovation transfer.

2.10.3 Objectives and Goals of Agricultural Promotion and Development

The objectives of agricultural promotion consisted of the following:

1) Provide service on dissemination of academic knowledge and technology.

2) Develop the standards of well-being of the families of the target groups.

3) Develop agricultural communities to achieve spiritual, social, and cultural progress.

4) Increase production efficiency and net profit of sustainable agriculture.

5) Ensure that farmers received information and news, as well as necessary and sufficient supporting services.

6) Ensure that farmers knew how to preserve and make use of natural resources and environment.

The objectives of agricultural promotion and development consisted of the following:

1) Stimulate and support farmers to have capability in agricultural production.

2) Advice and promote farmers to understand the complete process of production development.

3) Assist farmers to understand their own conditions.

4) Create the atmosphere for farmers to have the opportunity to develop problem solving skills.

5) Allow members of the agricultural families to have broader agricultural horizon.

6) Foster pride and independence in their profession and self-reliance.

7) Towards the development of sustainable agriculture and strengthen communities.

It could be summarized that the objectives of agricultural promotion and development focused on advice given to farmers in agricultural profession, knowledge transfer to farmers on modern practices, and sufficient provision of operational tools in response to the needs.

2.10.4 Principles of Agricultural Promotion and Development

Principles of agricultural promotion and development meant agricultural promotion that should focus on process of providing education while adhering to integrated agricultural promotion. The promoted activities should truly benefit the target groups starting from joint solutions to problems or common needs, participation of people sector, voluntary participation in planning and operation of projects in the form of group or institution, creation and development of community leaders to allow the target groups the ability to help themselves and in line with the geosocial conditions, conditions, situations, changes in society or community, and based on the foundation of natural resource and environmental preservation.

2.10.5 Strategy of Agricultural Promotion

The strategy of agricultural promotion meant the technique or factor that would support the ability to use the methods and techniques of agricultural promotion in a systematic and comprehensive manner. It would confidently ensure success and efficiency of agricultural promotion (Pattana Sukprasert, 2014). The strategy of agricultural promotion might prepare and formulate in advance the action plan mostly appropriate and congruent with the actual context and situation for future development or what could happen automatically during activities to solve immediate problem. The formulation of strategy of agricultural promotion at any time had the

objective of driving agricultural promotion activities to achieve the desired goal with confident efficiency.

2.10.6 Methods and Processes of Agricultural Promotion

The methods and processes of agricultural promotion directly involved the processes of the activities of agricultural promotion consisting of work activities with systematic continuity and congruence to ensure success of agricultural promotion which would in turn ensure continuous and gradual changes for farmers, communities, and society, as well as in accordance with the goals of agricultural promotion.

Methods of agricultural promotion meant the implementation of the principles of agricultural promotion with operation based on processes, continuity and congruence of the system. The methods of agricultural promotion could be divided into two features namely complete activities of agricultural promotion in all processes and activities of agricultural promotion in some processes only.

Steps of Agricultural Extension meant operation of agricultural promotion according to processes or timeframe. The continuous and congruent work for agricultural promotion confidently meeting with success would consist of promotion planning, operation of promotion activities, promotion assessment and supervision, and reporting on the results and setting up data bank.

2.10.7 Model of Agricultural Promotion

Model of agricultural promotion meant picture of model showing the activities of the holistic work of agricultural promotion whether they had process and operation, starting from the beginning until the end of operation (Pattana Sukprasert, 2014). The proper model of agricultural promotion appropriate to the nature and goals of agricultural promotion constituted one factor that would support efficient agricultural promotion to achieve success easily. The types of model of agricultural promotion could be classified according to the time management of the officials responsible for promotion and the process of work which could be linear, circular, or dynamic.

2.11 Social Return on Investment

Social Return on Investment (SROI)means the use of social impact in various fields as created by establishment to calculate the “Monetized Value” and then compare it to the financial value of the business operating costs to see how much the business that made social impact was worth for one baht of investment (Sarinee Achavanuntakul & Pattraporn Yamla-Or, 2011). Prior to operate activities or projects that would benefit the public, there should be holistic assessment or feasibility of the projects or activities whether the existing activities or projects would not cause damage to the public and would truly benefit the public. Skillern, 2007 as cited in Suchat Akphaitoon (2011) argued that entrepreneurs should pay interest in creating social value and not deviating from excess profit. There was application of the principles of business entrepreneurs to society such as creation of innovation, efficiency, control of costs, and income generation, etc. Moreover, the activities of good entrepreneurs should include the following: 1) Extend capability and maintain network and partnership of establishment 2) Develop ability to manage demands of general stakeholders 3) Develop ability to work with other non-profit organizations and 4) Preserve resources and environment and use mechanism to plan strategy to allow the organization’s growth and sustainability. As for the tool to measure or assess in order to assist in the decision-making whether to operate projects or activities or not, one of the methods that assisted in decision-making to operate projects was the “Social Return on Investment”. It was the conceptual framework to measure and calculate the return value which had wider meaning than financial value but could take into account social value and environmental value. The social return on investment could show the guideline to reduce inequality, reduce environmental degradation, and develop quality of life. It was the ratio between the current net value of profit and current net value of costs. For example, if SROI equaled 1.50 baht, it meant that every investment of 1 baht could generate profit back to the community 1. 50 baht. The profit that the society received would then be invested in local communities and continuously circular into the future.

2.11.1 Processes of Evaluation of Social Return on Investment

The framework of analysis of social return on investment had its strength and that was interaction with stakeholders during the analysis which were involved in many processes such as Outcomes, Outcome Mapping, Financial Proxies, and Attribution Proportion. The participation of stakeholders would greatly enhance the recognition of the analysis result, promote utilization and exchange of view, and work together to develop work for the better but this method might have limitation in Bias (Thai Health Promotion Foundation, 2014). The concept to measure the social return on investment was developed from the concept of CSR and the economic Cost-benefit Analysis before measuring the result. The application of the techniques to assess the SROI in order to assess the activities, the assessor must take into account seven principles as follows: (Sarinee Achavanuntakul & Pattraporn Yamla-Or, 2011).

1) Take into account stakeholders and engage them as much as possible. “Stakeholder” here meant individual, or organization derived from some “change” of operation of the activities which might be different in each activity such as employees, customers, trading partners, shareholders, investors, government sector, media, communities, or in some cases competitors.

2) Understand changes: Assessment of outcome and SROI measured the “changes” at a particular time. For example, “this activity will generate employment for 200 physically disabled people in2011” or “that activity can reduce 1,000 tons of waste between 2010-2012. Therefore, the assessor must place importance on recording changes.

3) Use “Financial Proxy”to value the results: Financial Proxy was an approximate to replace financial value of social outcome. It was the case where we did not know for sure the financial value and to give the opportunity to the people or organization that were not in the market system but were affected by business operation. For example, the prices of carbon that were transacted in the carbon credit market could be used to “replace” the production costs of greenhouse gas. The more our business operation could reduce greenhouse gas, the more we generated social value (carbon prices are multiplied with the reduced amount of greenhouse gas). What we should bear in mind was that in order to use the financial proxy, we must be sure that it could really “replace” the social value that we wanted to measure. It must not

go beyond the scope or irrelevant. It must also take into account the social and cultural contexts that were different in each area.

4) Include only the "essence": If we wanted the assessment result to be really implemented, we must select only the major social outcome so that we might focus on the management of the issue of utmost importance. The decision on the importance of the outcome relied on the reference to the organization's mission (internal process) and listening to the opinions of the stakeholders especially the target groups that we would like them to benefit. We might choose to assess the results of not more than five issues which were the most important or assess only the outcome where more than half of the stakeholders (from random interview or survey) confirmed that they would benefit from their operation.

5) Avoid exaggeration: As social activities or projects might have applaudable targets, the assessor must admit that the activities were not one activity that sought to solve social or environmental problems, unless it was the work assessment of the issue not yet studied which was very difficult as all problems were being solved by government agencies, charity organizations, foundations, and other organizations.

6) Focus on transparency in every process: As social outcome was abstract and difficult to measure and people had different perspectives, the most transparent assessment of each process was therefore necessary basic principle. Under this principle, we should prepare the document accompanying decision-making every time, especially the factors involving stakeholders, recording of the outcome, indicators, and used standards, as well as sources, methods of collecting information, and methods of consideration of alternatives in the assessment. Once the assessment was finished, the results of the assessment should be communicated to the stakeholders for acknowledgement and comments as well as explanation of how our organization would use the assessment result to improve future operation.

7) Ready for inspection: Although the analysis of SROI was "scientific" to a certain level and could forge more understanding of the value of operation, personal attitude was unavoidable. Some might see that the assessment of SROI was too high or too low. Some might question our methods of collecting information or the credibility of the information sources what we used as

representative, etc. Therefore, we should be readily happy for the inspection of the SROI from outsiders. If possible, external expert should be the assessor or write comments, not different from the report of the auditor in business entity seeking maximum benefit. The readiness for inspection and opinions from independent assessor should allow the stakeholder to decide if our assessment was straightforward and reasonable or not.

As for the compilation of the data of raw materials and input that could all be transformed into monetary value (unit of year could be used to see long term return), once monetary value of each indicator of each activity was obtained, the figures could be calculated for social return on investment (SROI) using the following formula (implementation phase).

$$\text{Ratio of social return on investment (SROI)} = \frac{\text{Total present value}}{\text{Used investment value}}$$

2.11.2 Benefits of Evaluation of Social Return on Investment

The assessment of the social return on investment (SROI) had its benefit similar to the analysis of general financial statement namely the tool to review efficiency and effectiveness of business operation in order to improve strategy or action plan of the operation in the future. Therefore, it was popular with investors for society such as foundations. Moreover, companies used it to assess the result and the progress of social enterprise or sustainable business and impact on the decision to operate project with low investment but highest efficiency or even in stakeholders. For example, consumers, villagers, NGOs could also use the social return on investment to reflect the information of the benefit from the project and how the project could yield social return on investment (Sarinee Achavanuntakul & Pattraporn Yamla-Or, 2011). As for the assessment of return on environmental management, the technique of the SROI could be used as the conceptual framework to measure and calculate the return value with wider definition than financial return which was social value such as return on cluster, value of saving in buying products for consumption, and environmental value such as value of reduced use of agricultural chemicals etc. so

that the SROI could serve as representative that showed the guideline to reduce economic and social inequalities, reduce environmental degradation, and develop quality of life. Chirapon Sumetheeprasit (2016) stated that in general the analysis of SROI was a recognized method of yielding benefit for social projects. Because it could compare the results with the costs of the project which was not real in the present and could happen in the future or assessed the past project to prove if the project really had SROI as stated in the project proposal at the beginning. Moreover, knowledge and understanding on the operation of the establishment or project and methods on operation were not sufficient if it could not obtain the value of performance or output or outcome into SROI. The government agencies faced numerous social demands and problems and they must identify those demands and problems and decide to operate the project and action plan to accomplish the social mission in its priority to suit the limited resources, as well as define the key success factors of different activities and projects which were more difficult to measure than the projects with financial and/or economic return. In addition, many establishments could not find the reliable methods that were congruent in estimating the costs of operating a project or action plan based on the mission. It was therefore difficult to clearly determine the value of efforts, dedication, and the loss of resources whether they were sufficiently worthwhile or beneficial. As the measurement of value of operation activity was important and complicated in the case where it was not possible to find market price for comparison, the concept of SROI was therefore one of numerous concepts that increased the necessity and demand of government agencies in solving the problem, to see if the activity and effort which were on going operation or past operation had SROI.

Therefore, the sustainable production of oil palm should evaluate social return which was the indicator to measure the ratio between the net value that society received from oil palm production considering the generated income and the amount of invested money. The indicator could describe that for each baht of investment, how much society would receive for compensation from oil palm production which would reflect the concrete changes in terms of figures, including economic, social, and environmental changes.

2.12 Relevant Research

Chong & Makay (2013, pp. 1-7) has suggested the guidelines to create a sustainability for the Malaysian palm oil industry whether the oil palm industry is sustainable, the principle of Carbon Footprint can be applied as an evaluation of a life cycle throughout the cycle of acquisition and production because it reflects the awareness of environmental problems, both from oil palm farmers, palm oil processing industry, and consumers. The important data towards consideration are as follows; 1) Direct data that affects greenhouse gas emissions from palm oil industry, such as land utilization, energy consumption, waste management, and the impacts, caused by the palm oil industry 2) Summary data of palm oil mills and palm oil refinery plants, it will be used for consideration, such as energy consumption, waste management in the factory, and the impacts caused by production activities within the factory. 3) Relevant industrial sectors, such as food industry until consumers of palm oil or palm oil-based products. These labels must be regularly inspected, monitored, and evaluated. Moreover, a knowledge regarding the value added to the products or waste, generated by the palm oil industry should be provided to achieve the systematic implementation for the palm oil industry and being as a support of the policies development for the sustainable continuity of the oil palm industry as well.

Mukherjee and Sovacool (2014, pp. 1-12) conducted a study on sustainability from oil palm production for biodiesel production in Southeast Asia by selecting Indonesia, Malaysia, and Thailand as case studies. The said study can be summarized as a guideline for creating sustainability in the production of biodiesel from oil palm in Southeast Asia. The details of three guidelines are as follows; 1) standards should be set, especially standards or regulations for oil palm plantation at both national and international levels in order to prevent the destruction of natural resources and the environment, being as the loss prevention of the sources for carbon sink caused by the oil palm plantation. 2) The compromisation or the opportunities for the rights on land utilization, should be concretely provided to prevent the invasion of oil palm plantations in HCV areas. The opportunity of biodiesel production by community for effective consumption should be provided as well. 3) The technology for biodiesel

production should be developed, being as a support for environmentally friendly energy consumption that is widely.

Fitzherbert et al. (2008, pp. 538-545) said of the oil palm that oil palm is a plant that is in great demand among the world population. In the past, there has been an invasion of forest areas for oil palm plantation widely, especially, in Southeast Asian countries. In addition to destroying ecosystems, it also reduces the variety of food crops due to the promotion of oil palm plantations only. These activities cause pollution from oil palm plantations, such as greenhouse gas emissions. Therefore, government agencies and NGOs or other related organizations should cooperate to prevent the destruction problems of ecosystem caused by the oil palm plantation. Therefore, there should have a collaboration in determining the suitable areas for oil palm plantations, including the inspection of the sources for oil palm plantation areas by independent agencies in order to create transparency for oil palm plantation areas that are not from encroaching the conserved forest. At the same time, producers of palm oil-based products are another important mechanism that helps the oil palm farmers to play a role in reducing the effects of oil palm plantations. For example, the drives between oil palm farmers, industrial factory, and local government agencies to jointly demonstrate the environmental responsibility by issuing regulations to preserve forestry areas of the community, the donation of the income from the sale of products from the palm oil industry, together with the community in restoring the environment of the community to maintain fertility. In addition, palm oil consumer is another important mechanism for driving the preservation of ecological fertility by not supporting products that cause negative impacts on the ecosystem or turning to consume products with a certification symbol that does not cause environmental impacts, etc.

Corley (2009) has described the guidelines to create sustainability for the palm oil industry in the future by starting with the policy to support the biodiesel consumption in order to create incentives for oil palm plantations. The NGOs should come to provide the advice regarding the areas suitable for oil palm plantations. The government agencies should define the laws regarding the development of the oil palm industry. The palm oil industry entrepreneurs should cooperate with NGOs as well in term of the area development for oil palm plantation, including a budget

support from financial and fiscal agencies to continuously develop the oil palm industry.

Bessou et al. (2014) has conducted a study on greenhouse gas emissions from palm oil mills in Malaysia and Indonesia that received the RSPO (The Roundtable on Sustainable Palm Oil) certification between 2009 and 2011, aiming to evaluate the reduction of greenhouse gas emissions caused by the implementation according to the RSPO requirements. The principle of life cycle evaluation has been applied. The results showed that the average greenhouse gas emissions from a sample of 9 palm oil mills are 1.67 tons of CO_{2e} per ton of crude palm oil (CPO). The greenhouse gas emission values of each factory will be between -0.02 tonnes of CO_{2e} per tonnes of CPO, mainly depending on changes in land utilization. If the area is wetland, the greenhouse gas emission will be very high.

Hidayat, Glasbergen, and Offermans (2015) have studied Sustainability Certification and Palm Oil Smallholders' Livelihood: A Comparison between Scheme Smallholders and Independent Smallholders in Indonesia. The said study can be show a lot of uncertainty about what sustainability certifications imply for the livelihood of smallholder farmers. Given these uncertainties, this paper explores the potential of certifications to improve the livelihood of smallholder farmers. To achieve this objective we developed an amended livelihood framework applied to an exploratory study of Indonesian smallholders who participate in the Roundtable of Sustainable Palm Oil (RSPO). Although access to markets and vulnerability are not improved through certification, indirect effects through organizational changes increase productivity. If certification schemes are weakly institutionalized, farmers will easily shift to a more profitable way of production. Further analysis is needed to discover the balance between the ethical aspects of certification while improving economic profitability for participating smallholders.

Saswattecha, Hein, Kroeze, and Jawjit (2015) have studied on the environmental impacts caused by palm oil production in Thailand by comparing values of the EIA between CPO producers using fresh palm fruits from three groups of farmers, namely RSPO certified farmers, non-RSPO certified farmers, and farmers with potential to achieve RSPO certification. It was found that the environmental impacts came from the production process of crude palm oil in terms of process. The

environmental impacts in factories with good waste management, such as, methane retention from wastewater that less environmental impacts are generated. For the environmental impact of palm plantations, If applying the good practices from the RSPO certified farmers in the oil palm planting areas that are without good practice, it will reduce the environmental impacts towards global warming by 90%, the acidification by 14%, a reduction of abnormal growth of aquatic plants by 3%, a reduction of the ozone layer by 53%, and a reduction of toxic effect towards humans by 15%.

Meijaard, Morgans, Husnayaen-Msi, Karen, and Ancrenaz (2017) This report compares deforestation rates between RSPO and non-RSPO oil-palm estates within 2,771 palm-oil estates across the island of Borneo, and the implications of this for orangutan conservation. Out of these 2,717 estates, 20% were inactive in 2016 (i.e., no palm had been planted within the boundaries of the estates and concessions; 8.1% were RSPO members. In 2015, more than 13.3 million ha had been allocated to the mapped oil-palm estates and concessions across the island (or 17.1% of the total land mass), but only 36.2% of the mapped concessions and estates had been planted with oil-palm (4.8 million ha). 2.8 million ha (or 21.2% of the total) was still forest in 2015. We note that at this stage in the study, a significant number of estates in Sabah have not yet been reliably mapped and that the total area allocated to oil-palm is higher than the 13.3 million ha mentioned in this study. Our results show that: Total loss of intact and logged forest between 2000 and 2015 in RSPO-certified concessions and estates (815,592 ha) was 73,559 ha (i.e., 9.0% of total concession area). Total loss of intact and logged forest between 2000 and 2015 in concessions and estates that were active and non-RSPO-certified in 2016 was 1,748,123 ha of forest loss (in 10,152,756 ha of concessions and estates, i.e., 17.2% of total concessions and estates area). Annual forest loss rates in RSPO-certified areas have consistently declined after 2005 (the RSPO cutoff date for deforestation avoidance), from 13,417 ha per year between November 2005 and November 2007 to 1,839 ha per year after May 2014, whereas those in non-RSPO areas have stayed consistently higher. Overall average planted area for active non-RSPO concessions and estates (41%) is much lower than that for RSPO-certified areas (82%), probably indicating better and more efficient land management and also potentially better resolution of land conflicts. Active

RSPO-certified concessions and estates retain less forest on average (4.5% in 2015) than active non-RSPO areas (10.9% in 2015), but forest loss rates between 2000 and 2015 are much higher in non-RSPO areas. Our analysis also reveals that there is still extensive overlap between oil-palm concessions and estates and orangutan habitats, especially in West and Central Kalimantan, to a lesser extent in East Kalimantan, 2 few in Sabah and apparently none in Sarawak. In 2014, we estimate that 275 orangutans were occurring in 32 RSPO-certified estates, while 9,300 individuals were found in non-RSPO estates. Between 1999 and 2014, orangutan populations in areas that are now RSPO-certified declined by 34% from 419 to 275, or about 2.2% population loss per year. In the same period, orangutan populations in non-certified concessions and estates declined by 31.0% from 13,480 to 9,302, or about 2.1% population loss per year: This suggests that the absolute loss of orangutans is significantly lower in RSPO areas on Borneo than in non-RSPO-certified areas, but that relative loss rates are about the same. Nevertheless, RSPO-certified concessions and estates are not yet meeting the target stipulated in P&C 5.2 as orangutan populations continue to decline in certified plantation areas and improvements need to be made in this regard.

Punya Jaismut, Sorapong Benchasri, Panumas Pruthikanee, Sakulrat Sanputawong, and Sakunkan Simla (2015) have studied the sustainable palm oil production in accordance with the Roundtable on Sustainable Palm Oil (RSPO) standards of farmers in Krabi province. It was found that the RSPO certified farmers have spent the average production costs of 5,559.58 baht per rai and received an average yield of 14,294.48 baht per rai with a net yield of 8,734.90 baht per rai. While Non-RSPO certified farmers have spent the production costs at the average of 5,344.54 baht/rai but received the average yield of 9,881.48 baht per rai with the net yield of only 4,536.94 baht per rai. It is less than the RSPO certified farmers for 4,197.96 baht/rai. Therefore, it can be concluded that the RSPO certified farmers can gain more yield.

Sorapong Benchasri and Punya Jaismut (2016) have studied the efficiency of sustainable oil palm production in accordance with the RSPO standards of farmers in Thailand. The analysis of compliance with the principles and criteria of Thailand according to the RSPO standards for farmers, it was found that the RSPO certified

farmers have complied with requirements more than all of non-RSPO certified farmers. And the yield (baht/rai) for the RSPO certified farmers is more than the conventional oil palm farmers, with the average net yields of 7,227.09 and 4,737.91 baht/rai respectively.

Sutonya Thongrak, Sirirat Kiatpathomchai, and Teerapong Jantaraniyom (2018) have studied of the participatory development of small-business farmers in sustainable oil palm production: a case study from members of Theppitak Palm Community Enterprise Group, Trang province, it was found that the major problem of oil palm production for small-business farmers could be resolved through the group process, a support by the crude palm oil mill networks, and research project. In addition, it was found that once, the farmers have received the appropriate knowledge regarding the sustainable palm oil production and put these knowledge into practice, especially palm plantation management, data recording, management of chemical fertilizer by using fertilizer instead of mixed fertilizer, a reduction and discontinuing the use of chemicals, could increase the productivity of oil palm production, including a positive impact on the environment as well. Farmers were satisfied with the participation in the group as membership. It's because the established group became a center for exchanging knowledge, allowing farmers to find the solutions for the problem. And most importantly, farmers have learned and are aware of the integration power. As for the factories networks, they could receive the more amount of palm fruit bunches, with better quality.

Amporn Pongkangsananant (2007) studied the development on non-formal education management in basic educational institutions to promote lifelong education by conducting the research in 2 steps which are; 1) Creating Model; it consists of studying basic information from relevant theory, papers, and relevant research, including the expert's opinions, applying the Modified Delphi Techniques and 2) The Model Evaluation, consisting of the model evaluation to study the suitability and feasibility of using the model and put into practice in the educational institutes, including the comparisons of the opinions by experts and school administrators towards the model development.

Suchat Akphaitoon (2011) studied the “Crab Bank” at Ban Koh Teab, Chumphon is employed as the case study of a business development system for social concerns operated by the locals. And this project is supported by many organizations including business firms, NGOs or the government agencies in order to create the sustainability of local fishery and maritime resources while the stakeholders simultaneously remain profitable. The finding demonstrated that SROI approach is capable to assess the social return on investment of the case study reliably at a ratio of 58.98: 1 which means every 1 Baht is able to generate 58.98 Baht in social return.

Wisakha Phoochinda and Vivat Keawdounglek (2015) studied the Initial Assessment of The Social Return on Investment of Electricity Generation using biomass: a case study of gasifier plant. The results of this study showed that the social return on investment from community electricity generation using biomass was 0.09. It can be implied that as the community invests one baht, it will receive benefits in terms of economic, social and environmental aspects of electricity production of about 0.09 baht. The environmental impacts originated from combustion, transportation, and waste treatment and disposal.

Chaiya Kongmanee, Palakorn Satsue, and Purawich Phitthayaphinant (2019) studied the Social Return on Investment (SROI) of scientific research projects in the project package of para-rubber industry development. The results revealed the value of the net benefit in terms of output and outcome equaled 34,019,934 THB. In addition, the Thailand Research Fund (TRF)’s research funding amounted to 18,551,441 THB. As a result, the SROI was 1.83. This value implied that the TRF obtained the social return on investment of 1. 83 THB for each their 1 THB research investment which was invaluable. Recommendations for the improvement of the SROI as follows 1) enhancement of para-rubber product experiment at a laboratory level to a market level, 2) research funding for continuous research projects in case of the research project outputs were uncompleted, and 3) improvement of pattern of research investment and ownership of research results.

Kittiwan Manopak (2017) studied the Appropriate Techniques of Agricultural Extension During the Present unrest Situation: A Case Study of Sungaipadi Sub-district, Sungaipadi District, Narathiwat Province. The results the farmers stated at a medium level that appropriate agricultural extension techniques during the present

situation were still the training and visiting techniques. They continued to require the agricultural extension officers to visit their farming sites in order to perceive their farming problems and suggest them with effective solutions. They minority believed that by attending the government's extension programs they could be a target for violence. The agricultural extension officers were suggested to adjust their training and visiting extension techniques by choosing the safest time during 13.00-15.00 pm and selecting safe and appropriate knowledge transfer sites. In addition, local agricultural extension representatives or volunteers should be encouraged in moving forward the agricultural extension programs and activities for their highest effectiveness.

Jamnong Jun-Iad, Pornchulee Nilvises, Bumpen Keowarn, and Somchit Yotakhong (2015) studied The Extension for Self-Reliance of Para Rubber Farmers in 3 Southern Border Provinces. The results the extension for self-reliance of para rubber farmers in 3 southern border provinces was operated in 6 forms, these were 1) the form of training in para rubber farming and visiting the farmers, 2) the form of one-stop service, 3) the form of participation, 4) the form of integration, 5) the form of individual characteristics and 6) other forms of extension in 3 southern border provinces. The communication process and media used in the extension for self-reliance of para rubber farmers in 3 southern border provinces consisted of individual, group, and mass communication together with the essential factors of information senders, information itself, channels of communication, and information receivers/farmers. Furthermore, the dimensions of the self-reliance of para rubber farmers in 3 southern border provinces were considered in 5 aspects/terms, which were the dimensions of technology, economy, natural resources/environment, mind, and society.

Phenchuphan Muangwong (2018) studied An Evaluation of Curriculum Implementation of Non-commissioned Officer, Officer Non-commissioned School, Directorate of Education and Training, Royal Thai Air Force, B.E. 2553. It was found that the curriculum could improve the graduates in terms of tolerance, unity, and sacrifice. However, the curriculum could poorly improve the monetary conservation.

Jittrapon Soontorn (2018) studied The Land Use Change Analysis in Amphoe Muang Nakhon Pathom, Nakhon Pathom Province. The supervised classification technique, classed land-use into 5 classes which are build up area, agricultural area, soil or bare land area, fishery farm area and water area. The result found that overall accuracy by calculating Error matrix is 62.17 percentages. Build up area is increasing 16.36 percentages from 11.78 percentages in 2004 to 28.14 percentages in 2014. In the other hand, another land use areas are decreased. Agricultural area is decreasing 10.42 percentages from 67.38 percentages in 2004 to 56.96 percentages in 2014. And Fishery farm area is decreasing 5.21 percentages from 13.16 percentages in 2004 to 7.95 percentages in 2014.

Saysongkham Sayavong, Kumut Sangkhasila, and Pongsant Srijantr (2012) studied The Land Use Planning for Efficient Agricultural uses in Viengphoukha District, Luangnamtha Province, Lao PDR. The results that there were the moderately and marginally suitable classes covering 0.37 and 60.71 percent of the total area. The main constraints for paddy rice cultivation were well drainage soil, steep area, strong acid soil reaction and low cation exchange capacity. Regarding maize plantation, the highly, moderately and marginally suitable classes were 2.97, 22.48 and 66.80 percent of total area and the lands suitable for rubber cultivation were those of highly, moderately and marginally suitable classes of 2.90, 17.36 and 75.82 percent of the total area. The main constraints of these 2 crops included strong acid soil reaction, low base saturation, shallow soil depth and steep area. Land suitable for paddy rice, maize and rubber, excluding forest areas conserved for biodiversity and natural environment quality, covered 0.19, 14.33 and 11.58 percent of the total area, respectively.

CHAPTER 3

METHODOLOGY

3.1 Conceptual Framework

This research was conducted based on the literature review, research works, and academic articles relevant to oil palm production, 20-Year Reform Strategy of Palm Oil and Oil Palm (2017-2036), and the study of the guideline relevant to the Roundtable on Sustainable Palm Oil (RSPO). The research collected data from government agencies and private sector related to oil palm and palm oil production, oil palm growers and construct the RSPO Model Compliance of oil Palm Smallholder Farmers in Chumphon. The conceptual framework of the research could be summarized as in Figure 3.1.

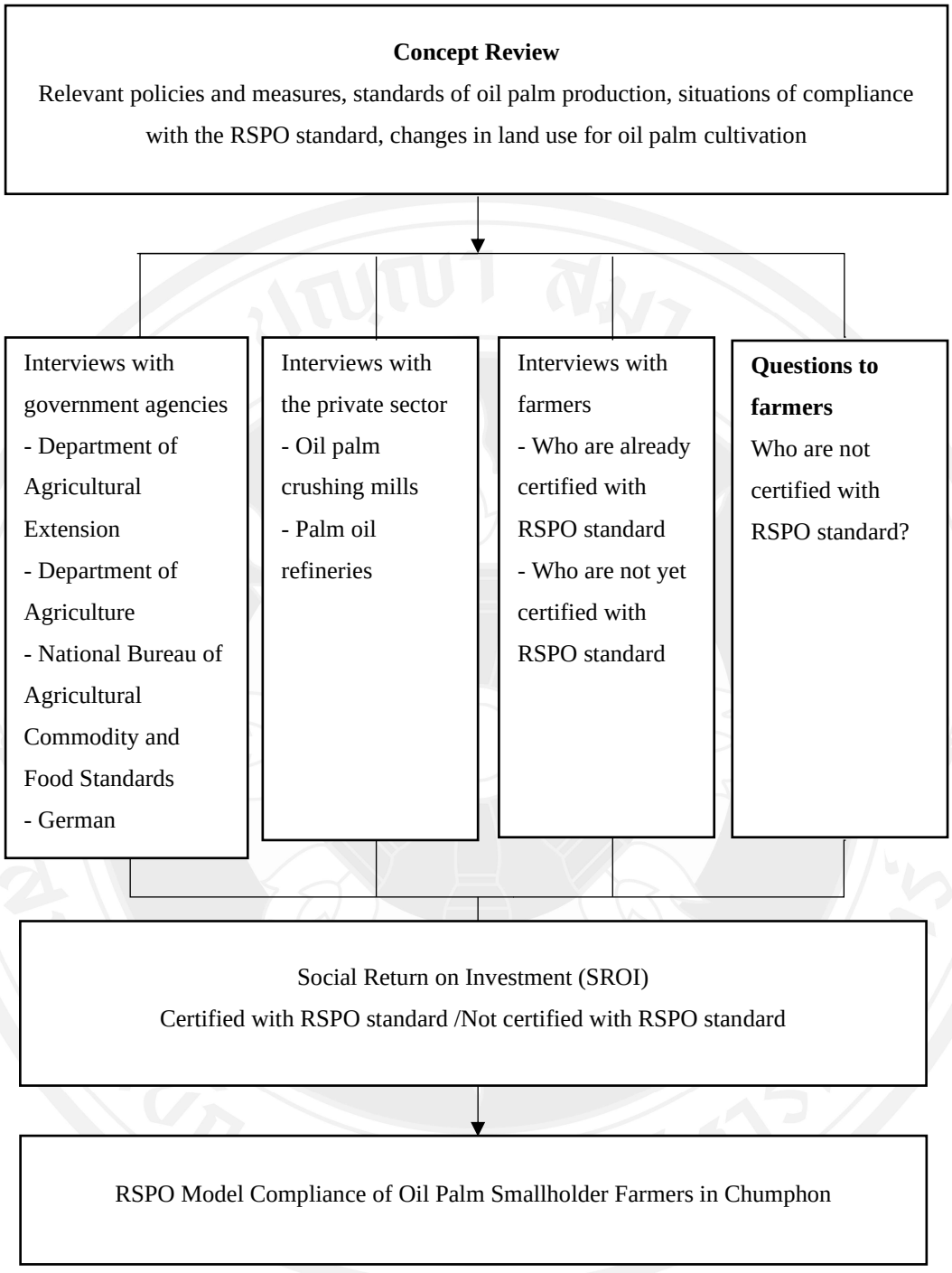

Figure 3.1 Conceptual Framework

3.2 Methodology

The study of the RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon consisted of the following methodology:

3.2.1 Study the review of concepts, theories, and research works related to policies and measures on oil palm cultivation, standards of sustainable oil palm production, oil palm plantation management from domestic and international sources, as well as study the strategies relevant to Thailand's oil palm to acquire information on oil palm cultivation and certification of the RSPO standard.

3.2.2 Study in-depth information from government agencies related to oil palm production through interviews to collect information on oil palm cultivation, request for certification of the RSPO standard, and promotion of sustainable oil palm production.

3.2.3 Interviews with the private sector such as oil palm crushing mills, and palm oil refineries to collect information of the promotion of farmers for sustainable oil palm production and certification of the RSPO standard.

3.2.4 Collect information of the oil palm growers who were not certified with the RSPO standard through questionnaire to study personal factors such as reception of information and news, knowledge and understanding, attitude and adoption with impact on compliance with the RSPO standard and certification of the RSPO standard.

3.2.5 Interviews with oil palm growers who were certified with the RSPO standard to study the information on the certification of the RSPO standard, compliance with the regulations of the RSPO standard, problems and obstacles, and interviews with oil palm growers who were not yet certified with the RSPO standard to study knowledge, understanding, attitude, motivation, and adoption of the RSPO standard.

3.2.6 Study the changes in land use for oil palm cultivation in Chumphon to know the situations of land use in oil palm cultivation in Chumphon.

3.2.7 Analyze the social return on investment (SROI) of the oil palm cultivation that was both already certified and not yet certified with the RSPO standard to compare the SROI of both types of oil palm cultivation.

3.2.8 Analyze the data using the statistics of Mean, Percentage to acquire the data on the reception of information and news, knowledge and understanding, attitude, adoption of farmers for the RSPO compliance, and Multiple Regression Analysis to study the factors that were related to the RSPO compliance of oil palm smallholder farmers in Chumphon, conduct description of the interview findings, and use the acquired information to construct the RSPO Model Compliance of oil Palm Smallholder Farmers in Chumphon.

3.2.9 Analyze and assess the RSPO Model Compliance by assessors who were experts/scholars to further develop the RSPO Model Compliance.

3.2.10 Improve the RSPO Model Compliance of Oil Palm Smallholder Farmers in order to ensure the complete RSPO Model Compliance of oil Palm Smallholder Farmers for further utilization.

3.2.11 Use the RSPO Model Compliance of oil Palm Smallholder Farmers to test with the farmers through focus group with participants such as oil palm growers who were members of ThaSae Land Settlement Cooperative, officials of ThaSae Land Settlement Cooperative, and employees of the Oil Palm Crushing Mill of ThaSae Land Settlement Cooperative Ltd.

3.3 Target groups and Key Informants

3.3.1 Public and private agencies relevant to oil palm and palm oil included 1) Department of Agricultural Extension, Ministry of Agriculture and Cooperatives 2) Department of Agriculture, Ministry of Agriculture and Cooperatives 3) National Bureau of Agricultural Commodity and Food Standards 4) German International Cooperation (GIZ) 5) Two oil palm crushing mills and 6) Two palm oil refineries. The roles of the target groups were shown in Table 3.1.

Table 3.1 Analysis of Stakeholders

Stakeholders	**Roles**	**Relevance to RSPO**
1. Department of Agricultural Extension	- Create and transfer knowledge of research on plants and agricultural machinery. - Stipulate and supervise the standards of production system, production of plant species, and production factors. - Develop the system to inspect and certify plant products for international recognition.	Provide knowledge and certification accredited with the RSPO standard.
2. Department of Agriculture	- Conduct research and development on various agricultural disciplines concerning crops. - Provide services for analysis, testing, inspection, and certification of crop standards. - Provide advice on soil, water, fertilizers, crops, agricultural raw materials, yield, plant products, etc.	Operate project to develop farmers to produce Oil palm with quality and encourage farmer groups, based on the RSPO principles.
3. National Bureau of Agricultural Commodity and Food Standards	- Standard setting for agricultural products and food in accordance with the demands and the international guideline. - Accreditation of certification of agricultural products and food in accordance with the demands and the international practice.	Standard setting of TSPO based on the RSPO principles.

Stakeholders	Roles	Relevance to RSPO
	- Encourage the implementation of the standards in the entire production chain and drive the strategies of food, agricultural product safety, and food safety.	
4. GIZ	- Economic development and employment, governance and democracy. - Rehabilitation in many fields, promote peace and reduce conflicts, food safety, public health, basic education, environmental protection, resource conservation, and climate protection.	- Disseminate knowledge on GAP standards, sustainable agricultural practice impacting environmental and social dimensions. - Encourage farmers to enter the certification system of the RSPO standard and drive the farmers to be certified..
5. Oil palm crushing mills	- Support budget for farmers' operation and activities. - Encourage farmer groups and registration as community enterprises.	Certified factories had more channels for selling their goods.
6. Oil palm refineries	- Promote farmers for environmental-friendly cultivation and compliance with the RSPO standards.	Certified factories had more channels for selling their goods.

3.3.2 The groups of oil palm growers who were certified with the RSPO standard in Krabi and Surat Thani included Community Enterprise for Sustainable oil Palm Producer Group Nuea Khlong - Khao Phanom, Nuea Khlong District, Krabi and Community Enterprise for Sustainable oil Palm Producer Group *(*Surat Thani*)*. These two groups were pioneers of smallholder farmers in the project for oil palm and palm oil production for sustainable bioenergy which was already certified with the RSPO standard.

3.3.3 The oil palm smallholder farmers who were not certified with the RSPO standard in Chumphon: The information was collected on the farmers who were members of Land Settlement Cooperatives in Chumphon consisting of Langsuan Land Settlement Cooperative, ThaSae Land Settlement Cooperative, and Pathio Land Settlement Cooperative, in total 8,754 persons (as per 1 September 2019) (Chumphon Provincial Cooperative Office, 2019) and database was used to calculate the size of the sample by using the Yamane formula with the deviation of 5%.

$$n = \frac{N}{1 + Ne^2}$$

When N = Number of smallholder farmers who were members of the cooperative

n = Size of sample

e = Deviation of 5%

$$n = \frac{8,754}{1+ 8,754*(0.05*0.05)}$$

= 383 sample or approximately 390 sample

When the size of sample was obtained from the calculation, the Quota Sampling was used by determining the ratio of the number of the members of each cooperative as follows: 85 sample for Langsuan Land Settlement Cooperative, 155 sample for ThaSae Land Settlement Cooperative, and 143 sample for Pathio Land Settlement Cooperative. Once the number of sample was obtained, Accidental

Sampling was used for collection of sample to obtain the sample with the required number (Sample collection had its limitation as the obtained sample might not equal the set number. It was therefore necessary to collect the sample again for the complete number).

Table 3.2 Number of Population and Size of Sample

Names of Land Settlement Cooperative	**Population**	**Size of Sample**
Langsuan Land Settlement Cooperative.	1,952	85
ThaSae Land Settlement Cooperative.	3,541	155
Pathio Land Settlement Cooperative.	3,261	143
Total	8,754	383

3.4 Study Tools

The tools used in the study included 1) Interview form for public and private agencies related to oil palm and palm oil production, certification of the RSPO standard, and farmers' compliance with the RSPO standard 2) Interview form for oil palm growers who were certified with the RSPO standard in Krabi and Surat Thani 3) Questionnaire for oil palm growers who were not certified with the RSPO standard in Chumphon. The details of the interview forms and the questionnaire were shown in Table 3.3.

Table 3.3 Details of the Tools Used in the Study

Issues	**Definitions**	**Questions**	**Key Informants/ Sample**
1. Promotion policies and measures to ensure certification of the RSPO standard.	Pattern used as a principle in practice for promotion to ensure certification of the RSPO	Are there promotion policies and measures to ensure oil palm growers'	Public and private agencies

Issues	Definitions	Questions	Key Informants/ Sample
	standard.	certification of the RSPO standard? What were they?	
2. Opinions on certification of the RSPO standard.	Belief, thought, or decision on certification of the RSPO standard.	Should oil palm growers be certified with the RSPO standard? Why?	Public and private agencies
3. What factors impacted promotion?	Reason or method to ensure set result.	What were the factors that impacted the promotion of oil palm growers for the RSPO compliance in order to be certified with the RSPO standard?	Public and private agencies
4. Guideline or model of promotion.	What was determined as principle or guideline of practice.	What was the guideline or model for promotion of oil palm growers in the RSPO compliance in order to be certified with the RSPO standard?	Public and private agencies
5. Problems and obstacles in promotion.	Impediment in promotion.	Problems and obstacles in promotion of oil palm growers in the RSPO compliance	Public and private agencies

Issues	Definitions	Questions	Key Informants/ Sample
		in order to be certified with the RSPO standard.	
6. Guideline to solve the problems.	What was determined for implementation.	What was the guideline to solve the problems?	Public and private agencies
7. Recommendations	Recommendations in RSPO compliance in order to be certified with the RSPO standard.	Recommendations for oil palm growers in the RSPO compliance in order to be certified with the RSPO standard.	Public and private agencies
8. History of oil palm plantation.	Background of oil palm plantation.	Background of oil palm plantation before being certified with the RSPO standard.	Farmers already certified with the RSPO standard
9. Reasons to decide to practice oil palm plantation.	References used to accompany action or decision.	Reasons of interest and decision in practicing oil palm plantation.	Farmers already certified with the RSPO standard
10. Motivation to join the project.	Factors that drove the participation in the project.	Motivation to participate in the project in order to be certified with the RSPO standard.	Farmers already certified with the RSPO standard
11. Supporting agencies.	Institutes to promote or render	What was the support from the	Farmers already certified with the

Issues	Definitions	Questions	Key Informants/ Sample
	assistance.	agencies supporting the request for the certification of the RSPO standard?	RSPO standard
12. Practice to ensure certification with the standard.	Implement the pattern to ensure certification of the RSPO standard.	What should farmers do to be certified with the RSPO standard?	Farmers already certified with the RSPO standard
13. Benefits	What is received from action or practice	Benefits from the certification of the RSPO standard	Farmers already certified with the RSPO standard
14. Problems and obstacles in order to be certified with the RSPO standard.	Impediment in requesting for certification of the RSPO standard.	Problems and obstacles derived from the request for certification of the RSPO standard.	Farmers already certified with the RSPO standard
15. General information.	Questions on personal information.	Gender, age, cultivation area, oil palm age, conditions of area, title deed, use of fertilizer, sales of oil palm yield, locations to sell yield.	Farmers not yet certified with the RSPO standard
16. Factors promoting the RSPO compliance.	Reason or method for the RSPO compliance.	Question on reception of information and news on the RSPO	Farmers not yet certified with the RSPO standard

Issues	Definitions	Questions	Key Informants/ Sample
		standard.	
17. Knowledge and understanding of the RSPO standard.	Education, practice, hearing, or experience on the RSPO standard.	Question on knowledge and understanding of the RSPO standard.	Farmers not yet certified with the RSPO standard
18. Attitude towards the RSPO standard.	Opinions or feelings towards the RSPO standard.	Question on attitude towards the RSPO standard.	Farmers not yet certified with the RSPO standard
19. Motivation to comply with the regulations of the RSPO standard.	The factors that drove the compliance with the regulations of the RSPO standard.	Question on motivation to comply with the regulations of the RSPO standard.	Farmers not yet certified with the RSPO standard
20. RSPO adoption.	Farmers knew about the RSPO standards leading to adoption.	Question on adoption of the RSPO standard.	Farmers not yet certified with the RSPO standard
21. RSPO compliance.	Action and compliance with the regulations of the RSPO standard.	Question on compliance with the regulations of the RSPO standard.	Farmers not yet certified with the RSPO standard

As for the scoring of the questionnaire which consisted of questions on knowledge and understanding, the questionnaire respondents must choose only one answer for each question. The average score was divided into three ranges by applying the criteria of Bloom (1971) as follows:

Mean 0.0 – 0.33 = Low level of knowledge and understanding
Mean 0.34 – 0.67 = Fair level of knowledge and understanding
Mean 0.68 – 1.00 = High level of knowledge and understanding

As for the scoring of the questionnaire which consisted of the questions on attitude, motivation, adoption, and practice, the questionnaire respondents must choose only one answer for each question. The average score was divided into five ranges. The criteria used to divide the levels was based on Best (Best, 1977) as follows:

Mean 1.00 – 1.80 = Lowest mean
Mean 1.81 – 2.60 = Low mean
Mean 2.61 – 3.40 = Fair mean
Mean 3.41 – 4.20 = High mean
Mean 4.21 – 5.00 = Highest mean

3.5 Inspection of the Quality of the Questionnaire

The inspection of the quality of the questionnaire was to ensure accuracy, confidence, and quality through the analysis and the inspection of the quality of the questionnaire prior to use to ensure correctness, accuracy, and precision according to the content of the variables that needed to be measured as follows:

3.5.1 Content Validity of the questionnaire by requesting four experts to inspect the content validity of the questions consisting of content, measurement, assessment, and use of language. The consideration was to compare with the objectives of the research. The questions that were congruent would receive 1 score, not sure 0 score, and not congruent -1 score. In finding the IOC (Index of Item – Objective Congruence), the questions were chosen with the IOC higher than 0 .5 – 1.00 and the questions were improved from the opinions and recommendations of the experts for more completeness. As for the results of the inspection of content validity of IOC, almost all questions exceeded 0.5. Only one question was lower than 0.5. So, it required improvement.

Table 3.4 Findings of the Content Validity

Questions of Item No.	**IOC**
Knowledge and understanding	
1	1
2	1
3	1
4	0.8
5	0.4
6	0.8
7	0.8
8	1
9	0.4
10	0.6
11	0.8
12	0.8
13	0.6
14	0.8
15	1
Attitude, motivation, and adoption	
1	1
2	0.8
3	1
4	0.8
5	0.8
6	0.8
7	0.8
8	0.8
9	0.8
10	0.8
11	1
12	0.8

Questions of Item No.	IOC
13	0.4
14	1
15	0.8
RSPO compliance	
1	1
2	0.8
3	0.8
4	0.6
5	0.8
6	1
7	1
8	0.6

3.5.2 Reliability: To ensure the questionnaire's appropriateness in line with the objectives and the conceptual framework, the Pre-test was conducted with the population with similar characteristics of the sample in the study to ensure Reliability of the questionnaire. The internal congruence was conducted through the Kuder-Richardson formula and Cronbach's Alpha Coefficient. The detail was shown in the annex.

Table 3.5 Reliability of the Questionnaire

Questions	Reliability
1. Knowledge and understanding of RSPO compliance.	0.75
2. Attitude, motivation, and adoption of RSPO compliance.	0.85
3. RSPO compliance.	0.89

3.6 Data Analysis

The data analysis of the study was the assessment while collecting data according to the research plan. The researcher conducted the data analysis on the certification of the RSPO standard and compliance with the RSPO standard, policies on the RSPO standard, as well as problems, obstacles, and guideline of farmers' promotion in the RSPO compliance. The details were as follows:

3.6.1 Analysis of qualitative data from interviews: The results of the interviews with public and private agencies related to oil palm and palm oil production and farmers who were certified with the RSPO standard were used for the Content Analysis by using the principles of project analysis and project assessment with IPO and the descriptive summary. The project assessment via IPO was to assess Input, Process, and Output. The weight of the assessment was considered from the project operation of public and private agencies in the sustainable promotion of oil palm farmers in order to use the results to develop the RSPO Model Compliance of oil Palm Smallholder Farmers in Chumphon by giving the weight of the assessment of Input with 30 scores as it was the basic factor of sustainable promotion of oil palm farmers; the weight of the assessment of Process with 30 scores as it was the process of sustainable promotion of oil palm farmers; and the weight of the assessment of Output with 40 scores as it was the successful result of sustainable promotion of oil palm farmers and were certified with the RSPO standard. The weight of the assessment was not very different as each factor was important to the promotion of the RSPO compliance of oil palm smallholder farmers in Chumphon. The details were in Table 3.6.

Table 3.6 Details of the Assessment and Weight of the Assessment

Assessment	Details of the Assessment	Weight
Input	- Personnel	30
	- Budget	
	- Types of activities and projects	
	- Tools and equipment	
	- Locations of activities	
Process	- Management	30
	- Public relations	
	- Coordination	
	- Knowledge transfer towards implementation	
	- Monitoring and assessment of operation	
Output	- Implementation	40
	- Results from implementation	
	- Economic impact	
	- Social impact	
	- Environmental impact	

The criteria of the assessment from the mean of the assessment was divided into three levels as shown in Table 3.7.

Table 3.7 Criteria of the Project Assessment

Score Ranges	Assessment Findings
1 – 1.66	Low mean
1.67 – 2.33	Fair mean
2.34 – 3.00	High mean

3.6.2 The data analysis of the questionnaire for the farmers who were not yet certified with the RSPO standard used the Descriptive Statistics such as Mean, Percentage, and Standard Deviation, and searching for the factors with the relationship and the impact on the RSPO compliance of oil palm smallholder farmers in Chumphon by using the analysis of Correlation and Multiple Regression Analysis to study the relationship between the Independent Variable and the Dependent Variable by determining the knowledge and understanding of the RSPO standard, the attitude towards the RSPO standard, the motivation of the RSPO compliance, and the adoption of the RSPO standard as the Independent Variable, and by determining the RSPO compliance of oil palm smallholder farmers in Chumphon as the Dependent Variable.

CHAPTER 4

STUDY RESULTS

The study results included 1) The results of the analysis of policies and strategies relevant to oil palm 2) The interview results with the public and the private sectors relevant to oil palm and palm oil production such as Department of Agriculture, Department of Agricultural Extension, National Bureau of Agricultural Commodity and Food Standards, German International Cooperation (GIZ), Oil palm crushing mills, and palm oil refineries 3) The interview results of groups of oil palm growers certified with the Roundtable on Sustainable Palm Oil (RSPO) 4) Evaluation of Input, Process, and Output (IPO) 5) Data analysis from the questionnaire 6) Factors impacting the RSPO compliance of oil palm smallholder farmers in Chumphon 7) Evaluation of Social Return on Investment in oil palm production 8) Changes of land use of oil palm in Chumphon 9) RSPO draft model compliance of oil palm smallholder farmers in Chumphon 10) Evaluation of RSPO draft model compliance of oil palm smallholder farmers in Chumphon and 11) Focus group to evaluate RSPO draft model compliance of oil palm smallholder farmers in Chumphon with the following details:

4.1 Results of the Analysis of Policies and Strategies Relevant to Oil Palm

The formulation of policies and strategies on the development of oil palm and palm oil industries aimed to operate efficiently and continuously and serve as framework and direction for the stakeholders to operate and implement in the continuous development of oil palm and palm oil industries which could generate sustainable income and to ensure that the farmers could develop the quality of the oil palm production, increase efficiency of oil palm production, in response to national demand, with equal efficiency and ability to compete with other countries. The

policies and plans of the development of oil palm and palm oil industries consisted of three components namely oil palm growers, entrepreneurs of palm oil industry, and policies on palm oil industry. The policies and strategies of the effective development of oil palm and palm oil industries consisted of six strategies namely production, innovation, marketing, standards, energy, and management.

The policies and strategies of the development of oil palm and palm oil industries would take into account the following: 1) Production: With the goal to increase yield per rai, increase cultivated areas, increase production efficiency and value of oil palm and products, and restructure oil palm and palm oil industries towards efficient production 2) Innovation: With the goal to develop towards upstream and downstream oleochemical industry with higher value added 3) Marketing: With the goal of efficient stock management, promote the marketing policy of palm oil and products in accordance with market mechanism to encourage competition and distribution of benefit to cover all 4) Standard: With the goal to set up and enforce the standards of oil palm and products based on international standards, compulsory standards, GMP, Oil palm bunch collection centers, standards of crushing mills and refineries 5) Energy: With the goal of increasing consumption, support continuous production of alternative energy, and promote the development of accommodating engine system 6) Management: With the goal to establish oil Palm and Palm Oil Act to be national agenda, establishment of agency and oil palm and palm oil development fund.

4.2 Interview Results with the Public and the Private Agencies Relevant to Oil Palm and Palm Oil Production

The interviews to collect information on oil palm cultivation, the certification of the RSPO standard, and the promotion of sustainable oil palm production were conducted with relevant officials in the government agencies namely Department of Agriculture, Department of Agricultural Extension, National Bureau of Agricultural Commodity and Food Standards, German International Cooperation (GIZ), and private agencies namely oil palm crushing mills and palm oil refineries. The results of the interviews were as follows:

4.2.1 Department of Agriculture

Department of Agriculture is responsible for study, experiment, research and development of agricultural disciplines involving plants; services provided for analysis, testing, inspection, and certification of plant standards; advice on soil, water, fertilizer, agricultural material, yield, and plant products; services provided for export of agricultural products, and others; services provided for academic information, news, and agricultural technology to officers, farmers, private sector, and other relevant agencies. The interviews with the experts in Department of Agriculture were as follows:

RSPO is the standard of sustainable oil palm production. It is the standard initiated by the private sector in EU. It started with GIZ, Germany's international cooperation agency, who operated worldwide to reach the goal of international cooperation of sustainable development and who came to disseminate the principles and certify farmers, with the assistance and promotion of smallholder farmers from oil palm crushing mills in organizing activities. GIZ cooperated with Department of Agricultural Extension and Department of Agriculture to transfer knowledge and certify the sustainable oil palm production standard of RSPO and other standards. The private sector was also involved in the operation namely oil palm crushing mills and palm oil refineries who needed to be certified with the RSPO standard. Farmer groups sent their yields to the mills and the mills assisted the farmers in various fields as the mills needed the yields to be RSPO certified.

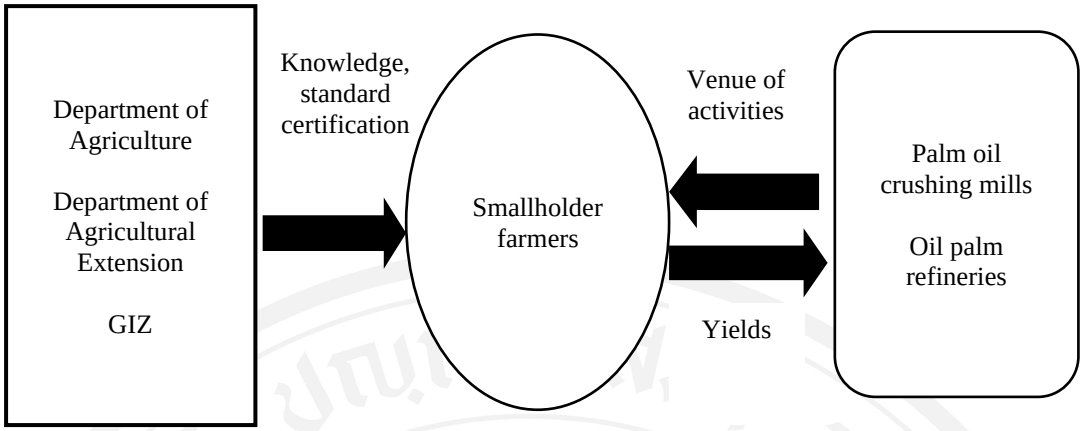

Figure 4.1 Participation to Support Smallholder Farmers

In the future, agricultural products must be certified with standards to be sellable as global population increasingly places importance on health and environmental conservation. Therefore, production for selling must be certified with standards for reliability. Similarly, when oil palm is certified with standards, the famers will benefit from higher selling prices of palm bunch as motivation to enter the system with compensation for them. At present, in reality, if oil palm is not certified with the RSPO standard, it is possible to do so because most oil palm yields of 80-90% is sufficient for domestic consumption. But in the future, it is necessary to be certified with standards if oil palm yields or oil palm products are to be exported. Presently, the palm oil prices drop as a result of the global market. The pricing of palm oil depends on 1) Demand of oil palm, 2) Prices of other vegetable oils such as soybean oil, rapeseed oil, 3) Fluctuating prices of petroleum. If the petroleum price is down, the vegetable oil price is down as well.

1) The factors impacting farmers' compliance to be accredited with the RSPO standard included knowledge and understanding provided to farmers, ability to adapt themselves with the global trend, and guideline to increase yields, reduce production costs, construct farmer groups with consciousness, and acquire the status of professional farmers. At present, farmers are not professional. The farmers exercise their profession as handed down by their ancestors if they do not exercise other professions. Professional farmers require knowledge, understanding, and ability to develop themselves towards professional farmers.

2) Farmers' RSPO model compliance was to promote farmers to have knowledge and understanding which was the easiest method. Tools and equipment were provided. Trainings were arranged by inviting experts to provide knowledge to farmers, moral encouragement, and inspection of oil palm plantation and other methods until the farmers were ready for RSPO's compliance. Other farmers would see the model, with study tours and implementation, teaching of farmers among themselves, with responsible agencies providing trainings for model farmer who would in turn transfer knowledge to other farmers, with support from relevant agencies, assistance and advice from officers, and formation of farmers' groups.

3) The main problems and obstacles to promote farmers' RSPO compliance included non-adoption because it would complicate compliance with regulations, recording, orderly implementation such as after use of chemicals, the bottles must be buried; spraying of chemicals required self-protection; prohibited employment of illegal immigrants; prohibited illegal land tenure; prohibited garbage or breeding of animals that might dirty the plantation due to possible contamination. The practice must be clean, hygienic, and environmentally-friendly. The main problem was recording. Most farmers were elderly and were not good at recording.

4) The recommendations of the RSPO compliance depended on farmers or farmer groups to implement the requirements. Responsible officers and people in the public and the private sectors only supported the farmers if the farmers adopted and complied with the requirements oil palm production in Thailand was advantageous over Indonesia and Malaysia. Because in Thailand, there was no practice of the following: destruction of environment, forest encroachment, killing of wild animals, forest burning emitting carbon, resulting in global warming.

In the interview, the key informant gave the following information and recommendations:

"Farmers did not accept it because it added to their burden and complications in palm plantation. They would have to comply to many requirements. So, farmers must be promoted to adopt and comply with the RSPO standard".

4.2.2 Department of Agricultural Extension

Department of Agricultural Extension is responsible for development of farmers, readiness of both personnel and farmers to build immunity against various situations, work process improvement in accordance with situations, efficient management system by adhering to the principles of Sufficiency Economy Philosophy as foundation to perform tasks. The interview with the specialist of Department of Agricultural Extension revealed the following opinion:

Department of Agricultural Extension has operated the farmer development project for two years and forwarded it to oil palm crushing mills for certification of the RSPO standard. If the farmer groups were to apply for the certification, it would be difficult. So, oil palm crushing mills would apply for the certification. The farmer development project promoted quality of yields and formation of farmers' groups based on the RSPO principles but did not focus on certification as application for certification involved high costs. This farmer development project was called the project of sustainable oil palm and palm oil production. It was joint project among three agencies namely Department of Agricultural Extension, Department of Agriculture, and GIZ. The role of Department of Agricultural Extension in this project was to develop lecturers who were farmers to transfer knowledge to target farmers who were members of agricultural project with large plots in the three provinces of Chumphon, Surat Thani, and Krabi which were the provinces with a lot of cultivated areas for oil palm. At present, the project was in the process of determining courses, setting up of operational guideline, and recruitment of officers and personnel in various positions. In terms of the project operation, after the lecturers finished development, the project must recruit oil palm crushing mills in parallel to link with the farmer groups because the oil palm crushing mills must be certified with the RSPO standard as well.

The interviewed person thought that farmers should pass the certification of the RSPO standard as the RSPO standard was one form of trade barrier as it changed from tariff system to requirements of sanitation and environment. The certification of the RSPO standard would indirectly rather than directly benefit them. The indirect benefit included the following: after the RSPO compliance, yields would increase due to recording, soil and leaf analysis before applying fertilizer so that palm trees

received fertilizer as required. As the RSPO standard was a new issue with many requirements, it created complications. But farmers should be promoted to be certified. It would enhance more systematic oil palm plantation, with clear information, planning of plantation of farmers themselves and at the national level, benefiting farmers, oil palm crushing mills, and palm oil refineries, as well as good for environment.

1) The factor impacting farmers to comply with the requirements of the RSPO standard in order to be certified with the standard was to have increased prices of yields. The costs for certification of the standard were high. But for the first time to apply for the certification, GIZ and oil palm crushing mills would share the expenses. But for next time, the farmer group must bear the expenses. The group would collect counterpart fund for expenses next time.

2) The model to promote farmers' compliance with the requirements to be certified with the RSPO standard was first of all to promote the farmers to form in groups. Then, the consideration to see if in the area there were oil palm crushing mills which would operate at the same time as the farmers' groups and support the farmers to be certified, both for both farmer groups and oil palm crushing mills.

3) The problems and obstacles impacting the promotion of farmers to comply with the RSPO standard included farmers did not know about this standard, they did not have correct knowledge and understanding, this standard had many requirements which were difficult for the farmers to implement. Formation of group was also another problem as most farmers were old without knowledge and understanding of the standard. They needed time to understand the RSPO standard and attitude towards old methods of palm plantation which were contrary to some requirements of the RSPO standard and the problem of recording.

4) In terms of recommendations to promote farmers to be certified with the RSPO standard, the government should stipulate that the RSPO standard constituted the government's policy similarly to the GAP standard so that the farmers certified with the RSPO standard would be more efficient. The drive for Thailand on Sustainable Palm Oil (TSPO) would make promotion more efficient because it was appropriate to the context of Thai farmers who would benefit through increased

amount of yields and higher selling prices. It would benefit both farmers and the entire industrial system of palm oil production.

The interview of the key informant revealed the following statement and recommendation:

"Farmers should be promoted for certification to ensure more systematic palm plantation. The information recording, and planning of plantation management will benefit the system of oil palm and palm oil production. It will also benefit society and environment".

4.2.3 National Bureau of Agricultural Commodity and Food Standards

National Bureau of Agricultural Commodity and Food Standards is an agency under Ministry of Agriculture and Cooperatives as the center of coordination and development of the standards of the country's agricultural products on a par with international standards. It cooperates with other agencies under Ministry of Agriculture and Cooperatives by focusing on comprehensive services for import and export of agricultural products, and issuance of standards such as standard of oil palm bunch collection centers, quality standard such as Good Agricultural Practice (GAP) and in the process of determining Thailand's standard of sustainable palm cultivation or the TSPO standard based on the RSPO. For the two standards, they were different in the areas of cultivation. There was no stipulation that the palm grown 7-9 years ago was in new planting area. But there was stipulation that when the law was enforced, the areas would be considered new planting. But the RSPO considered the palm trees grown 10 years ago as the new planting areas. Therefore, the palm trees aged 10 years were considered the new planting areas which required environmental assessment. The interview with the specialist at National Bureau of Agricultural Commodity and Food Standards revealed the following opinion:

The certification of the RSPO standard is divided into two parts namely RSPO P&C (Principles and Criteria). Large farmers or farmers with the areas of over 312.5 rais or 50 hectares were individually certified and smallholder farmers or farmers with the areas of less than 312.5 rais must form legally registered groups to have the right to be certified with the RSPO standard with system of group formation, and arrangement of group structure consisting of manager, committee member, market

supervisor, plantation supervisor, financial supervisor, etc. Farmers understood the details of the principles and criteria through trainings to provide them with knowledge and understanding such as knowledge on the RSPO standard, selection of species, use of fertilizers, environmental management, occupational health, accounting, etc. that farmers could implement. If they did not understand or could not implement, assistance team with expertise would efficiently assist them as shown in Figure 4.2.

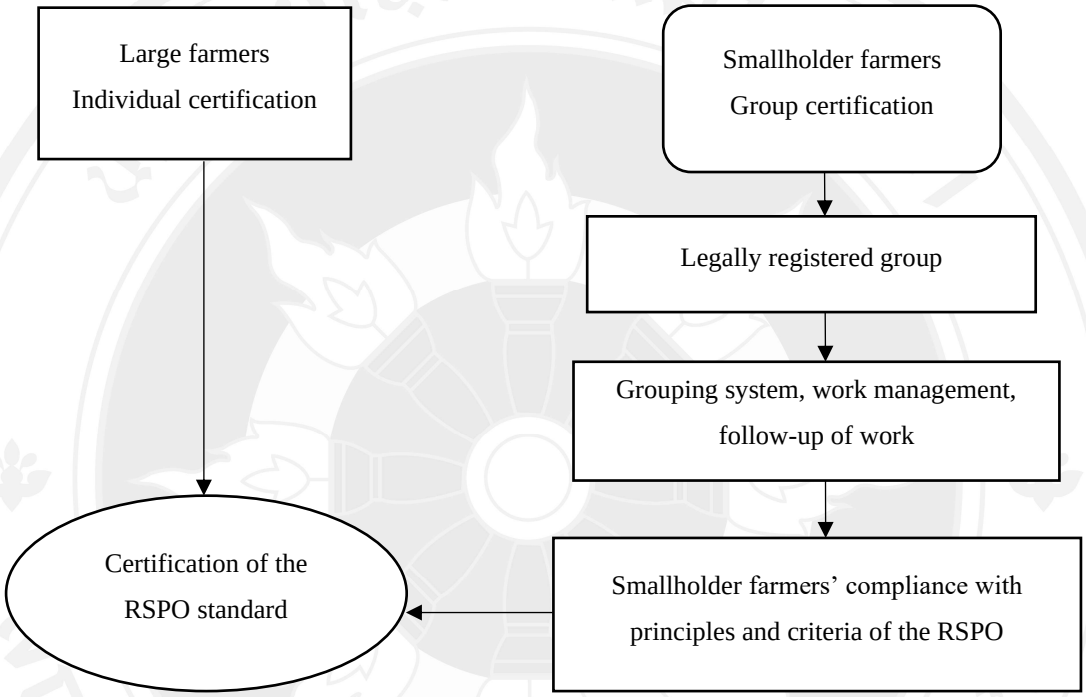

Figure 4.2 Process of Certification of The RSPO Standard

1) The factors impacting farmers to comply with the requirements to be certified with the RSPO standard depended on the farmers themselves. They must attend to their plantations and not let only their staff do the work. It was clear during the harvest. If the farmers did not control the harvest of yields, the yields might be ripe and raw mixed together which would reduce the oil percentage. The farmers must manage their plantations such as change from applying ready-made fertilizers to applying the fertilizer based on the inspection of leaves. The reduced use of fertilizer would reduce costs as well. The method of bio control was used. Reduced use of chemicals would reduce environmental problems. So, farmers must have knowledge

and could do accounting of the oil palm plantation. Farmers could use it for data analysis for beneficial purposes. For example, they knew the conditions of their plantations with good management by making use of the data, most importantly, the amount of increased oil palm bunch and oil percentage, and reduced costs. These were the general principles to promote knowledge and understanding of the techniques of plantation management. If the farmers had knowledge and understanding and could implement them, they would increase the efficiency in all aspects. The government should promote and support farmers to have more knowledge and to be able to implement to enhance skills and efficiency in plantation for higher yields and reduced costs. Even if the prices of the yields would go down, the farmers could continue to operate. In terms of promoting the farmers to use the RSPO standard leading to the certification of the plantation, it was the result of group formation and cooperation within the group such as joint purchase of fertilizers would be cheaper than individual purchase.

2) The model to promote smallholder farmers to comply with the RSPO standard required legally registered group such as community enterprise, company, mill, juristic person, cooperative, etc. It also required manager with knowledge and ability to manage and take care of the group. Once the group was formed, trainings must be provided to transfer knowledge of the RSPO standard to the farmers and motivate the farmers to implement them. Comparison should be made of the palm plantation prior and post operation to see the differences and changes such as higher yields, reduced production costs, higher prices, care of occupational health, self-protecting gear while spraying and applying fertilizer. These activities required inspection as it was the process to enter the RSPO standard.

3) The problems and obstacles to promote farmers to comply with the RSPO standard were that without the government's initial support, formation of group would not be operated. The grouping by the farmers themselves would be difficult. The main problem was that grouping required funding which was the main factor and starting point for the grouping. The fact that the farmers did not have equal knowledge was not a problem because they could attend trainings. But from the beginning, farmers must be formed into group first. The problem was how to group because there were many, diverse people. The person in control must have power and

respect, probably village headman, owner of oil palm bunch collection center, or factory owner. The problem of no advisor would be difficult because the farmers could not follow academic methods. Government agencies had to come to their help which would make farmers understand and implement (application of fertilizers, spraying of pesticides, harvesting). Formation of group required money to operate and personnel to manage for the farmers. Once certified with the RSPO standard, money would be used for management, ensuring sustainability, strong and secure foundation, in all aspects, including economic, social, environmental aspects. When the farmers complied with the RSPO, it would lead to higher yields, reduced production costs. The farmers in group would also have more bargaining power for themselves.

4) In terms of recommendations to promote farmers to be certified with the RSPO standard, there should be good management, trainings provided for farmers to have knowledge and understanding, follow-up and recording of information, officers giving advice on how to fill the information and taking care of the farmers. Most importantly, the Farm Advisor (FA) was responsible for work in the areas to disseminate, exchange news and information, give advice and follow up operation, develop according to action plan, and facilitate activities to enhance farmers' potential, coordination within the group, plantation management, solutions to problems, and trainings must have at least four courses to enable the farmers to understand all topics from plantation management to yield management. Although not part of RSPO, yield management was the most important because it would impact quality and prices of the yields. With good plantation management, the cutting of ripe palm based on the age of the palm would increase oil percentage from 17% to probably 19% which was considered good quality palm. Factories gave higher prices due to good care and management as there was relationship between quality and prices.

The interview with the key informant revealed the following statement and recommendation:

"Promotion of knowledge on plantation management for farmers' implementation increased the efficiency of oil palm production. The government should promote and support the farmers to have more knowledge and concrete

implementation, with higher yields, and reduced production costs. Even if the prices of the yields go down, farmers can continue to operate".

4.2.4 German International Cooperation (GIZ)

German International Cooperation (GIZ) is the German government's agency responsible for sustainable development. It operates in the names of various ministries under the German government, including public and private agencies of various countries and international organizations such as EU, UN, World Bank. GIZ has expertise in numerous fields such as economic development and employment, governance and democracy, rehabilitations in many aspects, peace and reduced conflict, food security, public health, basic education, environmental protection, natural resource preservation, and climate protection. The interview with the key informant revealed the following opinion:

GIZ formulated the measure to promote farmers to be certified with the RSPO standard in cooperation with Department of Agricultural Extension and Department of Agriculture such as agricultural project of large plots of oil palm, dissemination of knowledge of the GAP standard, sustainable agricultural practice impacting environmental and social dimensions. The project aimed to provide trainings to 3,000 farmers with the development of local lecturers who would disseminate knowledge to the farmers, promoted farmers to enter the system of certification of the RSPO standard which would drive the farmers to be certified with the standard, promote measures of good practice in line with sustainable oil palm production based on the requirements of the RSPO standard to indirectly reduce greenhouse gas. This project would help the farmers to reduce production costs such as efficient use of fertilizers impacting the increased yields and income and link with oil palm crushing mills in the form of partnership to enhance cooperation.

The certified palm oil ensured sustainable and environmental-friendly production in demand of the markets due to good management. In Thailand, the production did not destroy the environment unlike other countries under criticism. At the same time, Thailand was not a major exporting country of the product. Most of the consumption was domestic with partly export in processed products. Some companies could not export because the raw materials did not meet the RSPO standard. It was a good thing to drive for the accreditation of the RSPO standard as Thailand had many

strengths unlike other countries. But Thailand lacked market management, with no public relations of quality products. Probably because Thailand did not export so it did not focus on the dissemination of information or facts. Yet, even with no export, dissemination of quality products would allow trading partners to know, which constituted additional opportunity and market channel for the farmers. If the TSPO standard was established, it would be a good thing because it would stimulate domestic demand as well.

1) The factors impacting farmers to comply with the requirements to be certified with the RSPO standard included that farmers must know and understand sustainable oil palm production. Once they knew and understood, they would be certified more easily. Government agencies would give support. Even oil palm crushing mills who were partners would be willing to support expenses for the standard certification because the mills would benefit as well. As for the motivation to be certified with the standard, it started when the farmers had correct knowledge and understanding and implemented it to reduce production costs, increase yields, and income. As for the certification of the standard, the compensation was compared with the outcome after receiving the output. The farmers would get the increased prices of yields or Premium Price from oil palm crushing mills.

2) The model to promote farmers to comply with the requirements by promoting farmers to have actual knowledge and understanding of sustainable oil palm production, principles and requirements, and could implement them. Even if the project ended, farmers could enhance on the knowledge by themselves, and create networks of oil palm production for exchange of learning among themselves. The importance of the RSPO standard for smallholder farmers was strong group formation and good group management.

3) The problems and obstacles to promote farmers to comply with the requirements to be certified with the RSPO standard included; 1) Officers lacked knowledge and understanding of the RSPO standard and local residents lacked knowledge of sustainable oil palm production, 2) There was no systematic knowledge management, 3) Lack of good instruction media that could be used to disseminate to farmers for easy understanding. It would lead to the dialogue of the three agencies namely Department of Agricultural Extension, Department of Agriculture, and GIZ

who jointly operated a project with courses that should be arranged for smallholder farmers with development of lecturers, and quality media that the lecturers would disseminate to the farmers, 4) Officers from the central government did not understand the importance of sustainable oil palm production based on the RSPO standard with benefits and purposes and, 5) High costs for the standard certification because the assessment required foreign assessors. There was no Thai who could serve as assessor.

4) The recommendations to promote farmers to be certified with the RSPO standard as follows:

(1) In the future, if the assessment was area-based inspection, it would greatly reduce costs in assessment. RSPO made announcement that if any country was interested and saw the importance especially the public sector who saw the importance of sustainable oil palm production and if all quality oil palm production was certified, it would be possible to conduct area-based assessment which would reduce assessment costs.

(2) The government should have an integrated role to drive the local areas more which would ensure sustainable oil palm production. If the government could formulate the continuously long-term development plan at the provincial level, Thailand would produce quality oil palm based on sustainability with the entire country certified with the RSPO standard. The government should also construct the model for sustainable oil palm production to serve as example for the farmers to follow.

The interview with the key informant revealed the following statement and recommendation:

“The palm oil certified with the RSPO standard is in demand in the market due to its good, environmental-friendly management. Farmers must have knowledge and understanding of sustainable oil palm production. Once they have knowledge and understanding, they will be certified more easily. Once they have motivation to operate, they will be certified more easily as well”.

4.2.5 Oil Palm Crushing Mills

The interviews with two oil palm crushing mills in Krabi and Chumphon revealed that the interviewed persons spoke about the RSPO standard that it was established by EU following the Asian palm oil's penetration into the European market due to its lower prices than Canola oil with much lower production costs. The age of the palm tree which was planted once would be as long as 30 years whereas the oil plant such as rapeseed using Canola oil was grown once. After harvest, it would be grown anew, increasing production costs. So, palm oil penetrated the market with Indonesia and Malaysia as major exporters. Subsequently, EU tried to raise trade barrier by establishing the standard for the process of oil palm production by focusing on deforestation to expand the areas of oil palm cultivation in Indonesia which destroyed orangutan's habitats. If the producing countries wanted to export palm oil for final products such as instant food, soap, cosmetics, or health products, they must comply with the requirements. If not, they would not be able to sell. Thailand was certified with the standard in 2012 for the type of small entrepreneurs because most were smallholder farmers which were different from Malaysia and Indonesia with large plots. Thus, a lot of farmers were certified with the standard whereas in Thailand there were few farmers because the farmers did not focus on the certification of the RSPO standard.

In terms of preparation of the entrepreneurs in the Thai industrial sector, RSPO was the standard that certified the market in its supply chain from oil palm growers which constituted the upstream industry, oil palm crushing mills which constituted the midstream industry, and the producers of final products for consumption such as bakery, cracker, butter, margarine, sweet condensed milk, convenience food, as well as the manufacturing industry of consumer products which constituted the downstream industry of the RSPO. If Thailand was not certified with the RSPO, it could not export virgin palm oil to the countries which established the standard such as Europe but could export to the countries which did not establish the RSPO standard such as Myanmar, China, or domestic sales. However, the certification of the RSPO standard would provide more alternative to sell products. Both oil palm crushing mills and palm oil refineries must be certified with the RSPO

standard similarly to smallholder farmers with more stringent requirements than the farmer groups.

Oil palm crushing mills did not formulate policy or plan to promote smallholder farmers to be certified with the RSPO standard but operated the project in cooperation with GIZ to promote the farmers to be certified with the standard. GIZ supported the budget for operation and activities. Initially, it conducted the survey of the information of the farmers, as well as studied the demands of the farmers such as prices of yields, knowledge and understanding of palm plantation, and costs of oil palm plantation management. The information would be used to submit as project and operation, and supported the farmers to form groups and register as community enterprise. Then, in cooperation with GIZ, Prince of Songkhla University, Department of Agricultural Extension, and Office of Agricultural Economics, activities were held for trainings to farmers in order to develop their knowledge of oil palm plantation management, and preparation of documents. Oil palm crushing mills provided the venues for trainings and personnel with knowledge and ability to take care of and give advice to the farmers in compliance with the RSPO standard. The farmers attending the trainings would have more knowledge and understanding. They could select the species appropriate to the conditions of the soil, soil analysis, application of fertilizers in response to the needs of the oil palm. They also knew the methods of reforestation and harvest of yields with more oil percentage, including reduced use of fertilizer and pesticide, increasing yields per unit from 2 tons/rai to 3 tons/rai. Some farmers managed to reduce costs up to 50% as they did not have to pay for solving the problems of soil deterioration. They did not have to move or increase the cultivated areas. Importantly, for the oil palm plots certified with the RSPO standard, the oil palm crushing mills would increase the prices of yields about 5-10 satangs per kg from the market prices and the farmers could buy fertilizers jointly with the companies for lower prices than the market, which could reduce production costs. When the groups of smallholder farmers were certified with the standard, the oil palm crushing mills would supervise and give a little advice as the groups could operate by themselves.

The interview with the key informant revealed the following statement and recommendation:

"The palm oil not certified with the RSPO standard cannot be exported to the countries who will buy only certified products but can be exported to the countries with no such requirements or it can be sold domestically. However, if the palm oil is certified, there will be more alternatives in sales".

4.2.6 Palm Oil Refineries

The interviews with two palm oil refineries in Chumphon revealed that palm oil refineries did not formulate policy or measure to promote farmers to be certified with the RSPO standard as palm oil refineries bought palm oil directly from oil palm crushing mills certified with the RSPO standard. Therefore, it was the duty of the oil palm crushing mills to formulate policy or measure to promote farmers to practice the process of environmental-friendly cultivation or compliance with the RSPO standard. The palm oil refineries must be certified with the RSPO standard as the oil palm crushing mills. However, the palm oil refineries who joined relevant agencies to promote farmers to practice environmental-friendly cultivation or compliance with the RSPO standard did not directly formulate the promotional policy and measures.

1) The factor to promote palm oil refinery entrepreneurs to place importance on compliance with the RSPO standard was that the buying countries determined the requirements so that they could sell the products to those countries.

2) The recommendations to promote farmers to be certified with the RSPO standard could be practiced continuously by which the government should support academic knowledge to smallholder farmers, as well as continuous support and follow-up. Moreover, the government should study and promote smallholder farmers to form cooperative. The government should also study the RSPO standard to know if Thailand should use the standard or if Thailand should establish its own standard.

4.2.7 Summary of the Interviews with Relevant Agencies

The interviews with six government agencies and the private sector relevant to oil palm and palm oil production to summarize policy-based information and lead to the promotion of RSPO model compliance of oil palm smallholder farmers in Chumphon could be summarized as follows:

1) Department of Agriculture supported knowledge to farmers to be certified with the RSPO standard of sustainable oil palm production and other standards with the private sector's support.

2) Department of Agricultural Extension operated the project to develop farmers before passing them on to the private sector for the certification of the RSPO standard. The project to develop farmers promoted quality of yields and formation of farmer group according to the principles of the RSPO. But the Department did not support the application for the certification. The project to develop farmers was named sustainable oil palm and palm oil production project.

3) National Bureau of Agricultural Commodity and Food Standards was responsible for establishing standards such as standard of oil palm bunch collection centers, quality standard such as GAP standard and standards of agricultural products, principles of sustainable oil palm and palm oil production, and Thailand's practical guideline for sustainable palm oil production according to the framework of the RSPO 2015.

4) German International Cooperation (GIZ) formulated the measures to support farmers to be certified with the RSPO standard through collaboration with Department of Agricultural Extension and Department of Agriculture. They developed local experts to disseminate knowledge to the farmers and promote the farmers to enter the system of the certification of the RSPO standard which drove the farmers to be certified with the standard, and promote the measures of good practice in line with sustainable oil palm production according to the requirements of the RSPO standard.

5) Oil palm crushing mills did not formulate policy or plan to support smallholder farmers to be certified with the RSPO standard but operated the project with GIZ to enable the farmers to be certified. GIZ supported budget in operation and activities and oil palm crushing mills provided venues for trainings, and personnel

with knowledge and ability to take care of the farmers and gave them advice on the compliance with the RSPO standard.

6) Palm oil refineries did not formulate policy or measures to support farmers to be certified with the RSPO standard as the palm oil refineries bought palm oil directly from the oil palm crushing mills certified with the RSPO standard. But palm oil refineries cooperated with relevant agencies to promote farmers in environmental-friendly cultivation or in compliance with the RSPO standard.

4.3 Interview Results with Farmers

The interviews were divided into two farmer groups certified with the RSPO standard. They were representatives of Sustainable Oil Palm Smallholders Production Univanich-Plaipraya Community Enterprise Group in Krabi and Surat Thani Sustainable Oil Palm Production Community Enterprise, and farmers not certified with the RSPO standard who were the farmer representatives and members of Chumphon Land Settlement Cooperative, the detail as follows:

4.3.1 Farmers Certified with the RSPO Standard

4.3.1.1 Representative of Sustainable Oil Palm Smallholders Production Univanich-Plaipraya Community Enterprise Group in Krabi

Sustainable Oil Palm Smallholders Production Univanich-Plaipraya Community Enterprise Group was one of the four groups in Thailand certified with the RSPO standard. It was the first independent farmer group in the world that was certified. In the past, the farmers did not form any group. Each did his or her own duty. Until 2009, Office of Agricultural Economics, GIZ, and Prince of Songkhla University jointly operated the project for oil palm and palm oil production as sustainable bio energy, with assistance rendered by oil palm crushing mills. The group was formed with approximately 40-50 farmers. The project was operated as trainings with lecturers from Prince of Songkhla University who provided knowledge on oil palm plantation management so that the farmers had better knowledge and understanding and they could implement them and follow the requirements of the

RSPO standard. Then, they applied for the certification of the RSPO standard. After two years, they were certified. Most farmers practiced agriculture since the beginning prior to oil palm cultivation. For example, they grew coffee, rubber, and fruits, etc. Afterwards, they changed to oil palm cultivation. The palm trees were aged between 25-30 years without new planting. Due to the current low prices of yields, the farmers delayed the new planting. The problems found in palm plantation included management and harvest with low yield per rai due to lack of knowledge and understanding, or following their own understanding, or following others.

The formed farmer group was independent group in which the members managed by themselves to apply for the RSPO standard. Palm oil producing companies would support the farmers in all aspects such as providing lecturers to provide knowledge of oil palm plantation management, handling the documents required for the certification, financial support for assessment, and facilitation to form the farmer group. The expenses for the group management came from money collected by the group members and the sales of credit. Once the group was certified, they could sell credit to the companies requiring palm oil certified with the RSPO standard in the production process. Most were foreign companies. The formation of smallholder farmer group was an independent group in which the members managed by themselves and palm oil producing companies supported them in various aspects. They hired lecturers to provide knowledge to the farmers, and handling the documents required to apply for the standard certification. The expenses within the group came from the sales of credit to the companies using palm oil in the production process. Once the group was formed, the practice was that there must be group manager with knowledge, ability, and understanding of organizational structure (ICS) and group management. After attending the trainings, all members must prepare all documents with complete application forms, and land rights documents. The formation of a new group should select those who were willing to comply with the group’s conditions to continue the group. It was not necessary to have a lot of group members. But all members must agree and accept the requirements of the group.

Motivation was important for the farmers to form group to apply for the certification of the RSPO standard. Once the farmers were certified, oil palm producing companies would purchase the farmers' yields with additional 10 satangs per kg. If the farmers practiced new planting to replace the old planting, they could buy seedlings with 25% discount from the regular prices. They could also order fertilizers jointly with the companies which were cheaper than market prices. The farmers would also receive annual dividend from their group. What they acquired by being group members included the following: knowledge and understanding of plantation management, daily recording of income and expenditure so they knew production costs, follow-up of news all the time, and better and higher yields. Yet, the farmers' application to be certified with the standard encountered problems and obstacles in recording as most of them were old and did not understand the recording. However, the recording was improved and assisted by their children and officers.

4.3.1.2 Representative of Surat Thani Sustainable Oil Palm Production Community Enterprise

Surat Thani Sustainable Oil Palm Production Community Enterprise was one of the four groups certified with the RSPO standard in Thailand similarly to Sustainable Oil Palm Smallholders Production Univanich-Plaipraya Community Enterprise Group. The farmers were successful in oil palm plantation focusing on their own management since the beginning, resulting in high yields with quality based on academic development with correct knowledge and understanding of oil palm, leading to systematic practice and palm plantation management. Formerly, the farmers were in trade while the families cultivated paddy. Once the trade was saturated, they decided to return to agriculture. They started by raising cattle, poultry in deserted paddy fields and fruit orchards. Then, the labor problems ensued. So, they changed to oil palm cultivation which was the local economic crop. At the same time, it was the period that the government promoted oil palm as alternative energy crop. The farmers' land was acid soil with pH 4.6-4.7. It was peat soil that palm trees could grow. Then, they started to cultivate palm trees without basic knowledge on oil palm cultivation both in raised plots and general plots. The ridging would drain water in the rainy season and pump water in during the dry season because it was near a waterway in order to maintain the level of underground water in the palm plantation to be humid

all the time. Afterwards, grass must be regularly cut to eliminate weeds. The reason behind the decision to cultivate oil palm was that they followed the others who had already cultivated it and the areas were appropriate for oil palm cultivation.

In terms of oil palm cultivation, the farmers studied by themselves by reading or attending trainings held by relevant agencies. Then, they implemented them based on the principles from trainings such as application of fertilizers that was appropriate to the demand of oil palm based on the analysis of nutrients from the leaf and soil analysis focusing on all single nutrient fertilizers. The advantage of leaf analysis would help correctly apply fertilizers, reducing fertilizer costs. No organic fertilizer was applied as the end leaves would cover all the areas to preserve humidity and add organic matters to the soil. The problems found in palm plantation included coconut rhinoceros beetles which destroyed the leaflets as it was near a coconut dust factory and also shortage of water during summer.

In terms of oil palm plantation, the supporting government agencies included Provincial Agricultural Extension Office, Department of Agricultural Extension, and Department of Agriculture. They supported knowledge and understanding of oil palm cultivation, as well as soil and leaf analysis. The farmers also participated in the agencies' projects. But the government agencies were not involved in support to apply for the certification of the RSPO standard.

Participation to become members of Surat Thani Sustainable Oil Palm Production Community Enterprise of farmers derived from the fact that the farmers wanted to seek knowledge of oil palm plantation management. The knowledge and understanding of palm plantation were important. Hence, the background of joining the sustainable oil palm production community enterprise which provided continuous trainings on the knowledge of oil palm to farmers. The farmers were taught to record and manage palm plantation systematically. Farmers would efficiently apply knowledge to palm plantation. Subsequently, the palm plantation was certified with the RSPO standard. The operation of sustainable oil palm production community enterprise was effectuated through the support of Office of Agricultural Economics, GIZ, and Prince of Songkhla University. It started with recruitment of members in the group and registration as community enterprise. Currently, there were 70 members. Then, the group applied for the RSPO

membership. The structure of the group consisted of chairman, manager, and committee. In terms of the group's operation, palm oil producing company would render support in various aspects. The group members must be prepared in line with the requirements, including documents. Trainings were provided for the members so that they had knowledge and understanding of oil palm plantation management. Once they were ready, assessors would come for assessment. Once they were certified, the members could sell credit to companies requiring palm oil certified with the RSPO standard. The income would be used to manage the group and paid in dividend to the group members.

The farmer gave recommendations of oil palm cultivation. With good management, the accommodating factors and environment would ensure oil palm plantation as secure and sustainable profession. Farmers would need to seek knowledge constantly. Palm cultivation and care to obtain good yields were not difficult through attentive care, knowledge of palm tree, learning and understanding. Farmers must be plantation owners, academics, and plantation managers all in one. The farmer said:

"The RSPO standard increases income and reduces costs. Thanks to the recording, one knows where the costs are and one can manage costs better. It also covers the use of fertilizers, leading to suitable control. How much and when should fertilizer be applied? The work is more systematic, leading to more income".

4.3.2 Farmers not Certified with the RSPO Standard

The interviews were done with two not certified RSPO standard farmers. They are leaders from different oil palm farmers, details are as follows.

4.3.2.1 Farmer no. 1, chairman of ThaSae Land Settlement Cooperative, said in the interview that he was interested in sustainable oil palm production based on the RSPO standard due to long years of oil palm cultivation and several trainings attended on oil palm production. So, he has learned to know about oil palm plantation management. However, he knew and understood a little about the sustainable oil palm production based on the RSPO standard. He realized that, in practice in order to be certified with the RSPO standard, there were many requirements and many complications. It was too difficult for him to follow the RSPO

standard and he did not join a group to be certified as he was also too old. He understood only some topics of RSPO, for example, obligation to submit land rights document and non-use of chemicals to eliminate weeds and pests. These were general practices in the care of palm plantation as he had already attended the trainings. But he did not have specific knowledge of requirements and practices of the RSPO standard.

In terms of attitude, he thought that compliance with the requirements of the standard and certification of the RSPO standard was a good thing. It required knowledge and understanding of the correct practice and formation of farmer groups to apply for the certification. But it was complicated for him. Production costs might increase as well. For example, elimination of weeds required grass cutting. So, he had to hire labor force to cut the grass which increased expenses.

In terms of motivation, the farmer agreed that it impacted employment, increased yields with better quality. He also agreed that it would increase networks, benefiting his own plantation. He accepted that the compliance with the RSPO standard would enhance sustainable oil palm cultivation. However, the farmer thought that he could not comply with the requirements of the RSPO standard.

4.3.2.2 Farmer no. 2, chairman of ThaSae Land Settlement Cooperative as well, said in the interview that he was interested in sustainable oil palm cultivation based on the RSPO standard because he saw the benefit of compliance with the RSPO standard. He also attended trainings on oil palm production several times from agencies who organized trainings to farmers so that he knew about management and care of palm planation and had some knowledge and understanding of the sustainable oil palm production based on the RSPO standard but could not join farmer group to apply for the certification of the RSPO standard. As he had no land rights document for his land, he could not apply for the standard certification. The farmer had knowledge and understanding of the RSPO standard in many questions. For example, preparation of information on the criteria of the RSPO in terms of environmental, social, and legal aspects; compliance with the RSPO standard contributed to reduction of soil erosion and soil degradation; evidences must be provided for rights of land use and without protest from local communities showing their rights of land use; land use for oil palm cultivation must not cause

problems to other land users; use of techniques of mixed pest management, use of chemical pesticides that was not hazardous to health and environment; compliance with the RSPO standard would cause body to be less exposed to toxic substances because the use of chemical pesticides was not hazardous to health; prohibited to practice new oil palm planting in forest conservation area; and in preparing the areas for new oil palm planting or reforestation, it was categorically prohibited to burn waste. The interviewed farmer said that some requirements of the RSPO standard were already implemented while some were not. So, he had knowledge and understanding of the RSPO standard.

In terms of attitude, the farmer agreed with the question. He thought that the requirements of the standard and the certification of the RSPO standard were good and beneficial in many aspects, including good plantation management, reduced production costs, and yields with quality and higher prices, without exploitation from the purchasing sources of yields, and without labor problems.

In terms of motivation, the farmer agreed that it impacted employment, and increased yields with better quality. He also agreed that it increased the prices of oil palm, income, and networks, benefiting his own palm plantation. He also accepted that the compliance with the RSPO standard enhanced sustainable oil palm cultivation.

4.3.3 Summary of Interview Results with the Farmers Certified with the RSPO Standard

The interviews with the farmers certified with the RSPO standard could be summarized as follows:

1) Farmers' participation in the project to apply for certification of the RSPO standard started with formation of farmer groups, legal registration, complete group management structure, group operation of the project by organizing trainings to provide knowledge to the farmers.

2) Groups were supported by the public and private sectors, as well as institutions of higher education who organized trainings to provide for the farmers to have more knowledge and understanding of plantation management, comply with the requirements of the RSPO standard, and apply for the certification of the RSPO standard.

3) Factors motivating the farmers to participate in the project to apply for the certification of the RSPO standard included increased prices of yields, discount for the purchase of oil palm seedlings and fertilizers, and annual dividend from the groups.

4) The results of participation in the project to apply for certification of the RSPO standard enhanced knowledge and understanding of plantation management in every process from preparation of land for cultivation, purchase of oil palm seedlings, cultivation, care, harvest of yields, and sales of yields.

5) Problems and obstacles included the following: At the beginning the farmers did not understand about RSPO. But through many trainings and additional advice given by experts, they had more knowledge and understanding so that they could implement it.

6) Recommendations for profession of sustainable oil palm plantation included good management of oil palm plantation, attentive care, and regular seeking of knowledge which would ensure secure and sustainable profession.

4.3.4 Summary of Interview Results with the Farmers not Certified with the RSPO Standard

The interviews with the farmers not certified with the RSPO standard could be summarized as follows:

The farmers were interested in sustainable oil palm production according to the RSPO standard as they had cultivated oil palm for a long time. They realized the benefit of the implementation according to the RSPO standard and attended trainings of oil palm production several times organized by many agencies. Consequently, they knew about management and care of palm plantation. Yet, the knowledge and understanding of the RSPO standard of each farmer were different due to the needs to be certified with the RSPO standard.

In terms of attitude, the farmers agreed with the question because they thought that the implementation according to the requirements of the RSPO standard and the certification of the RSPO standard was a good thing with many benefits.

In terms of motivation, the farmers agreed that it impacted employment, increased yields and quality, higher selling prices of oil palm, more income, and more networks, benefiting their own palm plantation.

The interviews with relevant agencies and farmers could be summarized in Table 4.1.

Table 4.1 Summary of Interviews with Relevant Agencies and Farmers

Details of Problems and Obstacles Impacting Farmers' RSPO Compliance	**Opinions of Relevant Agencies**								**Percentage**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
Factors impacting farmers' RSPO compliance									
1. Knowledge and understanding of the RSPO standard.	✓		✓	✓	✓		✓	✓	75.0
2. Higher yield prices.		✓		✓	✓		✓	✓	62.5
3. Reduce production costs.	✓			✓	✓		✓		50.0
4. Farmers' interest.			✓					✓	12.5
5. Formation of farmer groups.	✓		✓		✓	✓	✓		62.5
6. Support from relevant agencies.				✓		✓	✓		37.5
Problems and obstacles									
1. Farmers thought that implementation was complicated.	✓	✓			✓				37.5
2. Farmers had incorrect knowledge and understanding of the RSPO standard.	✓	✓	✓		✓		✓		62.5
3. Formation of farmer groups.	✓	✓	✓						37.5
4. Farmers adhered to old methods of plantation which was contrary to the requirements of the RSPO standard.	✓								12.5

Details of Problems and Obstacles Impacting Farmers' RSPO Compliance	Opinions of Relevant Agencies								Percentage
	1	2	3	4	5	6	7	8	
5. Lack of support from relevant agencies.			✓						12.5
6. Officers lacked knowledge and understanding of the RSPO standard.			✓	✓					25.0
7. Lack of learning media which could be disseminated for farmers' easier understanding.				✓					16.67

Note: 1 = Department of Agriculture, 2 = Department of Agricultural Extension, 3 = National Office of Agricultural Commodity and Food Standards, 4 = German International Cooperation (GIZ), 5 = Oil palm crushing mills, 6 = Palm oil refineries, 7 = Certified farmers, 8 = Non-certified farmers

According to Table 4.1, the details could be explained as follows:

1) The model to promote farmers to be certified with the RSPO standard was to promote formation of farmer groups which must be legally formed groups. The established farmer groups would promote farmers to have knowledge and understanding through trainings, study tours, with experts providing knowledge to farmers together with moral encouragement, inspection of oil palm plantation, and other methods until the farmers were ready to implement them, provision of farmers as role model for other farmers through learning among themselves and through relevant agencies' support and officers' assistance and advice.

2) The most important factor impacting the promotion of farmers to comply with the requirements to be certified with the RSPO standard included the following. The relevant agencies and farmers thought that correct knowledge and understanding of the RSPO standard was the first factor impacting the promotion of farmers to be certified with the RSPO standard or 75.0%. When the farmers had correct knowledge and understanding of the RSPO standard, they could implement the knowledge in plantation management to increase efficiency in oil palm

production, leading to the certification of the RSPO standard. The second most important factor was formation of farmer groups and increased prices of yields or 62.5%. The formation of farmer groups was the starting point to apply for the certification of the RSPO standard and increased prices of yields and motivated farmers to be certified with the RSPO standard.

3) Problems and obstacles to promote farmers' compliance with the requirements to be certified with the RSPO standard included the following. The farmers had incorrect knowledge and understanding of the RSPO standard or 62.5%. If the farmers did not have knowledge and understanding of the RSPO standard, they could not implement it correctly. This was followed by farmers did not adopt it due to complexities and the problems of formation of farmer groups or equally 37.5%.

4.4 Data Analysis from the Questionnaire

The results of the data analysis from the questionnaire were conducted through the questionnaire with oil palm smallholder farmers not certified with the RSPO standard with the following details:

4.4.1 Results of the Data Analysis of Oil Palm Growers and Members of ThaSae Land Settlement Cooperative

4.4.1.1 General Information of Oil Palm Growers

There were in total 216 oil palm growers who answered the questionnaire, divided into 123 males or 56.9% and 93 females or 43.1%. Most farmers or 78 farmers were aged between 51-60 years old or 36.1%, followed by 49 farmers aged between 61-70 years old or 22.7%, and 2 farmers were aged between 20 - 30 years old or 0.9%. Most farmers or 77 farmers had the areas for oil palm cultivation of approximately 31-40 rais or 35.7%, followed by 56 farmers with the areas of approximately 11-20 rais or 25.9%, and 8 farmers had the areas of over 40 rais or 3.7%. Half of the oil palm grown by 135 farmers were aged between 26-30 years or 62.5%, followed by those grown by 28 farmers were aged over 30 years or 13.0%, and those grown by 6 farmers were aged between 1–5 years or 2.8%. Over half of the farmers or 84 farmers collected oil palm yields of 1-5 tons/round or 38.9%,

followed by 80 farmers collected oil palm yields of 6-10 tons/round or 37.0%, and 8 farmers collected oil palm yields of 16-20 tons/round or 3.7%, the detail as shown in Table 4.2.

Table 4.2 General Information of Oil Palm Growers

Details	**Number**	**Percentage**
Gender		
Male	123	59.6
Female	93	43.1
Total	216	100.0
Age (years)		
20-30	2	0.9
31-40	13	6.0
41-50	45	20.8
51-60	78	36.1
61-70	49	22.7
Over 70	29	13.4
Total	216	100.0
Areas of oil palm cultivation (rais)		
1-10	41	19.0
11-20	56	25.9
21-30	34	15.7
31-40	77	35.6
Over 40	8	3.7
Total	216	100
Age of oil palm (years)		
1-5	6	2.8
6-10	13	6.0
11-15	13	6.0
16-20	7	3.2
21-25	14	6.5
26-30	135	62.5
Over 30	28	13.0

Details	Number	Percentage
Total	216	100
Amount of yields (tons/round)		
1-5	84	38.9
6-10	80	37.0
11-15	38	17.6
16-20	8	3.7
N/A	6	2.8
Total	216	100

4.4.1.2 Conditions of Areas of Oil Palm Cultivation

The conditions prior palm cultivation were mostly waste land by 173 farmers or 80.1%, followed by other areas such as allocated areas, areas for annual crops and garden plants by 19 farmers or 8.8%, and pasture by 5 farmers or 2.3%. Land rights documents of most farmers included title deed of 182 farmers or 84.3%, followed by A.L.R.O 4-01 of 18 farmers or 8.3%, and permit to utilize land in self-help land settlement of 1 farmer or 0.5%. Most fertilizers that the farmers used in oil palm plantation were chemical fertilizers by 119 farmers or 55.1%, followed by chemical fertilizers used with organic fertilizers by 97 farmers or 44.9%. Most oil palm yields were sold to land settlement cooperatives by 175 farmers or 81.0%, followed by sales to oil palm bunch collection centers by 26 farmers or 12.0%, and sales to oil palm crushing mills by 15 farmers or 6.9%, the detail as shown in Table 4.3.

Table 4.3 Conditions of Areas of Oil Palm Cultivation

Details	**Number**	**Percentage**
Conditions of areas prior to palm cultivation		
Forest	9	4.2
Waste land	173	80.1
Pasture	5	2.3
Paddy fields	10	4.6
Others such as allocated land, annual crops, garden plants	19	8.8
Total	216	100
Land rights documents		
Title deed/Nor Sor 4	182	84.3
Title deed in conservation forest and degraded forest	2	0.9
Certification utilization	3	0.9
Allotment of land for living	10	4.6
A.L.R.O 4-01	18	8.3
Permit to utilize land in self-help land settlement	1	0.5
Total	216	100
Use of fertilizers		
Chemical fertilizers	119	55.1
Chemical fertilizers with organic fertilizers	97	44.9
Total	216	100
Purchasing sources of yields		
Oil palm bunch collection centers	26	12.0
Oil palm crushing mills	15	6.9
Land settlement cooperatives	175	81.0
Total	216	100

4.4.1.3 Factors to Promote the RSPO Compliance

Reception of news and information

Most farmers or 207 farmers received news and information from relevant officers or 95.8%, followed by 116 farmers who received news and information from RSPO handbook or 76.9%, and 1 farmer who received news and information from newspaper or 0.5%. Most farmers or 170 farmers received news and information on knowledge and understanding of the RSPO or 78.7%, followed by 163 farmers on conduct for accreditation or 75.5%, and 7 farmers on preparation of evidences or 3.2%. Most farmers or 118 farmers thought that Chief of District Agricultural Extension Office should provide the information on the RSPO or 54.6%, followed by 100 farmers who thought that land settlement cooperatives should do so or 46.3%, and 2 farmers thought that academic institutions should do so or 0.9%. Most farmers or 189 farmers received sufficient news and information on the RSPO standard or 87.5%, and 10 farmers did not receive sufficient news and information on the RSPO standard or 4.6%. Additional news and information should include preparation of information, correct practice for accreditation, trainings on inspection of soil conditions in the areas of oil palm cultivation and inspection of oil palm leaves, the detail as shown in Table 4.4.

Table 4.4 Reception of News and Information

Details	**Number**	**Percentage**
Channels to receive news and information (you can answer more than 1 item)		
Television	9	4.2
Internet	5	2.3
Relevant officers	207	95.8
Sign boards	4	1.9
Brochures	59	27.3
Letters	6	2.8
Newspapers	1	0.5
Friends/relatives	11	5.1
RSPO handbook	116	76.9

Details	Number	Percentage
News and information on RSPO		
Preparation of information	10	4.6
Benefits of certification	139	64.4
Conduct for accreditation	163	75.5
Methods of plantation management for accreditation	136	63.0
Knowledge on the RSPO	170	78.7
Preparation of evidences and documents	7	3.2
Agencies of key informants		
District Agricultural Extension Office	100	46.3
Provincial Agricultural Extension Office	8	3.7
Department of Agriculture	11	5.1
Department of Agricultural Extension	8	3.7
Land Settlement Cooperatives	118	54.6
Academic institutions	2	0.9
Oil palm crushing mills	97	44.9
Office of Agricultural Economics	4	1.8
Amount of acquired information and news		
Sufficient	189	87.5
Insufficient	10	4.6
N/A	17	7.9
Total	216	100

4.4.1.4 Knowledge and Understanding of the RSPO Standard

In terms of knowledge and understanding of the RSPO standard of the farmers, it was found that the topic that the farmers knew and understood most was compliance with the RSPO standard caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health with the mean of 0.96, followed by land use for oil palm cultivation must not cause problems to other land users and oil palm growers must attend training courses on the RSPO with the equal mean of 0.95, and the least knowledge and understanding was use of chemical pesticides that was not hazardous to health and environment with the mean of 0.67. The overall knowledge and understanding of the RSPO standard was at high level with the mean of 0.94, the detail as shown in Table 4.5.

Table 4.5 Knowledge and Understanding of the RSPO Standard

Knowledge and Understanding of the RSPO Standard	**Opinions**				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
1. RSPO was the standard of sustainable oil palm production with eight requirements.	196 (90.3)	1 (0.5)	19 (8.8)	0 (0.0)	0.91 (high)
2. Obligation to prepare information relevant to the RSPO criteria on environmental, social, and legal issues to relevant stakeholders.	190 (88.0)	9 (4.2)	17 (7.9)	0 (0.0)	0.87 (high)
3. Compliance with the RSPO standard contributed to reduction of soil erosion and soil degradation.	191 (88.4)	7 (3.2)	18 (8.3)	0 (0.0)	0.88 (high)
4. Compliance with laws and regulations at local and national levels, and various requirements.	190 (88.0)	3 (1.4)	23 (10.6)	0 (0.0)	0.87 (high)
5. Evidence of rights of land use with no protest of rights by local communities showing rights of land use.	204 (94.9)	4 (1.9)	8 (3.7)	0 (0.0)	0.94 (high)
6. Land use for oil palm cultivation must not cause problems to other land users.	205 (94.9)	3 (1.4)	8 (3.7)	0 (0.0)	0.95 (high)
7. Obligation to implement the methods to reduce soil erosion and soil degradation.	199 (92.1)	7 (3.2)	9 (4.2)	1 (0.5)	0.92 (high)
8. Use of techniques of mixed pest management.	203 (94.0)	3 (1.4)	9 (4.2)	1 (0.5)	0.93 (high)
9. Use of chemical pesticides that was not hazardous to health and environment.	142 (65.7)	66 (30.6)	8 (3.7)	0 (0.0)	0.67 (moderate)
10. Compliance with the RSPO standard caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health.	207 (95.8)	1 (0.5)	8 (3.7)	0 (0.0)	0.96 (high)
11. Oil palm growers must attend training courses on the RSPO.	205 (94.9)	3 (1.4)	8 (3.7)	0 (0.0)	0.95 (high)
12. Prohibited to practice new oil palm planting in forest conservation area.	203 (94.0)	4 (1.9)	9 (4.2)	0 (0.0)	0.94 (high)
13. In preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste.	203 (94.0)	5 (2.3)	8 (3.7)	0 (0.0)	0.94 (high)
14. In your palm plantation, there was no sexual harassment and no violence against women.	202 (93.5)	6 (2.8)	8 (3.7)	0 (0.0)	0.93 (high)

Knowledge and Understanding of the RSPO Standard	Opinions				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
15. In your palm plantation, there was no forced labor or human trafficking.	201 (93.1)	5 (2.3)	9 (4.2)	1 (0.5)	0.92 (high)
Total					0.94 (high)

Note: Mean Rating Interpretation

0.0 – 0.33 Marginal knowledge and understanding

0.34 – 0.67 Moderate knowledge and understanding

0.68 – 1.00 High knowledge and understanding

4.4.1.5 Attitude, Motivation, and Acceptation Towards the RSPO Standard

In terms of the farmers' attitude towards the RSPO standard, it was found that the farmers thought that compliance with the RSPO standard mostly required knowledge and understanding of the correct practice with the mean of 4.77, followed by formation of groups to organize activities for exchange of learning among themselves and formation of groups to be certified with the RSPO standard with the mean of 4.50, and compliance with the RSPO standard was complicated with many processes (negative question) with the mean of 3.69. The overall attitude towards the RSPO standard was at the highest level with the mean of 4.33, the detail as shown in Table 4.6.

Most motivation in compliance with the RSPO standard of the farmers included compliance with the RSPO standard increased oil palm yields with better quality with the mean of 4.60, followed by compliance with the RSPO standard benefited oil palm plantation with the mean of 4. 5, and least motivation was compliance with the RSPO standard benefited employment with the mean of 4.25. The overall motivation in compliance with the RSPO standard was at the highest level with the mean of 4.46, the detail as shown in Table 4.6.

Most acceptation of the RSPO standard of the farmers included compliance with the requirements of the RSPO standard with the mean of 4.49, followed by acceptance that compliance with the RSPO standard ensured sustainable oil palm cultivation with the mean of 4.45. The overall acceptation of the RSPO standard was at the highest level with the mean of 4.47, the detail as shown in Table 4.6.

Table 4.6 Attitude, Motivation, and Acceptation Towards the Compliance with the RSPO Standard

Topics	**Levels**					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Attitude towards the RSPO standard						
1. You thought that compliance with the RSPO standard required knowledge and understanding of correct practice.	174 (80.6)	34 (15.7)	8 (9.7)	0 (0.0)	0 (0.0)	4.77 (Strongly agree)
2. You thought that the certification of the RSPO standard would increase export of oil palm yields.	94 (43.5)	113 (52.3)	1 (0.5)	8 (3.7)	0 (0.0)	4.36 (Strongly agree)
3. You thought that compliance with the RSPO standard was complicated with many processes (negative question).	5 (2.3)	15 (6.9)	31 (14.4)	155 (71.8)	10 (4.6)	3.69 (agree)
4. You thought that oil palm growers were committed to ethical business operation.	53 (24.5)	150 (69.4)	8 (3.7)	5 (2.3)	0 (0.0)	4.16 (agree)
5. Compliance with the RSPO standard increased production costs (negative question).	9 (4.2)	10 (4.6)	12 (5.6)	86 (39.8)	99 (45.8)	4.18 (agree)

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
6. You thought that the areas of your oil palm plantation were appropriate to comply with the RSPO standard.	99 (45.8)	105 (48.6)	12 (5.6)	0 (0.0)	0 (0.0)	4.40 (Strongly agree)
7. You would be treated fairly and transparently from collectors of fresh fruit bunch (oil palm bunch collection centers) and oil palm crushing mills if you were certified with the RSPO standard.	116 (53.7)	88 (40.7)	4 (1.9)	8 (3.7)	0 (0.0)	4.44 (Strongly agree)
8.You must form groups to organize activities for exchange of learning among yourselves.	130 (60.2)	75 (34.7)	3 (1.4)	4 (1.9)	4 (1.9)	4.50 (Strongly agree)
9. You must form groups to be certified with the RSPO standard.	124 (57.4)	82 (38.0)	2 (0.9)	8 (3.7)	0 (0.0)	4.50 (Strongly agree)
Total						4.33 (Strongly agree)
Motivation in the RSPO standard						
10. You thought that compliance with the RSPO standard benefited your employment of labor force.	80 (37.0)	122 (56.5)	4 (1.9)	8 (3.7)	2 (0.9)	4.25 (Strongly agree)
11.You thought that compliance with the RSPO standard increased the oil palm prices and your income.	99 (45.8)	109 (50.5)	8 (3.7)	0 (0.0)	0 (0.0)	4.42 (Strongly agree)
12. Compliance with the RSPO standard increased oil	138 (63.9)	69 (31.9)	9 (4.6)	0 (0.0)	0 (0.0)	4.60 (Strongly

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
palm yields with better quality.						agree)
13. Compliance with the RSPO standard increased networks and benefited oil palm plantation.	132 (61.1)	76 (35.2)	8 (3.7)	0 (0.0)	0 (0.0)	4.57 (Strongly agree)
Total						4.46 (Strongly agree)
Acceptation of the RSPO standard						
14. You accepted to comply with the RSPO standard.	123 (56.9)	83 (38.4)	2 (0.9)	8 (3.7)	0 (0.0)	4.49 (Strongly agree)
15. You accepted that compliance with the RSPO standard ensures sustainable oil palm cultivation.	122 (56.5)	85 (39.6)	1 (0.5)	0 (0.0)	8 (3.7)	4.45 (Strongly agree)
Total						4.47 (Strongly agree)

Note: Mean Rating Interpretation

1.00 – 1.80	Strongly disagree
1.81 – 2.60	Disagree
2.61 – 3.40	Neutral
3.41– 4.20	Agree
4.21 – 5.00	Strongly agree

4.4.1.6 Compliance with the Requirements of the RSPO Standard

The questions in the questionnaire on compliance with the requirements of the RSPO standard posed to the farmers not certified with the RSPO standard of the possible implementation. It was found that most compliance with the requirements of the RSPO standard of the farmers included obligation to disclose documents such as land rights documents, and health and safety plans with the mean of 4.58, followed by continuous improvement and development of oil palm plantation, regular monitoring and review of activities with the mean of 4.48, and the least compliance was follow the best methods of oil palm care, appropriate operational processes, and continuous monitoring of operation with the mean of 4.28. The overall compliance with the requirements of the RSPO standard was at the highest level with the mean of 4.40, the details as shown in Table 4.7.

Table 4.7 Compliance with the Requirements of RSPO Standard

Requirements of the RSPO Standard	**Levels of Practice**					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
1. Farmers must disclose documents such as land rights documents, health and safety plans.	0 (0.0)	8 (3.7)	14 (6.5)	39 (18.1)	155 (71.8)	4.58 (Fully practiced)
2. Compliance with laws and regulations at local, national, and international levels.	5 (2.3)	3 (1.4)	13 (6.0)	64 (29.6)	131 (60.6)	4.45 (Fully practiced)
3. Palm plantation management plan such as planning for high quality use, training plan to provide knowledge	0 (0.0)	9 (4.2)	9 (4.2)	98 (45.4)	100 (46.3)	4.34 (Fully practiced)

Requirements of the RSPO Standard	Levels of Practice					
	Not Practiced	Slightly Practiced	Moderate Practiced	Preferably Practiced	Fully Practiced	Mean
to increase yields on a continuous basis.						
4. Follow the best methods of oil palm care, appropriate operational processes, and continuous monitoring of operation.	0 (0.0)	10 (4.6)	8 (3.7)	110 (50.9)	88 (40.7)	4.28 (Fully practiced)
5. Environmental, natural resource, and biodiversity conservation, identify environmental impact from palm plantation.	0 (0.0)	3 (1.4)	15 (6.9)	113 (52.3)	85 (39.4)	4.30 (Fully practiced)
6. Responsibility towards staff and communities affected by palm cultivation, solution to problems of complaints, fair compensation, legal employment.	1 (0.5)	8 (3.7)	11 (5.1)	92 (42.6)	104 (48.1)	4.34 (Fully practiced)
7. Oil palm cultivation in new areas or expansion of cultivated areas must not be practiced in forest	0 (0.0)	9 (0.0)	7 (3.2)	75 (34.7)	125 (57.9)	4.46 (Fully practiced)

Requirements of the RSPO Standard	Levels of Practice					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
conservation area.						
8. Continuous improvement and development of oil palm plantation, regular monitoring and review of activities.	0 (0.0)	0 (0.0)	18 (8.3)	77 (35.6)	121 (56.1)	4.48 (Fully practiced)
Total						4.40 (Fully practiced)

Note: Mean Rating Interpretation

1.00 – 1.80	Not practiced
1.81 – 2.60	Slightly practiced
2.61 – 3.40	Moderate practiced
3.41– 4.20	Preferably practiced
4.21 – 5.00	Fully practiced

4.4.2 Results of Data Analysis of Oil Palm Growers and Members of Pathio Land Settlement Cooperative

4.4.2.1 General Information of Oil Palm Growers

There were 111 oil palm growers who answered the questionnaire, divided into 75 males or 67.6%, and 36 females or 32.4%. Most farmers or 34 farmers were aged between 51- 60 years old or 33.6%, followed by 31 farmers aged between 61-70 years or 27.9%, and 8 farmers were aged between 31-40 years old or 7.2 %. Most farmers or 42 farmers had the areas of oil palm cultivation of approximately 31-40 rais or 37.8%, followed by 32 farmers with the areas of approximately 11-20 rais or 28.8%, and 18 farmers with the areas of approximately 1-10 rais or 16.2%. Over half of oil palm aged between 26-30 years was grown by 62

farmers or 55.8%, followed by oil palm aged over 30 years which was grown by 17 farmers or 15.3%, and oil palm aged between 16–20 years was grown by 1 farmer or 0 . 9 %. Most farmers or 49 farmers collected oil palm yields of 1-5 tons/round or 44.1%, followed by 48 farmers who collected the yields of 6-10 tons/round or 43.2%, and 1 farmer collected the yields of 16-20 tons/round or 0.9%, the detail as shown in Table 4.8.

Table 4.8 General Information of Oil Palm Growers

Details	**Number**	**Percentage**
Gender		
Male	75	67.6
Female	36	32.4
Total	111	100.0
Age (years)		
31-40	8	7.2
41-50	24	21.6
51-60	34	30.6
61-70	31	27.9
Over 70	14	12.6
Total	111	100.0
Areas of oil palm cultivation (rais)		
1-10	18	16.2
11-20	32	28.8
21-30	19	11.1
31-40	42	37.8
Total	111	100
Age of oil palm (years)		
6-10	10	9.0
11-15	11	9.9
16-20	1	0.9
21-25	7	6.3
26-30	62	55.8
Over 30	17	15.3

Details	Number	Percentage
Total	111	100
Amount of yields (tons/round)		
1-5	49	44.1
6-10	48	43.2
11-15	13	11.7
16-20	1	0.9
Total	111	100

4.4.2.2 Conditions of Areas of Oil Palm Cultivation

The areas prior to palm cultivation were mostly waste land by 84 farmers or 75.7%, followed by other areas such as annual crops, garden plants by 20 farmers or 18.0%, and pasture by 1 farmer or 0.9%. The land rights document by most farmers or 98 farmers was title deed or 88.3%, followed by A.L.R.O 4 -0 1 by 8 farmers or 7.2%, and allotment of land for living by 5 farmers or 5.5%. The fertilizers used in oil palm plantation were mostly chemical fertilizers by 63 farmers or 56.8%, followed by use of chemical fertilizers with organic fertilizers by 48farmers or 43.2%. The number of 90 farmers sold oil palm yields mostly to land settlement cooperatives or 81.1%, followed by 14 farmers sold them to oil palm bunch collection centers or 12.6%, and 7 farmers sold them to oil palm crushing mills or 6.3%, the detail as shown in Table 4.9.

Table 4.9 Conditions of Areas of Oil Palm Cultivation

Details	Number	Percentage
Conditions of areas prior to palm cultivation		
Forest	3	2.7
Waste land	84	75.7
Pasture	1	0.9
Paddy fields	3	2.7
Others such as annual crops, garden plants	20	18.0
Total	111	100

Details	Number	Percentage
Land rights documents		
Title deed	98	88.3
Allotment of land for living	5	4.5
A.L.R.O. 4-01	8	7.2
Total	111	100
Use of fertilizers		
Chemical fertilizers	63	56.8
Chemical fertilizers with organic fertilizers	48	43.2
Total	111	100
Purchasing sources of yields		
Oil palm bunch collection centers	14	12.6
Oil palm crushing mills	7	6.3
Land settlement cooperatives	90	81.1
Total	111	100

4.4.2.3 Factors to Promote the RSPO Compliance

Reception of news and information

Most farmers or 109 farmers received news and information from relevant officers or 98.2%, followed by 80 farmers received news and information from the RSPO handbook or 72.1%, and 1 farmer received news and information from the internet or 0.9%. Most farmers of 81 farmers received news and information on knowledge and understanding of the RSPO or 73.0%, followed by 80 farmers who conducted themselves to be certified or 72.1%, and 6 farmers on preparation of evidences and documents or 5.4%. Most farmers or 61 farmers thought Department of Agricultural Extension should provide information of the RSPO or 55.0%, followed by 53 farmers thought that Chief of District Agricultural Extension Office should do so or 47.7%, and 3 farmers thought that academic institutions and Office of Agricultural Economics should do so or equally 2.7%. Most farmers or 82 farmers received sufficient news and information of the RSPO standard or 73.9%, and 5 farmers did not receive sufficient news and information of the RSPO standard or 4.5%, the detail as shown in Table 4.10.

Table 4.10 Reception of News and Information

Details	Number	Percentage
Channels to receive news and information (You can answer more than 1 item)		
Television	2	1.8
Internet	1	0.9
Relevant officers	109	98.2
Sign boards	3	2.7
Brochures	28	25.2
Friends/relatives	8	7.2
RSPO handbook	80	72.1
News and information on RSPO		
Preparation of information	7	6.3
Benefits of certification	65	58.6
Conduct for accreditation	80	72.1
Methods of plantation management for accreditation	72	64.9
Knowledge on the RSPO	81	73.0
Preparation of evidences and documents	6	5.4
Agencies of key informants		
District Agricultural Extension Office	53	47.7
Provincial Agricultural Extension Office	5	4.7
Department of Agriculture	9	8.1
Department of Agricultural Extension	61	55.0
Land settlement cooperatives	18	16.2
Academic institutions	3	2.7
Oil palm crushing mills	37	33.3
Office of Agricultural Economics	3	2.7
Amount of received news and information		
Sufficient	82	73.9
Not sufficient	5	4.5
N/A	24	7.9
Total	111	100

4.4.2.4 Knowledge and Understanding of the RSPO Standard

In terms of knowledge and understanding of the RSPO standard of the farmers, it was revealed that the topic that the farmers had most knowledge and understanding was RSPO was the standard of sustainable oil palm production with eight requirements with the mean of 0.95, followed by in preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste with the mean of 0.9, and the least knowledge and understanding was use of chemical pesticides that was not hazardous to health and environment with the mean of 0.59. The overall knowledge and understanding of the RSPO standard was at high level with the mean of 0.88, the detail as shown in Table 4.11.

Table 4.11 Knowledge and Understanding of the RSPO Standard

Knowledge and Understanding of the RSPO	**Opinions**				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
1. RSPO was the standard of sustainable oil palm production with eight requirements.	106 (95.5)	4 (3.6)	1 (0.9)	0 (0.0)	0.95 (high)
2. Obligation to prepare information relevant to RSPO requirements on environmental, social, and legal issues to relevant stakeholders.	99 (89.2)	9 (8.1)	3 (2.7)	0 (0.0)	0.89 (high)
3. RSPO compliance contributed to reduction of soil erosion and soil degradation.	94 (84.7)	12 (10.8)	5 (4.5)	0 (0.0)	0.85 (high)
4. Compliance with laws and regulations at local and national levels, and various requirements.	98 (88.3)	7 (6.3)	6 (5.4)	0 (0.0)	0.88 (high)
5. Evidence of rights of land use with no protest of rights by local communities showing rights of land use.	102 (91.9)	6 (5.4)	3 (2.7)	0 (0.0)	0.92 (high)
6. Land use for oil palm cultivation must not cause problems to other land users.	102 (91.9)	4 (3.6)	5 (4.5)	0 (0.0)	0.92 (high)

Knowledge and Understanding of the RSPO	Opinions				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
7. Obligation to implement the methods to reduce soil erosion and soil degradation.	99 (89.2)	9 (8.1)	3 (2.7)	0 (0.0)	0.89 (high)
8. Use of techniques of mixed pest management.	102 (91.9)	3 (2.7)	6 (5.4)	0 (0.0)	0.92 (high)
9. Use of chemical pesticides that was not hazardous to health and environment.	66 (59.6)	40 (36.0)	5 (4.5)	0 (0.0)	0.59 (moderate)
10. Compliance with the RSPO standard caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health.	102 (91.9)	7 (6.3)	2 (1.8)	0 (0.0)	0.92 (high)
11. Oil palm growers must attend training courses on the RSPO.	95 (85.6)	4 (3.6)	12 (10.8)	0 (0.0)	0.85 (high)
12. Prohibited to practice new oil palm planting in forest conservation area.	101 (91.0)	6 (5.4)	4 (3.6)	0 (0.0)	0.90 (high)
13. In preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste.	103 (92.8)	2 (1.8)	6 (5.4)	0 (0.0)	0.93 (high)
14. In your palm plantation, there was no sexual harassment and no violence against women.	101 (91.0)	6 (5.4)	4 (3.6)	0 (0.0)	0.91 (high)
15. In your palm plantation, there was no forced labor or human trafficking.	101 (91.0)	5 (4.5)	5 (4.5)	0 (0.0)	0.91 (high)
Total					0.88 (high)

Note:

Mean Rating	Interpretation
0.0 – 0.33	Marginal knowledge and understanding
0.34 – 0.67	Moderate knowledge and understanding
0.68 – 1.00	High knowledge and understanding

4.4.2.5 Attitude, Motivation, and Acceptation Towards the RSPO Standard

In terms of the farmers' attitude towards the RSPO standard, it was found that the farmers agreed most that the RSPO compliance required knowledge and understanding of correct practice or the mean of 4.67, followed by certification of the RSPO standard increased export of oil palm yields with the mean of 4.43, and least was that the farmers thought that the RSPO compliance was complicated with many processes (negative question) with the mean of 3.88. The general attitude towards the RSPO standard was at the highest level with the mean of 4.32, the detail as shown in Table 4.12.

The most motivation in the RSPO compliance of farmers was that the RSPO compliance increased networks, benefiting oil palm plantation with the mean of 4.60, followed by the RSPO compliance increased oil palm yields with better quality with the mean of 4.54, and the farmers thought that the RSPO compliance benefited their employment with the mean of4.20. The general motivation in the RSPO standard was at the highest level with the mean of 4.42, the detail as shown in Table 4.12.

The most acceptation of the RSPO standard of the farmers included acceptance of compliance with the RSPO standard ensured sustainable oil palm cultivation with the mean of 4.64, followed by acceptance to comply with the RSPO standard with the mean of 4.45. The overall adoption of the RSPO standard was at the highest level with the mean of 4.54, the detail as shown in Table 4.12.

Table 4.12 Attitude, Motivation, and Acceptation Towards the RSPO Standard

Topics	**Levels**					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Attitude towards the RSPO standard						
1. You thought that compliance with the RSPO standard required knowledge and understanding of correct practice.	77 (69.4)	31 (27.9)	3 (2.7)	0 (0.0)	0 (0.0)	4.67 (Strongly agree)
2. You thought that the certification of the RSPO standard increased export of oil palm yields.	55 (49.5)	50 (45.0)	5 (4.5)	1 (0.9)	0 (0.0)	4.43 (Strongly agree)
3. You thought that compliance with the RSPO standard was complicated with many processes (negative question).	0 (0.0)	2 (1.8)	15 (13.5)	88 (79.3)	6 (5.4)	3.88 (agree)
4. You thought that oil palm growers were committed to ethical business operation.	18 (16.2)	83 (74.8)	7 (6.3)	3 (2.7)	0 (0.0)	4.04 (agree)
5. Compliance with the RSPO standard increased production costs (negative question).	0 (0.0)	3 (2.7)	5 (4.5)	50 (45.0)	53 (47.7)	4.41 (Strongly agree)
6. You thought that the areas of your oil palm cultivation were appropriate to comply with the RSPO standard.	46 (41.4)	60 (54.1)	5 (4.5)	0 (0.0)	0 (0.0)	4.36 (Strongly agree)
7. You would be treated fairly and transparently from collectors of fresh fruit bunch (oil palm bunch collection centers) and oil palm crushing mills if you were certified	47 (42.3)	54 (48.6)	7 (6.3)	3 (2.7)	0 (0.0)	4.30 (Strongly agree)

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
with the RSPO standard.						
8.You must form groups to organize activities for exchange of learning among yourselves.	62 (55.9)	42 (37.8)	7 (6.3)	0 (0.0)	0 (0.0)	4.50 (Strongly agree)
9. You must form groups to be certified with the RSPO standard.	47 (42.3)	54 (48.6)	7 (6.3)	3 (2.7)	0 (0.0)	4.30 (Strongly agree)
Total						4.32 (Strongly agree)
Motivation in the RSPO standard						
10. You thought that compliance with the RSPO standard benefited your employment of labor force.	36 (32.4)	64 (57.7)	9 (8.1)	2 (1.8)	0 (0.0)	4.20 (agree)
11.You thought that compliance with the RSPO standard ensured higher oil palm prices and higher income.	43 (38.7)	63 (56.8)	5 (4.5)	0 (0.0)	0 (0.0)	4.34 (Strongly agree)
12. Compliance with the RSPO standard increased oil palm yields with good quality.	67 (60.4)	39 (35.1)	4 (3.6)	1 (0.9)	0 (0.0)	4.54 (Strongly agree)
13. Compliance with the RSPO standard increased networks and benefited oil palm plantation.	68 (59.5)	37 (35.1)	6 (5.4)	0 (0.0)	0 (0.0)	4.60 (Strongly agree)
Total						4.42 (Strongly agree)
Adoption of the RSPO standard						
14. You accepted to comply	60	45	5	0	0	4.45

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
with the requirements of the RSPO standard.	(54.1)	(40.5)	(5.4)	(0.0)	(0.0)	(Strongly agree)
15. You accepted that compliance with the requirements of the RSPO standard ensured sustainable oil palm cultivation.	67 (55.0)	43 (42.3)	3 (0.0)	0 (0.0)	0 (0.0)	4.64 (Strongly agree)
Total						4.54 (Strongly agree)

Note: Mean Rating Interpretation

1.00 – 1.8 0 Strongly disagree

1.81 – 2.60 Disagree

2.61 – 3.40 Neutral

3.41 – 4.20 Agree

4.21 – 5.00 Strongly agree

4.4.2.6 Compliance With the Requirements of the RSPO Standard

The questions in the questionnaire on compliance with the requirements of the RSPO standard were posed to farmers not certified with the RSPO standard. The opinions were sought from the farmers of the feasible implementation and the scope of implementation. It was found that most compliance with the requirements of the RSPO standard of the farmers included the farmers must disclose documents such as land rights documents, health and safety plans with the mean of 4.67, followed by oil palm cultivation in new areas or expansion of cultivated areas must not be situated in forest conservation area with the mean of 4.54, and the least implementation included conservation of environment, natural resources, and biodiversity, identification of environmental impact from palm plantation with the

mean of 4.27. The overall compliance with the requirements of the RSPO standard was at the highest level with the mean of 4.46, the detail as shown in Table 4.13.

Table 4.13 Compliance with the Requirements of the RSPO Standard

Requirements of the RSPO Standard	**Operational Levels**					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
1. Farmers must disclose documents such as land rights documents, health and safety plans.	0 (0.0)	0 (0.0)	3 (0.0)	27 (24.3)	81 (73.0)	4.67 (Fully practiced)
2. Compliance with laws and regulations at local, national levels, and international rules and regulations.	0 (0.0)	1 (0.9)	3 (2.7)	45 (40.5)	62 (55.9)	4.51 (Fully practiced)
3. Palm plantation management plan such as planning for high quality palm seedlings, training plan to provide knowledge for continuously	0 (0.0)	2 (1.8)	7 (6.3)	44 (39.6)	58 (52.3)	4.42 (Fully practiced)

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	Slightly Practiced	Moderate Practiced	Preferably Practiced	Fully Practiced	Mean
increased yields.						
4. Practice best methods of oil palm care, appropriate operational processes, and continuous follow-up of operation.	0 (0.0)	4 (3.6)	7 (6.3)	53 (47.7)	47 (42.3)	4.29 (Fully practiced)
5. Conservation of environment, natural resources, and biodiversity, identification of environmental impact from palm plantation.	0 (0.0)	2 (1.8)	4 (3.6)	67 (60.4)	38 (34.2)	4.27 (Fully practiced)
6. Responsibilities towards temporary staff and communities affected by palm cultivation, complaint management, fair compensation, and legal	0 (0.0)	1 (0.9)	4 (3.6)	52 (46.8)	54 (48.6)	4.45 (Fully practiced)

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
employment.						
7. Oil palm cultivation in new areas or expansion of cultivated areas must not be situated in forest conservation area.	1 (0.9)	2 (1.8)	4 (3.6)	33 (29.7)	71 (64.0)	4.54 (Fully practiced)
8. Continuous improvement and development of oil palm plantation, regular follow-up and review of activities.	0 (0.0)	0 (0.0)	9 (8.1)	35 (31.5)	67 (60.4)	4.52 (Fully practiced)
Total						4.46 (Fully practiced)

Note:

Mean Rating	Interpretation
1.00– 1.80	Not practiced
1.81 – 2.60	Slightly practiced
2.61 – 3.40	Moderate practiced
3.41– 4.20	Preferably practiced
4.21 – 5.00	Fully practiced

4.4.3 Results of Data Analysis of Oil Palm Growers and Members of Langsuan Land Settlement Cooperative

4.4.3.1 General Information of Oil Palm Growers

There were 63 oil palm growers who answered the questionnaire divided into 39 males or 61.9% and 24 females or 38.1%. Most farmers or 23 farmers were aged between 61-70 years or 36.5%, followed by 22 farmers aged between 51-60 years or 34.9%, and 6 farmers aged between 31–40 years or 9.5%. Most farmers or 21 farmers owned areas for oil palm cultivation of approximately 11-20 rais or 33.3%, followed by 18 farmers with the areas of approximately 1-10 rais or 25.6%, and 10 farmers with the areas of 30-40 rais or 15.9%. Oil palm grown by most farmers or 30 farmers were aged between 26-30 years or 47.6%, followed by oil palm aged between 21-25 years grown by 9 farmers or 14.3%, and oil palm aged 1-5 years grown by 2 farmers or 3.2%. Most farmers or 48 farmers collected oil palm yields of 1-5 tons/round or 76.2%, followed by 15 farmers with the yields of 6-10 tons/round or 23.8%, the details in Table 4.14.

Table 4.14 General Information of Oil Palm Growers

Details	**Number**	**Percentage**
Gender		
Male	39	61.9
Female	24	38.1
Total	63	100.0
Age (years)		
31-40	6	9.5
41-50	9	14.3
51-60	22	34.9
61-70	23	36.5
Over 70	3	4.8
Total	63	100.0
Areas for oil palm cultivation (rais)		
1-10	18	25.6
11-20	21	33.3

Details	Number	Percentage
21-30	14	22.2
31-40	10	15.9
Total	63	100
Age of oil palm (years)		
1-5	2	3.2
6-10	4	6.3
11-15	5	7.9
16-20	6	9.5
21-25	9	14.3
26-30	30	47.6
Over 30	7	11.1
Total	63	100
Amount of yields (tons/round)		
1-5	48	76.2
6-10	15	23.8
Total	63	100

4.4.3.2 Conditions of Areas for Oil Palm Cultivation

The areas prior to palm cultivation were mostly waste land by 47 farmers or 74.6%, followed by other areas namely degraded forests by 14 farmers or 22.2%, and paddy fields by 1 farmer or 1.6%. Land rights document of most farmers or 56 farmers was title deed or 88.9%, followed by 4 farmers with A.L.R.O 4-01 or 6.3%, and 1 farmer with claim certification or 1.6%. The fertilizers that most farmers or 46 farmers used in oil palm plantation were chemical fertilizers with organic fertilizers or 73.0%, followed by 17 farmers used chemical fertilizers or 26.0%. Most farmers or 32 farmers sold half of oil palm yields to oil palm bunch collection centers or 50.8%, followed by 29 farmers sold them to land settlement cooperatives or 46.0%, and 2 farmers sold them to oil palm crushing mills or 3.2%, the detail as shown in Table 4.15.

Table 4.15 Conditions of Areas of Oil Palm Cultivation

Details	**Number**	**Percentage**
Conditions or areas prior to palm cultivation		
Waste land	47	74.6
Paddy fields	1	1.6
Others such as degraded forest	14	22.2
Total	63	100
Land rights documents		
Title deed/Certificate utilization NS 4	56	88.9
Allotment of land for living	2	3.2
Claim certification	1	1.6
A.L.R.O. 4-01	4	6.3
Total	63	100
Use of fertilizers		
Chemical fertilizers	17	27.0
Chemical fertilizers with organic fertilizers	46	73.0
Total	63	100
Purchasing sources of yields		
Oil palm bunch collection centers	32	50.8
Crushing mills	2	3.2
Land settlement cooperatives	29	46.0
Total	63	100

4.4.3.3 Factors to Promote the RSPO Compliance

Reception of news and information

Most farmers or 61 farmers received news and information on the RSPO from relevant officers or 96.8%, followed by 57 farmers received news and information from the RSPO handbook or 90.5%, and 2 farmers received news and information from sign boards or 3.2%. Most farmers or 59 farmers received news and information on knowledge and understanding of the RSPO standard or 93.7%, followed by 58 farmers on benefits of certification or 92.1%, and 2 farmers on preparation of documents or 3.2%. Most farmers or 59 farmers thought that Local Settlement Cooperatives should give information on the RSPO or 93.7%, followed by

40 farmers thought that Chief of District Agricultural Extension Office should do so or 63.5%, and 1 farmer thought that academic institution should do so or 1.6%. All or 63 farmers received sufficient news and information on the RSPO standard or 100%, the detail as shown in Table 4.16.

Table 4.16 Reception of News and Information

Details	**Number**	**Percentage**
Channels for reception of news and information (you can answer more than 1 item)		
Television	5	7.9
Internet	3	4.8
Relevant officers	61	96.8
Sign boards	2	3.2
Letters	3	4.8
Friends/relatives	14	22.2
RSPO handbook	57	90.5
Others such as trainings	25	39.7
News and information of RSPO		
Preparation of information	22	34.9
Benefits of certification	58	92.1
Conduct for accreditation	8	12.7
Methods of plantation management for accreditation	15	23.8
Knowledge of the RSPO	59	93.7
Preparation of evidences and documents	2	3.2
Agencies of key informants		
District Agricultural Extension Office	40	36.5
Provincial Agricultural Extension Office	7	11.1
Department of Agricultural Extension	3	4.8
Land Settlement Cooperatives	59	93.7
Academic institutions	1	1.6
Oil palm crushing mills	19	30.2
Office of Agricultural Economics	2	3.2
Amount of received news and information		
Sufficient	63	100.0
Insufficient	0	0.0
Total	63	100

4.4.3.4 Knowledge and Understanding of the RSPO Standard

In terms of knowledge and understanding of the RSPO standard of the farmers, it was found that the topic that farmers had most knowledge and understanding was that RSPO was the standard of sustainable oil palm production with eight requirements with the mean of 1.0, followed by obligation to prepare information relevant to the RSPO requirements on environmental, social, and legal issues to relevant stakeholders with the mean of 0.97.

The least knowledge and understanding was the obligation to comply with laws and regulations at local and national levels, and various requirements with the mean of 0.54. The overall knowledge and understanding of the RSPO standard was at high level with the mean of 0.80, the detail as shown in Table 4.17.

Table 4.17 Knowledge and Understanding of the RSPO Standard

Knowledge and Understanding of the RSPO Standard	**Opinions**				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
1. RSPO was the standard of sustainable oil palm production with eight requirements.	63 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1.0 (high)
2. Obligation to prepare information relevant to RSPO requirements on environmental, social, and legal issues to relevant stakeholders.	61 (96.8)	2 (3.2)	0 (0.0)	0 (0.0)	0.97 (high)
3. RSPO compliance contributed to reduction of soil erosion and soil degradation.	40 (63.5)	15 (23.8)	3 (4.8)	0 (0.0)	0.63 (moderate)
4. Compliance with laws and regulations at local and national levels, and various requirements.	34 (54.0)	20 (31.7)	9 (14.3)	0 (0.0)	0.54 (moderate)
5. Evidence of rights of land use with no protest of rights by local communities showing rights of land use.	45 (71.4)	5 (7.9)	13 (20.6)	0 (0.0)	0.71 (high)
6. Land use for oil palm cultivation must not cause problems to other land users.	37 (58.7)	15 (23.8)	11 (17.4)	0 (0.0)	0.59 (moderate)
7. Obligation to implement the	45	10	8	0	0.71

Knowledge and Understanding of the RSPO Standard	Opinions				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
methods to reduce soil erosion and soil degradation.	(71.4)	(15.9)	(12.7)	(0.0)	(high)
8. Use techniques of mixed pest management.	36 (57.1)	15 (23.8)	12 (19.0)	0 (0.0)	0.57 (moderate)
9. Use of chemical pesticides not hazardous to health and environment.	60 (95.2)	3 (4.8)	0 (0.0)	0 (0.0)	0.95 (high)
10. RSPO compliance caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health.	57 (90.5)	4 (6.3)	2 (3.2)	0 (0.0)	0.90 (high)
11. Oil palm growers must attend training courses on RSPO.	54 (85.7)	9 (14.3)	0 (0.0)	0 (0.0)	0.86 (high)
12. Prohibited to practice new oil palm planting in forest conservation area.	51 (81.0)	8 (12.7)	4 (6.3)	0 (0.0)	0.81 (high)
13. In preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste.	58 (92.1)	5 (7.9)	0 (0.0)	0 (0.0)	0.92 (high)
14. In your palm plantation, there was no sexual harassment and no violence against women.	58 (92.1)	3 (4.8)	2 (3.2)	0 (0.0)	0.92 (high)
15. In your palm plantation, there was no forced labor or human trafficking.	60 (95.2)	3 (4.8)	0 (0.0)	0 (0.0)	0.95 (high)
Total					0.80 (high)

Note: Mean Rating Interpretation

0.0 – 0.33 Marginal knowledge and understanding

0.34 – 0.67 Moderate knowledge and understanding

0.68 – 1.00 High knowledge and understanding

4.4.3.5 Attitude, Motivation, and Acceptation Towards RSPO Standard

In terms of attitude of the farmers towards the RSPO standard, it was found that farmers agreed that compliance with the RSPO standard most required knowledge and understanding of the correct practice with the mean of 4.20, followed by farmers must form groups to be certified with the RSPO standard with the mean of 3.92, and least of the farmers thought that compliance with the RSPO standard was complicated with many processes (negative question) with the mean of 2.93. The overall attitude towards the RSPO standard was at high level with the mean of 3.62, the detail as shown in Table 4.18.

Most motivation in compliance with the RSPO standard of the farmers included that farmers thought that compliance with the RSPO standard increased oil palm prices and income with the mean of 3.98, followed by farmers thought that compliance with the RSPO standard increased oil palm yields with better quality with the mean of 3.89, and least of the farmers thought that compliance with the RSPO standard benefited employment with the mean of 2.68. The overall motivation in compliance with the RSPO standard was at low level with the mean of 2.59, the detail as shown in Table 4.18.

The acceptation of the RSPO standard of most farmers included compliance with the RSPO standard ensured sustainable oil palm cultivation with the mean of 4.20, followed by acceptance to comply with the requirements of the RSPO standard with the mean of 4.17. The overall acceptation of the RSPO standard was at the highest level with the mean of 4.19, the detail as shown in Table 4.18.

Table 4.18 Attitude, Motivation, and Acceptation Towards the RSPO Compliance

Topics	**Levels**					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Attitude towards the RSPO standard						
1. You thought that compliance with the RSPO standard required knowledge and understanding of correct practice.	14 (22.2)	47 (74.6)	2 (3.2)	0 (0.0)	0 (0.0)	4.20 (Strongly agree)
2. You thought that the certification of the RSPO standard would increase export of oil palm yields.	8 (12.7)	41 (65.1)	14 (22.2)	0 (0.0)	0 (0.0)	3.90 (Strongly agree)
3. You thought that compliance with the RSPO standard was complicated with many processes (negative question).	1 (1.6)	23 (36.5)	19 (30.2)	19 (30.2)	1 (1.6)	2.93 (neutral)
4. You thought that oil palm growers were committed to ethical business operation.	3 (4.7)	24 (38.1)	35 (55.6)	1 (1.6)	0 (0.0)	3.46 (agree)
5. Compliance with the RSPO standard increased production costs (negative question).	1 (1.6)	21 (33.3)	26 (41.3)	15 (23.8)	0 (0.0)	2.87 (agree)
6. You thought that the areas of your oil palm cultivation were appropriate to comply with the RSPO standard.	7 (11.1)	41 (65.1)	15 (23.8)	0 (0.0)	0 (0.0)	3.87 (Strongly agree)
7. You would be treated	1	36	26	0	0	3.60

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
fairly and transparently from collectors of fresh fruit bunch (oil palm bunch collection centers) and oil palm crushing mills if you were certified with the RSPO standard.	(1.6)	(57.1)	(41.3)	(0.0)	(0.0)	(Strongly agree)
8.You must form groups to organize activities for exchange of learning among yourselves.	4 (6.3)	44 (69.8)	14 (22.2)	1 (1.6)	0 (0.0)	3.81 (Strongly agree)
9. You must form groups to be certified with the RSPO standard.	4 (6.3)	50 (79.4)	9 (14.3)	0 (0.0)	0 (0.0)	3.92 (Strongly agree)
Total						3.62 (Strongly agree)
Motivation in the RSPO standard						
10. You thought that compliance with the RSPO standard benefited your employment of labor force.	4 (6.3)	31 (49.2)	28 (44.4)	0 (0.0)	0 (0.0)	2.68 (neutral)
11. You thought that compliance with the RSPO standard increased the oil palm prices and your income.	15 (19.0)	32 (50.8)	16 (30.2)	0 (0.0)	0 (0.0)	3.98 (Strongly agree)
12. Compliance with the RSPO standard increased oil palm yields with better quality.	6 (9.5)	44 (69.8)	13 (20.6)	0 (0.0)	0 (0.0)	3.89 (Strongly agree)

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
13. Compliance with the RSPO standard increased networks, benefiting oil palm plantation.	7 (11.1)	38 (60.3)	18 (28.6)	0 (0.0)	0 (0.0)	3.83 (Strongly agree)
Total						3.59 (Strongly agree)
Acceptation of RSPO standard						
14. You accepted to comply with the RSPO standard.	19 (30.2)	36 (57.1)	8 (12.7)	0 (0.0)	0 (0.0)	4.17 (Strongly agree)
15. You accepted that compliance with the RSPO standard ensured sustainable oil palm cultivation.	18 (28.6)	40 (63.5)	4 (6.3)	1 (1.6)	0 (0.0)	4.20 (Strongly agree)
Total						4.19 (Strongly agree)

Note:

Mean Rating	Interpretation
1.00 – 1.8 0	Strongly disagree
1.81 – 2.60	Disagree
2.61 – 3.40	Neutral
3.41 – 4.20	Agree
4.21 – 5.00	Strongly agree

4.4.3.6 Compliance with the Requirements of the RSPO Standard

The questions in the questionnaire on compliance with the requirements of the RSPO standard posed to the farmers not certified with the RSPO standard. The questions sought opinions whether farmers could implement the accreditation. It was found that most compliance with the requirements of the RSPO standard of the farmers was compliance with laws and regulations at local and national levels, and international rules and regulations with the mean of 2.6, followed by farmers must disclose documents such as land rights documents, health and safety plans with the mean of 2.56, and least implementation included palm plantation management plan such as planning for high quality palm seedlings, training plan to provide knowledge for continuously increased yields, and practice best methods of oil palm care, appropriate operational processes, and continuous follow-up of operation with the equal mean of 2 .37. The overall compliance with the requirements of the RSPO standard was at low level with the mean of 2.49, the detail as shown in Table 4.19.

Table 4.19 Compliance with the RSPO Standard

Requirements of the RSPO Standard	**Operational Levels**					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
1. Farmers must disclose documents such as land rights documents, health and safety plans.	0 (0.0)	34 (54.0)	23 (36.5)	6 (9.5)	0 (0.0)	2.56 (Slightly practiced)
2. Compliance to laws and regulations at local and national levels, and international rules and regulations.	0 (0.0)	32 (50.8)	23 (36.5)	8 (12.7)	0 (0.0)	2.62 (Moderate practiced)

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
3. Palm plantation management plan such as planning for high quality palm seedlings, training plan to provide knowledge for continuously increased yields.	2 (3.2)	36 (57.1)	25 (39.7)	0 (0.0)	0 (0.0)	2.37 (Slightly practiced)
4. Practice best methods of oil palm care, appropriate operational process, and continuous follow-up of operation.	0 (0.0)	40 (63.5)	23 (36.5)	0 (0.0)	0 (0.0)	2.37 (Slightly practiced)
5. Conservation of environment, natural resources, and biodiversity, identification of environmental impact from palm plantation.	1 (1.6)	30 (47.6)	27 (42.9)	5 (7.9)	0 (0.0)	2.57 (Slightly practiced)
6. Responsibilities towards temporary staff and communities affected by palm cultivation, complaint management, fair	2 (3.2)	36 (57.1)	20 (31.7)	5 (7.9)	0 (0.0)	2.44 (Slightly practiced)

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
compensation, and legal employment.						
7. Oil palm cultivation in new areas or expansion of cultivated areas must not be situated in forest conversation area.	3 (4.8)	25 (39.7)	19 (30.2)	15 (23.8)	1 (1.6)	2.54 (Slightly practiced)
8. Continuous improvement and development of oil palm plantation, regular follow-up and review of activities.	3 (4.8)	32 (50.8)	26 (41.3)	2 (3.2)	0 (0.0)	2.43 (Slightly practiced)
Total						2.49 (Slightly practiced)

Note:

Mean Rating	Interpretation
1.00– 1.80	Not practiced
1.81 – 2.60	Slightly practiced
2.61 – 3.40	Moderate practiced
3.41– 4.20	Preferably practiced
4.21 – 5.00	Fully practiced

4.4.4 Total Results of the Data Analysis of Oil Palm Smallholder Farmers

4.4.4.1 General Information of Oil Palm Growers

There were 390 oil palm growers who answered the questionnaire, divided into 225 males or 57.7% and 165 females or 42.3%. Most or 132 farmers were aged between 51- 60 years old or 33.8%, followed by 105 farmers aged between 61-70 years old or 26.9%, and or 2 farmers aged between 20 - 30 years old or 0.5%. Most or 131 farmers had the oil palm cultivated areas of approximately 31- 40 rais or 33.6%, followed by 98 farmers with the areas of approximately 11- 20 rais or 25.1%, and 18 farmers with the areas of over 40 rais or 4.6%. Over half of the oil palm were aged between 26-30 years grown by 209 farmers or 53.6%, followed by those aged over 30 years grown by 53 farmers or 13.6%, and those aged between 1–5 years grown by 10 farmers or 2.6%. Over half of farmers or 197 farmers harvested oil palm 1-5 tons/round or 50.5%, followed by 126 farmers with harvest of 6-10 tons/round or 32.3%, and 1 farmer with harvest of over 20 tons/round or 0.3%, the detail as shown in Table 4.20.

Table 4.20 General Information of Oil Palm Growers

Details	**Number**	**Percentage**
Gender		
Male	225	57.7
Female	165	42.3
Total	390	100.0
Age (years)		
20-30	2	0.5
31-40	25	6.4
41-50	84	21.5
51-60	132	33.8
61-70	105	26.9
Over 70	42	10.8
Total	390	100.0
Areas of oil palm cultivation (rais)		

Details	Number	Percentage
1-10	83	21.3
11-20	98	25.1
21-30	41	10.5
31-40	131	33.6
Over 40	18	4.6
N/A	19	4.9
Total	390	100
Age of oil palm (years)		
1-5	10	2.6
6-10	34	8.7
11-15	32	8.2
16-20	17	4.4
21-25	35	8.9
26-30	209	53.6
Over 30	53	13.6
Total	390	100
Amount of yields (tons/round)		
1-5	197	50.5
6-10	126	32.3
11-15	51	13.0
16-20	12	3.0
N/A	4	2.8
Total	390	100

4.4.4.2 Conditions of Areas of Oil Palm Cultivation

Prior to palm cultivation, most of the areas were waste land by 289 farmers of 74.1%, followed by other areas such as allocated land, annual crops, degraded forest area by 60 farmers or 15.4%, and least of them pasture with 10 farmers or 2.7%. The land rights document of most or 330 farmers was title deed or 84.6%, followed by 27 farmers with A.L.R.O 4-01 or 6.9%, and 1 farmer with permit to utilize land in self-help land settlement or 0.3%. Most fertilizers used in oil palm plantation was chemical fertilizers by 194 farmers or 49.7%, followed by use of chemical fertilizers with organic fertilizers with 186 farmers or 47.7%. The sales of

oil palm yields were mostly to land settlement cooperatives by 296 farmers or 75.9%, followed by oil palm bunch collection centers by 66 farmers or 16.9%, and sales to oil palm crushing mills by 28 farmers or 7.2%, the detail as shown in Table 4.21.

Table 4.21 Conditions of Areas for Oil Palm Cultivation

Details	**Number**	**Percentage**
Conditions of areas prior to palm cultivation		
Forest	17	4.4
Waste land	289	74.1
Pasture	10	2.6
Paddy fields	14	3.6
Others such as land allocation, annual crops, degraded forestland	60	15.4
Total	390	100
Land rights documents		
Title deed/Nor Sor 4	330	84.6
Title deed in conservation forest and degraded forest	1	0.3
Certificate utilization	5	1.3
Allotment of land for living	23	5.9
A.L.R.O. 4-01	27	6.9
Permit to utilize land in self-help land settlement	1	0.3
N/A	3	1.0
Total	390	100
Use of fertilizers		
Chemical fertilizers	194	49.7
Chemical fertilizers with organic fertilizers	186	47.7
N/A	10	2.6
Total	390	100
Purchasing sources of yields		
Oil palm bunch collection centers	66	16.9
Oil palm crushing mills	28	7.2
Land settlement cooperatives	296	75.9
Total	390	100

4.4.4.3 Factors to Promote RSPO Compliance

Reception of news and information

Most or 370 farmers received news and information from relevant officers or 94.9%, followed by 302 farmers received news and information from the RSPO handbook or 77.4%, and 1 farmer received news and information from newspapers or 0.3%. Most or 308 farmers received news and information on knowledge and understanding of the RSPO or 79.0%, followed by 261 farmers with conduct for accreditation or 66.9%, and 8 farmers on others such as inspection of soil conditions, and conduct for accreditation or 2.0%. Most or 187 farmers thought that District Agricultural Extension Office should provide information on the RSPO or 47.9%, followed by 175 farmers who thought that land settlement cooperatives should do so or 44.9%, and 6 farmers thought that academic institutions should do so or 1.5%. Most or 339 farmers received sufficient news and information of the RSPO standard or 86.9%, and 18 farmers thought that they did not receive sufficient news and information of the RSPO standard or 4.6%. The additional news that should be received included preparation of information, correct conduct for accreditation, and trainings on inspection of the soil conditions for oil palm cultivation and inspection of the conditions of oil palm leaves, the detail as shown in Table 4.22.

Table 4.22 Reception of News and Information

Details	**Number**	**Percentage**
Channels to receive news and information (you can answer more than 1 item)		
Radio	3	0.8
Television	14	3.6
Internet	9	2.3
Relevant officers	370	94.9
Sign boards	7	1.8
Brochures	95	24.4
Letters	9	2.3
Newspapers	1	0.3
Friends/relatives	32	8.2
RSPO handbook	302	77.4

Details	Number	Percentage
Others such as training, group line	25	6.4
News and information on the RSPO		
Preparation of information	51	13.1
Benefit from certification	261	66.9
Conduct for accreditation	243	62.3
Methods of plantation management for accreditation	231	59.2
Knowledge of the RSPO	308	79.0
Preparation of evidences and documents	26	6.7
Others such as inspection of soil conditions, conduct for accreditation	8	2.0
Agencies of key informants		
District Agricultural Extension Office	187	47.9
Provincial Agricultural Extension Office	20	5.1
Department of Agriculture	26	6.7
Department of Agricultural Extension	142	36.4
Land Settlement Cooperatives	175	44.9
Academic institutions	6	1.5
Oil palm crushing mills	154	39.5
Office of Agricultural Economics	10	2.6
Amount of received news and information		
Sufficient	339	86.9
Not sufficient	18	4.6
N/A	33	10.0
Total	390	100

4.4.4.4 Knowledge and Understanding of the RSPO Standard

Knowledge and understanding of the RSPO standard of the farmers revealed that the topic that the farmers had most knowledge and understanding was RSPO was the standard of sustainable oil palm plantation with eight requirements with the mean of 0.96, followed by obligation to prepare information relevant to RSPO requirements on environmental, social, and legal issues to relevant stakeholders, and it was prohibited to use forced labor or human trafficking in palm plantation with the equal mean of 0.93, and the least knowledge and understanding

was the use of chemical pesticides that was not hazardous to health and environment with the mean of 0.63. The overall knowledge and understanding of the RSPO standard was at high level with the mean of 0.88, the detail as shown in Table 4.23.

Table 4.23 Knowledge and Understanding of the RSPO Standard

Knowledge and Understanding of the RSPO Standard	**Opinions**				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
1. RSPO was the standard of sustainable oil palm plantation with eight requirements.	373 (95.6)	10 (2.6)	7 (1.8)	0 (0.0)	0.96 (high)
2. Obligation to prepare information relevant to the RSPO requirements on environmental, social, and legal issues to relevant stakeholders.	361 (92.6)	20 (5.1)	9 (2.3)	0 (0.0)	0.93 (high)
3. RSPO standard contributed to reduction of soil erosion and soil degradation.	324 (83.1)	20 (5.1)	46 (11.8)	0 (0.0)	0.83 (high)
4. Compliance with laws and regulations at local and national levels, and various requirements.	324 (83.1)	10 (5.5)	36 (9.2)	0 (0.0)	0.83 (high)
5. Evidence of rights of land use with no protest of rights by local communities showing rights of land use.	347 (89.0)	11 (2.8)	32 (8.2)	0 (0.0)	0.89 (high)
6. Land use for oil palm cultivation must not cause problems to other land users.	342 (87.7)	12 (3.1)	36 (9.2)	0 (0.0)	0.88 (high)
7. Obligation to implement the methods to reduce soil erosion and soil degradation.	336 (86.2)	5 (1.3)	48 (12.3)	1 (0.3)	0.86 (high)
8. Use of techniques of mixed pest management.	341 (87.4)	11 (2.8)	37 (9.5)	1 (0.3)	0.87 (high)
9. Use of chemical pesticides that was not hazardous to health and environment.	271 (69.5)	106 (27.2)	13 (3.3)	0 (0.0)	0.69 (high)
10. RSPO compliance caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health.	361 (92.6)	7 (1.8)	22 (5.6)	0 (0.0)	0.92 (high)

Knowledge and Understanding of the RSPO Standard	Opinions				
	Yes	**No**	**Not Sure**	**N/A**	**Mean**
11. Oil palm growers must attend training courses on RSPO.	342 (87.7)	20 (5.1)	28 (7.2)	0 (0.0)	0.88 (high)
12. Prohibited to practice new oil palm planting in forest conservation area.	348 (89.2)	19 (4.9)	23 (5.9)	0 (0.0)	0.89 (high)
13. In preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste.	358 (91.8)	16 (4.1)	16 (4.1)	0 (0.0)	0.92 (high)
14. In your oil plantation, there was no sexual harassment and no violence against women.	353 (90.5)	20 (5.1)	17 (4.3)	0 (0.0)	0.91 (high)
15. In your oil plantation, there was no forced labor or human trafficking.	362 (92.8)	14 (3.6)	13 (3.3)	1 (0.3)	0.93 (high)
Total					0.88 (high)

Note:

Mean Rating	Interpretation
0.0 – 0.33	Marginal knowledge and understanding
0.34 – 0.67	Moderate knowledge and understanding
0.68 – 1.00	High knowledge and understanding

4.4.4.5 Attitude, Motivation, and Acceptation Towards the RSPO Standard

The attitude of the farmers towards the RSPO standard revealed that farmers thought that most compliance with the RSPO standard required knowledge and understanding of correct practice with the mean of 4.62, followed by formation of groups to be certified with the RSPO standard with the mean of 4.40, and least of all was the thought that compliance with the RSPO standard was complicated with many processes (negative question) with the mean of 3.57. The overall attitude towards the RSPO standard was at high level with the mean of 4.17, the detail as shown in Table 4.24.

Most motivation in compliance with the RSPO standard of the farmers included the compliance with the RSPO standard increased oil palm yields with better quality with the mean of 4.48, followed by compliance with the RSPO standard increased networks, benefiting oil palm plantation with the mean of 4.39, and least of all the farmers thought that compliance with the RSPO standard benefited their employment with the mean of 4.12. The overall motivation in compliance with the RSPO standard was at the highest level with the mean of 4.32, the detail as shown in Table 4.24.

Most acceptation of the RSPO standard of the farmers included farmers accepted that compliance with the RSPO standard ensured sustainable oil palm cultivation with the mean of 4.48, followed by acceptance to comply with the RSPO standard with the mean of 4.43. The overall acceptation of the RSPO standard was at the highest level with the mean of 4.45, the detail as shown in Table 4.24.

Table 4.24 Attitude, Motivation, and Acceptation Towards the Compliance with the RSPO Standard

Topics	**Levels**					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Attitude towards the RSPO standard						
1. You thought that compliance with the RSPO standard required knowledge and understanding of correct practice.	259 (66.4)	122 (31.3)	8 (2.1)	1 (0.3)	0 (0.0)	4.62 (Strongly agree)
2. You thought that the certification of the RSPO standard would increase export of oil palm yields.	160 (41.0)	198 (50.8)	29 (7.4)	3 (0.8)	0 (0.0)	4.30 (Strongly agree)
3. You thought that compliance with the RSPO	9 (2.3)	45 (11.5)	63 (16.2)	259 (66.4)	14 (3.6)	3.57 (agree)

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
standard was complicated with many processes (negative question).						
4. You thought that oil palm growers were committed to ethical business operation.	70 (17.9)	257 (65.9)	57 (14.6)	5 (1.3)	1 (0.3)	4.03 (agree)
5. Compliance with the RSPO standard increased production costs (negative question).	14 (3.6)	39 (10.0)	44 (11.3)	152 (39.0)	141 (36.2)	3.94 (agree)
6. You thought that the areas of your oil palm cultivation were appropriate to comply with the RSPO standard.	147 (37.7)	210 (53.8)	31 (7.9)	2 (0.5)	0 (0.0)	4.30 (Strongly agree)
7. You would be treated fairly and transparently from collectors of fresh fruit bunch (oil palm bunch collection centers) and oil palm crushing mills if you were certified with the RSPO standard.	153 (39.2)	185 (47.4)	47 (12.1)	5 (1.3)	0 (0.0)	4.02 (agree)
8. You must form groups to organize activities for exchange of learning among yourselves.	177 (45.4)	176 (45.1)	34 (8.7)	3 (0.8)	0 (0.0)	4.35 (Strongly agree)
9. You must form groups to be certified with the RSPO standard.	177 (45.4)	190 (48.7)	22 (5.6)	1 (0.3)	0 (0.0)	4.40 (Strongly agree)

Topics	**Levels**					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Total						4.17 (agree)
Motivation in the RSPO standard						
10. You thought that compliance with the RSPO standard benefited your employment of labor force.	116 (29.7)	211 (54.1)	58 (14.9)	5 (1.3)	0 (0.0)	4.12 (agree)
11. You thought that compliance with the RSPO standard increased the oil palm prices and your income.	157 (40.3)	197 (50.5)	33 (8.5)	3 (0.8)	0 (0.0)	4.30 (Strongly agree)
12. Compliance with the RSPO standard increased oil palm yields with better quality.	197 (50.5)	168 (43.1)	24 (6.2)	1 (0.3)	0 (0.0)	4.48 (Strongly agree)
13. Compliance with the RSPO standard increased networks and benefited oil palm plantation.	187 (47.9)	168 (43.1)	34 (8.7)	1 (0.3)	0 (0.0)	4.39 (Strongly agree)
Total						**4.32 (**Strongly agree**)**
Acceptation of the RSPO standard						
14.You accepted to comply with the RSPO standard.	187 (47.9)	181 (46.4)	21 (5.4)	1 (0.3)	0 (0.0)	4.43 (Strongly agree)
15. You accepted that compliance with the RSPO standard ensure sustainable oil palm cultivation.	206 (52.8)	169 (43.3)	13 (3.3)	1 (0.3)	1 (0.3)	4.48 (Strongly agree)

Topics	Levels					
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**
Total						4.45 (Strongly agree)

Note: Mean Rating Interpretation

1.00 – 1.8 0	Strongly disagree
1.81 – 2.60	Disagree
2.61 – 3.40	Neutral
3.41 – 4.20	Agree
4.21 – 5.00	Strongly agree

4.4.4.6 Compliance with the Requirements of the RSPO Standard

The questions in the questionnaire on the compliance with the requirements of the RSPO standard were directed to the farmers who were not certified with the RSPO standard. The questions sought the farmers' opinions on their actual implementation and the scope of implementation. It was found that the farmers' most compliance with the requirements of the RSPO standard was that the farmers must disclose documents such as land rights documents, and health and safety plans with the mean of 4.24, followed by compliance with laws and regulations at local and national levels, and international rules and regulations, and oil palm cultivation in new areas or expansion of cultivated areas must not be situated in forest conservation area with the mean of 4.15 and the least was practice best methods of oil palm care, appropriate operational process, and continuous follow-up of operation with the mean of 3.90. The overall compliance with the requirements of the RSPO standard was at high level with the mean of 4.06, the detail as shown in Table 4.25.

Table 4.25 Compliance with the Requirements of the RSPO Standard

Requirements of the RSPO Standard	**Operational Levels**					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
1. Farmers must disclose documents such as land rights documents, health and safety plans.	0 (0.0)	34 (8.7)	56 (14.4)	80 (20.5)	220 (56.4)	4.24 (Fully practiced)
2. Compliance with laws and regulations at local and national levels, and international rules and regulations.	0 (0.0)	34 (8.7)	54 (13.8)	123 (31.5)	179 (45.9)	4.15 (Fully practiced)
3. Palm plantation management plan such as planning for high quality palm seedlings, training plan to provide knowledge for continuously increased yields.	2 (0.5)	41 (10.5)	49 (12.6)	154 (39.5)	144 (36.9)	4.02 (Preferably practiced)
4. Practice best	0	50	49	168	123	3.90

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
methods of oil palm care, appropriate operational process, and continuous follow-up of operation.	(0.0)	(12.8)	(12.6)	(43.1)	(31.5)	(Preferably practiced)
5. Conservation of environment, natural resources, and biodiversity, identification of environmental impact from palm plantation.	1 (0.3)	33 (8.5)	60 (15.4)	165 (42.3)	131 (33.6)	4.00 (Fully practiced)
6. Responsibilities towards temporary staff and communities affected by palm cultivation, complaint management, fair .compensation,	3 (0.8)	43 (11.0)	51 (13.1)	150 (38.5)	143 (36.7)	3.99 (Fully practiced)

Requirements of the RSPO Standard	Operational Levels					
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**	**Mean**
and legal employment.						
7. Oil palm cultivation in new areas or expansion of cultivated areas must not be situated in forest conservation area.	9 (2.3)	30 (7.7)	37 (9.5)	132 (33.8)	182 (46.7)	4.15 (Preferably practiced)
8. Continuous improvement and development of oil palm plantation, regular follow-up and review of activities.	4 (1.0)	35 (9.0)	58 (14.9)	119 (30.5)	174 (44.6)	4.08 (Preferably practiced)
Total						4.06 (Preferably practiced)

Note:

Mean Rating	Interpretation
1.00– 1.80	Not practiced
1.81 – 2.60	Slightly practiced
2.61 – 3.40	Moderate practiced
3.41– 4.20	Preferably practiced
4.21 – 5.00	Fully practiced

From the data analysis of the questionnaire of the farmers who were members of land settlement cooperatives which were divided into three land settlement cooperatives, the overview analysis revealed that the farmers who were members of the three land settlement cooperatives had knowledge and understanding of the RSPO at high level. In terms of attitude, the farmers who were members of ThaSae Land Settlement Cooperative and Pathio Land Settlement Cooperative had the highest level whereas the farmers who were members of Langsuan Land Settlement Cooperative had high level. In terms of motivation, the farmers who were members of ThaSae Land Settlement Cooperative and Pathio Land Settlement Cooperative had the highest level whereas the farmers who were members of Langsuan Land Settlement Cooperative had low level. In terms of acceptation of the three Land Settlement Cooperatives, they were at the highest level. In terms of compliance with the requirements of the RSPO standard, the farmers who were members of ThaSae Land Settlement Cooperative and Pathio Land Settlement Cooperative had the highest level whereas the farmers who were members of Langsuan Land Settlement Cooperative had low level. The overview analysis revealed that knowledge and understanding was at high level, attitude was at high level, motivation and acceptation were at the highest level, and compliance was at high level.

Table 4.26 Levels of Results of Data Analysis

Land Settlement Cooperatives	**Level of Understanding**	**Level of Attitude**	**Level of Motivation**	**Level of Acceptation**	**Level of Compliance**
ThaSae	high	strongly agree	strongly agree	strongly agree	fully practiced
Pathio	high	strongly agree	strongly agree	strongly agree	fully practiced
Langsuan	high	agree	disagree	strongly agree	slightly practiced
Overview	high	agree	agree	strongly agree	preferably practiced

4.5 Evaluation of the Promotion of Sustainable Oil Palm Production and Compliance with the RSPO Standard of the Farmers

Based on the compilation of quantitative and qualitative data, the data was used to evaluate the promotion of sustainable oil palm production and compliance with the RSPO standard of the farmers based on the evaluation framework of IPO (Input, Process, Output) to evaluate Input, Process, and Output. The evaluation issue of Input included personnel, budget, tools and equipment, and venues for activities; Process included management, public relations, coordination, activities to promote the compliance with the RSPO standard, knowledge transfer, and follow-up and evaluation of operation of activities; Output included farmers' implementation of the activities, and results from the implementation. The evaluation results are shown in Table 4.27.

Table 4.27 Evaluation Results of IPO

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
Input	1. Personnel and farmers	1.1 Personnel responsible for operating activities to promote farmers.	- Yes = 3 scores - No = 0 score	- Questionnaire - Interviews with relevant agencies/farmers	Personnel responsible for operating activities to promote farmers' sustainable oil palm production = 3 scores
		1.2 Sufficient personnel responsible for operating activities to promote farmers.	- Sufficient = 3 scores - Slightly insufficient = 2 scores - Very insufficient =1 score	- Questionnaire - Interviews with relevant agencies/farmers	Sufficient personnel responsible for operating activities to promote farmers' sustainable oil palm production = 3 scores
		1.3 Personnel's knowledge, understanding, and experience of	- Personnel had much knowledge and understanding = 3 scores	- Questionnaire - Interviews with relevant agencies/farmers	Personnel had knowledge, understanding, and experience of

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
		operating activities to promote farmers in sustainable oil palm production.	- Personnel had medium knowledge and understanding = 2 scores - Personnel had little knowledge and understanding = 1 score		operating activities to promote farmers in sustainable oil palm production= 2scores
		1.4 Farmers were interested in sustainable oil palm production1	- Farmers were very interested = 3 scores - Farmers were fairly interested = 2 scores - Farmers were little interested = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Farmers were interested in sustainable oil palm production = 2 scores
		1.5 Attitude of farmers towards sustainable oil palm production2.	- Farmers had very good attitude = 3 scores - Farmers had fairly	- Questionnaire - Interviews with relevant agencies/farmers	Farmers had very good attitude towards sustainable oil palm production

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
			good attitude = 2 scores - Farmers had slightly good attitude = 1 score		= 3 scores
		1.6 Farmers had knowledge of sustainable oil palm production.	- Much knowledge = 3 scores - Medium knowledge = 2 scores - Little knowledge = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Farmers had much knowledge of sustainable oil palm production = 3 scores
	2. Budget	2.1 Budget allocated to operate activities for sustainable oil palm production	- Much supporting budget = 3 scores - Medium supporting budget = 2 scores - No budget = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Relevant agencies were fairly allocated supporting budget to operate activities for sustainable oil palm production = 2 scores

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
		2.2 Sufficient budget to operate activities for sustainable oil palm production1.	- Sufficient = 3 scores - Slightly insufficient = 2 scores - Very insufficient = 1 score	- Interviews with relevant agencies/farmers	Allocated budget was slightly insufficient to operate activities for sustainable oil palm production = 2 scores
	3. Types of activities and projects	3.1 Goals and objectives to promote sustainable oil palm production.	- Formulated clear goals = 3 scores - Formulated goals but unclear = 2 scores - No formulation =1 score	- Interviews with relevant agencies/farmers	Formulation of goals and objectives to promote sustainable oil palm production = 3 scores
		3.2 Focus on activities to promote sustainable oil palm production.	- Much focus = 3 scores - Medium focus = 2 scores - Little focus = 1	- Questionnaire - Interviews with relevant agencies/farmers	Relevant agencies and farmers fairly focused on activities to promote sustainable oil palm

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
			score		production = 2 scores
	4. Tools and equipment	Sufficient tools and equipment for activities to promote sustainable oil palm production.	- Very sufficient = 3 scores - Fairly sufficient = 2 scores - Not sufficient = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Fairly sufficient tools and equipment for activities to promote sustainable oil palm production = 2 scores
	5. Venues to operate activities	Ready venues to operate activities.	- Much readiness = 3 scores - Fairly readiness = 2 scores - Little readiness = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Fairly ready venues to operate activities = 2 scores
Process	6. Management	6.1 Agencies responsible for activities to promote sustainable oil palm production.	- Responsible agencies = 3 scores - Responsible agencies but not clear = 2 scores	- Interviews with relevant agencies/farmers	Agencies clearly responsible for activities to promote sustainable oil palm production = 3 scores

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
			- No responsible agency =1 score		
		6.2 Planning of activities to promote sustainable oil palm production.	- Planning = 3 scores - No planning =1 score	- Interviews with relevant agencies/farmers	Planning of activities to promote sustainable oil palm production = 3 scores
	7. Public relations	7.1 Public relations to ensure farmers' widespread reception of news and information.	- High level = 3 scores - Fair level = 2 scores - Low level or no public relation = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Public relations ensured farmers' reception of news and information at fair level = 2 scores
		7.2 Methods used for public relations to ensure that farmers received news and information.	- Much = 3 scores - Fairly = 2 scores - Nothing =1 score	- Questionnaire - Interviews with relevant agencies/farmers	Agencies disseminated news on sustainable oil palm production = 2 scores

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
	8. Coordination	8.1 Coordination with other agencies.	- Much coordination = 3 scores - Medium coordination = 2 scores - Little or no coordination =1 score	- Questionnaire - Interviews with relevant agencies/farmers	Coordination with other public and private agencies = 2 scores
		8.2 Coordination with farmers.	- Much coordination = 3 scores - Medium coordination = 2 scores - Little or no coordination = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Medium coordination with farmers = 2 scores
	9. Activities to promote the RSPO	9.1 Trainings held for farmers.	Trainings = 3scores No training = 0score	- Interviews with relevant	Trainings organized for farmers = 3

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
	compliance			agencies/farmers	scores
		9.2 Study tours organized for farmers.	Study tours = 3 scores No study tour = 0 score	- Interviews with relevant agencies/farmers	Study tours organized for farmers = 3 scores
	10. Knowledge transfer	Guideline of knowledge transfer and implementation process.	- Guideline of diverse transfers of knowledge = 3 scores - Guideline of some transfer = 2 scores - No guideline of transfer =1 score	- Questionnaire - Interviews with relevant agencies/farmers	Guideline of knowledge transfer and implementation process at fair level = 2scores
	11. Follow-up and evaluation of operating activities	11.1 Process of follow-up and evaluation of operating activities.	- Continuous = 3 scores - Yes but not continuous = 2 scores	- Questionnaire - Interviews with relevant agencies/farmers	Process of continuous follow-up and evaluation of operating activities = 3 scores

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
		11.2 Frequency of follow-up and evaluation of operating activities.	- Not at all = 1 score - Regularly = 3 scores - Not regularly = 2 scores - No follow-up = 1 score	- Questionnaire - Interviews with relevant agencies/farmers	Regular follow-up and evaluation of operation = 3 scores
Output	12. Implementation	Farmers implemented knowledge obtained from trainings.	- Regular implementation = 3 scores - Some implementation = 2 scores - No implementation = 1 score	- Interviews with relevant agencies/farmers	Some implementation of knowledge obtained on sustainable oil palm production = 2 scores
	13. Results from implementation	13.1 Good oil palm plantation management.	- A lot = 3 scores - Fairly = 2 scores - Not at all =1 score	- Interviews with farmers	Farmers were transferred knowledge of good

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
					oil palm plantation management = 2 scores
		13.2 Received quality yields with higher prices.	Received = 3 scores Did not receive = 1 score	- Interviews with farmers	Farmers received quality yields with higher prices = 3 scores
		13.3 Certified with the RSPO standard.	Certified = 3 scores Not certified =1 score	- Interviews with relevant agencies/farmers	Farmers certified with the RSPO standard = 3 scores
	14. Economic impact	Farmers earned more income and had better quality of life.	Increased income = 3 scores Income did not increase = 1 score	- Interviews with farmers	Farmers earned more income and had better quality of life = 3 scores
	15. Social impact	Employment of community residents with fairness and without exploitation.	No labor exploitation = 3 scores Labor exploitation = 1score	- Interviews with farmers	Employment of community residents with fairness and without exploitation

Evaluation Framework	Major Evaluation Issues	Indicators	Decision Criteria	Methods of Data Compilation	Evaluation Results
					= 3 scores
	16. Environmental impact	16.1 Use of chemicals in eliminating pests and weeds.	Did not use chemicals = 3 scores Used chemicals a little = 2 scores Used only chemicals = 1 score	- Interviews with farmers	Farmers did not use chemicals in eliminating pests and weeds = 3 scores
		16.2 Use of techniques of mixed pest management.	Use of mixed techniques = 3 scores Use a little = 2 scores Did not use = 1 score	- Interviews with farmers	Farmers used the techniques of mixed pest management only a little = 2 scores

4.5.1 The Evaluation Results to Promote Sustainable Oil Palm Production and Compliance with the RSPO Standard of the Farmers According to the Evaluation Framework of the IPO Theory

The evaluation using the IPO theory was conducted with the following evaluation results:

4.5.1.1 Input

1) In terms of personnel, the evaluation issue included personnel responsible for operating activities to promote and comply with the RSPO standard with the evaluation result of 3 scores as both public and private agencies had personnel to operate the activities. In terms of sufficient personnel for operating activities to promote and comply with the RSPO standard, the evaluation result was 3 scores due to sufficient personnel of both public and private agencies for operation. In terms of the evaluation of knowledge, understanding, and experience of personnel for operation, the evaluation result was 3 scores as the personnel of both public and private agencies had good knowledge, understanding, experience, and ability to perform tasks. As for the issue of the farmers with interest in sustainable oil palm production, the evaluation result was 2 scores as some farmers were interested in sustainable oil palm production. In terms of the farmers' attitude towards sustainable oil palm production, the evaluation result was 3 scores as the farmers had good attitude towards sustainable oil palm production. In terms of the farmers' knowledge and understanding of sustainable oil palm production, the evaluation result was 3scores as the farmers had knowledge of sustainable oil palm production at high level = 3 scores.

2) In terms of budget, the evaluation issue included budget to operate the activities to promote and comply with the RSPO standard with the evaluation result of 3 scores as the government agencies were allocated budget for operation and the private sector supported budget for operation as well. In terms of the evaluation issue of sufficient budget to operate activities based on the interviews, the evaluation result was 2 scores as some activities required a lot of budget so that the allocated budget was slightly insufficient.

3) In terms of the types of activities to promote and comply with the RSPO standard, the evaluation issue included the goals and objectives of sustainable oil palm production with the evaluation result of 3 scores as the activities focused on the goals and objectives of sustainable oil palm production to ensure that the farmers were certified with the RSPO standard. On the issue of importance placed on operating the palm production activities and projects, the evaluation result was 2 scores as agencies and farmers placed importance on operating activities at fair level. This is because each farmer had different knowledge and understanding of sustainable oil palm production. Some had much knowledge and understanding while some did not.

4) In terms of tools and equipment, the evaluation issue included sufficient tools and equipment in organizing activities to promote sustainable oil palm production. The evaluation result was 2 scores due to fairly sufficient tools and equipment to organize activities in order to promote sustainable oil palm production.

5) In terms of venues for organizing activities, the evaluation issue included ready venues for organizing activities with the evaluation result of 2 scores as the venues for organizing activities were fairly ready.

4.5.1.2 Process

1) In terms of management, the evaluation issue included agencies responsible for operating activities and projects of sustainable oil palm production with the evaluation result of 3 scores as the public and private agencies responsible for operating the activities and projects included Department of Agriculture, Department of Agricultural Extension, GIZ, oil palm crushing mills, and academic institutions. The evaluation issue included planning of operation of sustainable oil palm production activities and projects with the evaluation result of 3 scores as the public and private agencies planned the operation of sustainable oil palm production activities and projects.

2) In terms of public relations, the evaluation issue included public relations to ensure that all farmers received news and information with the evaluation result of 2 scores as public relations were conducted to ensure that the farmers received news and information through questionnaire and interviews. But

there were still some farmers who did not receive news and information on sustainable oil palm production. In terms of the issue of the methods used for public relations to ensure the farmers' reception of news and information, the evaluation result was 3 scores due to public relations on sustainable oil palm production.

3) In terms of coordination, the evaluation issue included coordination with other agencies with the evaluation result of 3 scores as there was coordination with other agencies including the public and the private sectors and academic institutions. The evaluation issue of coordination with the farmers had the evaluation result of 2 scores due to coordination with the farmers in some areas only.

4) In terms of activities to promote the RSPO compliance, the evaluation issue included trainings for the farmers with the evaluation result of 3 scores due to trainings held for the farmers. In terms of study tours held for the farmers, the evaluation result was 3 scores due to study tours held for the farmers.

5) In terms of knowledge transfer, the evaluation issue included the guideline for knowledge transfer and implementation process with the evaluation result of 2 scores due to knowledge transfer and implementation process at fair level.

6) In terms of follow-up and evaluation of operating activities and projects, the evaluation issue included process of follow-up and evaluation of operating activities had the evaluation result of 3 scores as there was continuous process of follow-up and evaluation of operating activities. As for the issue of frequency of follow-up and evaluation of operating activities and projects, the evaluation result was 3 scores due to regular follow-up and evaluation of operation.

4.4.1.3 Output

1) In terms of implementation, the evaluation issue included farmers implemented knowledge acquired from trainings with the evaluation result of 3 scores as farmers implemented knowledge on oil palm plantation management and sustainable oil palm production until they were certified with the RSPO standard.

2) In terms of the results of implementation, the evaluation issue included good oil palm plantation management with the evaluation result of 3 scores as farmers who participated in sustainable oil palm production activities and projects attended trainings so that they could implement good oil palm plantation

management. In terms of evaluation issue, the farmers received quality yields and higher prices with the evaluation result of 3 scores. Good oil palm plantation management resulted in quality yields and higher prices. In terms of the evaluation issue of certification of the RSPO standard, the evaluation result was 3 scores as the farmers could manage oil palm plantation well with quality yields and certification of the RSPO standard.

3) In terms of economic impact, the evaluation issue included the farmers earned higher income and better quality of life with the evaluation result of 3 scores as they earned higher income and better quality of life.

4) In terms of social impact, the evaluation issue included employment of community residents with fairness and without exploitation with the evaluation result of 3 scores as there was employment of community residents with fairness and without exploitation.

5) In terms of environmental impact, the evaluation issue included the use of chemicals in eliminating pests and weeds with the evaluation result of 3 scores as the farmers did not use chemicals in eliminating pests and weeds. As for the evaluation issue of the mixed techniques of pest management, the evaluation result was 2 scores as the farmers used the mixed techniques of pest management only a little.

The evaluation of the effectiveness of the promotion of sustainable oil palm production and the RSPO compliance of the farmers based on the evaluation framework of the IPO theory was conducted by collecting information from the questionnaire with the farmers, interviews, and document study. Then, the information was analyzed based on the indicators with the evaluation weight of 100 scores. The weight given to each evaluation issue included Input with 30 scores and 12 indicators, 30 scores and 11 indicators, and Output with 40 scores and 9 indicators. The Input had the evaluation mean of 2.42 at high level, the Process had the evaluation mean of 2.55 at high level, and the Output had the evaluation mean of 2.33 at medium level. The total of the evaluation mean multiplied by weight divided by 100, the result equaled 2.43 which was at high level, the detail as shown in Table 4.28.

Table 4.28 Evaluation Scores

Evaluation Framework	**Issues of Major Evaluation**	**Indicators**	**Scores**
Input	1. Personnel/farmers	1.1 Personnel to operate promotional activities.	3
		1.2 Sufficient personnel to operate promotional activities.	3
		1.3 Knowledge, understanding, and experience of personnel to operate promotional activities.	2
		1.4 Farmers were interested in sustainable oil palm production.	2
		1.5 Farmers' attitude towards sustainable oil palm production.	3
		1.6 Farmers were knowledgeable in sustainable oil palm production.	3
	2. Budget	2.1 Budget allocation to operate promotional activities.	2
		2.2 Sufficient budget used to operate promotional activities.	2
	3. Types of activities and projects	3.1 Goals and objectives to operate promotional activities.	3
		3.2 Importance placed on operation of promotional activities.	2
	4. Tools and equipment	4.1 Sufficient tools and equipment to operate activities.	2
	5. Venues for activities	5.1 Venues to operate promotional activities were ready.	2
	Total		29
Operational process	6. Management	6.1 Agencies responsible for promotional activities.	3
		6.2 Planning to conduct promotional activities.	3
	7. Public relations	7.1 Public relations for all farmers to receive news and information.	2

Evaluation Framework	Issues of Major Evaluation	Indicators	Scores
		7.2 Public relations to ensure that farmers received news and information.	2
	8. Coordination	8.1 Coordination with other agencies.	2
		8.2 Coordination with farmers.	2
	9. Activities to promote RSPO compliance	9.1 Trainings provided for farmers.	3
		9.2 Study tours organized for farmers.	3
	10. Knowledge transfer	10. Guideline of knowledge transfer and implementation process.	2
	11. Follow-up and evaluation of the operation of activities	11.1 Process to follow up and evaluate the operation of activities.	3
		11.2 Frequency of follow-up and evaluation of the operation of activities.	3
	Total		28
Output	12. Implementation	12.1 Farmers implemented knowledge acquired from trainings.	2
	13. Results from implementation	13.1 Good oil palm plantation management.	2
		13.2 Quality yields with higher prices.	3
		13.3 Certification of the RSPO standard.	3
	14. Economic impact	14.1 Farmers earned higher income and better quality of life.	3
	15. Social impact	15.1 Employment of community residents with fairness and without exploitation.	3
	16. Environmental impact	16.1 Use of chemicals in eliminating pests and weeds.	3
		16.2 Use of techniques of mixed pest management.	2
	Total		21

Table 4.29 Mean of Evaluation Issues

Evaluation Issues	**Weight**	**No. of Indicators**	**Scores**	**Mean**	**Average Score x Weight/100**
Input	30	12	29	2.42 (high)	0.73
Process	30	11	28	2.55 (high)	0.77
Output	40	9	21	2.33 (medium)	0.93
Total	100	32		-	2.43

Note: 1 – 1.66 = Low
1.67 – 2.33 = Medium
2.34 – 3.00 = High

The evaluation results to promote sustainable oil palm production and compliance with the RSPO standard of the farmers showed that relevant agencies operated the projects to promote and support the farmers for sustainable oil palm production and certification of the RSPO standard through budget, personnel, accommodations of tools and equipment, venues of activities (Input), project management, public relations of projects, trainings for farmers, study tours for farmers, knowledge transfer, and evaluation of performance (Process), so that the farmers had knowledge and understanding of sustainable oil palm production, and implementation, resulting in quality yields, higher selling prices, the farmers' increased income, impacting employment in community, reduced environmental impact, and the farmers' certification of the RSPO standard.

4.6 Factors that Had Relationships and Impact on the RSPO Compliance of Oil Palm Smallholder Farmers in Chumphon

4.6.1 Relationships of the RSPO Compliance of Oil Palm Smallholder Farmers in Chumphon

The relationships of the RSPO compliance of oil palm smallholder farmers in Chumphon had positive relationships with the knowledge and understanding of the RSPO standard, attitude towards the RSPO standard, motivation in the compliance with the RSPO standard, and adoption of the RSPO standard with the statistical significance at the level of 0.01, the detail as in Table 4.30.

Table 4.30 Relationships of the RSPO Compliance of Oil Palm Smallholder Farmers in Chumphon

	Compliance with the Requirements	**Knowledge and understanding**	**Attitude**	**Motivation**	**Acceptation**
Compliance with the requirements	1	.393**	.274**	.643**	.371**
Knowledge and understanding	-	1	.343**	.456**	.334**
Attitude	-	-	1	.357**	.296**
Motivation	-	-	-	1	.393**
Acceptation	-	-	-	-	1

Note: **Correlation is significant at the 0.01 level (2-tailed)

4.6.2 Multiple Regression Analysis

The Multiple Regression Analysis to find the factors and relationships impacting the RSPO compliance of oil palm smallholder farmers in Chumphon was conducted to find the relationships between independent variables towards dependent variables. It was determined that knowledge and understanding of the RSPO standard, attitude towards the RSPO standard, motivation in compliance with the RSPO

standard, and adoption of the RSPO standard were independent variables, and the compliance with the RSPO standard of oil palm smallholder farmers in Chumphon was dependent variable. The relationships could be found through the construction of equation of forecast or forecast of dependent variable as follows

$y = b_0 + b_1x_1 + b_2x_2 + b_3x_2 + b_4x_4$

y = Dependent variable means the RSPO standard of oil palm smallholder farmers in Chumphon

b_0 = Constant of regression equation

Regression Coefficient of independent variable

b_{1-4} = Regression Coefficient of independent variable

x_{1-4} = Independent variable means knowledge and understanding of the RSPO standard, attitude towards the RSPO standard, motivation in the compliance with the RSPO standard, and adoption of the standard

Therefore, the equation of forecast means the RSPO compliance of oil palm smallholder farmers in Chumphon = b_0+ b_1(knowledge and understanding of the RSPO standard) + b_2(attitude towards the RSPO standard) + b_3(motivation in compliance with the RSPO standard) + b_4(adoption of the RSPO standard) . The analysis was conducted to find the variables which had relationship towards the RSPO compliance of oil palm smallholder farmers in Chumphon. There were 390 farmers who answered the questionnaire.

This analysis used the stepwise Multiple Regression Analysis. It consisted of choosing independent variables to the equation which were independent variables which had relationships with the dependent variable at the statistical significance at the level of 0.05 with the following assumptions:

1) Knowledge and understanding of the RSPO standard was not the factor and did not have relationship with the RSPO compliance of oil palm smallholder farmers in Chumphon.

2) Attitude towards the RSPO standard was not the factor and did not have relationship with the RSPO compliance of oil palm smallholder farmers in Chumphon.

3) Motivation in compliance with the RSPO standard was not the factor and did not have relationship with the RSPO compliance of oil palm smallholder farmers in Chumphon.

4) Acceptation of the RSPO standard was not the factor and did not have relationship with the RSPO compliance of oil palm smallholder farmers in Chumphon.

Table 4.31 Stepwise Multiple Regression Analysis

	B	**β**	**t-test**	**p-value**
CONSTANT	-11.18		-4.16	.000
Knowledge and understanding of the RSPO standard	0.27	0.10	2.33	.002
Motivation in compliance with the RSPO standard	1.94	0.55	12.25	.000
Acceptation of the RSPO standard	0.76	0.12	2.88	.004
$R = 0.661$, $R^2 = 0.437$				

Note: Multiple Regression Analysis of the RSPO compliance of oil palm smallholder farmers in Chumphon = - 11.18+ 0.27 (knowledge and understanding of the RSPO standard) + 1.94 (motivation in compliance with the RSPO standard) + 0.76 (Acceptation of the RSPO standard)

From Table 4.31, the stepwise Multiple Regression Analysis showed that there were only three independent variables entering the equation of forecast at the statistical significance namely knowledge and understanding of the RSPO standard, motivation in compliance with the RSPO standard, and acception of the RSPO standard with positive influence on the dependent variable and could jointly forecast the dependent variable namely the RSPO compliance of oil palm smallholder farmers in Chumphon of 43.7% ($R^2 = 0.437$) which negated the assumption. But the variable that was attitude towards the RSPO standard was not the factor and did not have relationship with the RSPO compliance of oil palm smallholder farmers in Chumphon. So, it accepted the assumption.

In considering the individual variable, it was found that the three variables could be ranked in terms of important influence on the RSPO compliance of oil palm smallholder farmers in Chumphon namely motivation in compliance with the RSPO standard had the most influence or 0.55, followed by adoption of the RSPO standard equaled 0.12, and finally knowledge and understanding of the RSPO standard equaled 0.10. The importance of the factors influencing the RSPO compliance of farmers was used as the criteria of the RSPO model compliance of oil palm smallholder farmers in Chumphon.

4.7 Evaluation Results of the Social Return on Investment in Oil Palm Production

The calculation of the Social Return on Investment (SROI) in oil palm production in this study was based on the calculation of the SROI in the process of palm plantation care, harvest of yields, and transport of yields for selling. The process consisted of Fixed Costs which were total costs that did not change according to the level of the amount of oil palm yields such as equipment, machinery, etc., and Variable Costs which were costs that could change according to the ratio of activities or market prices such as fuel, wages, fertilizers. The value that the society received from investment in oil palm production consisted of economic benefit, social benefit, and environmental benefit. Then, the analysis was conducted on the Social Return on Investment (SROI) through the analysis of the SROI in oil palm production for the period of 1 year to describe that for every 1 baht of investment, how much money the society would receive for the SROI in oil palm production. The SROI could be calculated as follows:

$$\text{Social return on investment (SROI)} = \frac{\text{Value acquired from investment}}{\text{Costs of investment}}$$

1) Costs of investment were the information of costs collected through the questions posed to oil palm growers, information from electronic documents, website, and Social Return on Investment Index (SROI Index).

2) Value acquired from investment consisted of economic benefit, social benefit, and environmental benefit. The economic benefit accounted for the monetary value such as income from sales of yields. The social benefit was that people in community were employed and could earn income from working in palm plantations. The economic benefit was reduced pollution to the environment.

4.7.1 Social Return on Investment in Oil Palm Production Certified with the RSPO Standard

In terms of the Social Return on Investment in the process of palm plantation care, harvest of yields, and transport of yields for selling, the information used to assess the SROI derived from the interview with one oil palm grower who was certified with the RSPO standard. The information of oil palm plantation in 2019 was as follows:

Fixed cost

1) Water pump (Tor-Payanak) 12,000 baht

Variable costs

1) Fertilizers (as shown in Table 4.32)

2) Soil conditioners (as shown in Table 4.32)

Table 4.32 Costs of Fertilizers and Soil Conditioners

Formula of Fertilizers/Soil Conditioners	**Rate of Use (Kg)/Tree**	**Number of Unit (Sack)/Times**	**Number of Time/Year**	**Price (Baht)/Unit**	**Total Prices (Baht)**
1. 21-0-0	2	40	2	320	25,600
2. 0-0-60	2	40	4	610	97,600
3. 18-46-0	1	20	2	810	32,400
4. 46-0-0	1	20	1	530	10,600
5. 0-3-0	2	40	1	420	16,800
6. 15-15-15	2	40	1	710	28,400
Total					211,400
7. Boron	0.4	4	1	580	2,320
8. Lime	7	700 (bag)	1	16	11,200
9. MgO	2	40	1	400	16,000
Total					29,520

3) Labor costs for applying fertilizers and soil conditioners with 1 baht/kg (as shown in Table 4.33)

Table 4.33 Labor Costs

Formula of Fertilizers/Soil Conditioners	**Number of Units (Sacks)/Times**	**Number of Time/Year**	**Amount (Kg)/Unit**	**Total Amount (Kg)**	**Labor Costs (Baht)**
1. 21-0-0	40	2	50	4,000	4,000
2. 0-0-60	40	4	50	8,000	8,000
3. 18-46-0	20	2	50	2,000	2,000
4. 46-0-0	20	1	50	1,000	1,000
5. 0-3-0	40	1	50	2,000	2,000
6. 15-15-15	40	1	50	2,000	2,000
7. Boron	4	1	25	100	100
8. Lime	700 (bags)	1	10	7,000	7,000
9. MgO	40	1	50	2,000	2,000
Total					28,100

4) Labor costs for harvest of yields 500 baht/ton

5) Labor costs for transport of yields for selling 200 baht/ton

Table 4.34 Labor Costs for Harvest and Transport of Yields

Months	Amount of Yields (Tons)	Labor Costs (Baht)	Transport Costs (Baht)
January	30.91	15,455	6182
February	31.16	15,580	6,222
March	26.52	13,260	5,304
April	22.96	11,480	4,592
May	26.58	13,290	5,316
June	25.63	12,815	5,126
July	23.81	11,905	4,762
August	22.03	11,015	4,406
September	26.48	13,240	5,296
October	21.95	10,975	4,390
November	29.01	14,405	5,802
December	24.29	12,145	4,858
Total	311.33	155,565	62,256

6) Fuel for pumping water 3,000 baht/year

7) Labor costs for leaf pruning 15,000 baht/year

Economic benefit

The income from sales of oil palm of 7.0 tons/rai/year with the average selling price of 3.4 baht/kg with 44 rais (44 x 7.0 x 1000 x 3.4) with the total income of 1,047,200 baht/year.

Social benefit

Employment was generated in community. The hired person received income of 29,600 baht/year for applying fertilizers, 155,665 baht/year for harvest of yields, and 15,000 baht/year for leaf pruning (29,600 +155,665 +15,000) = 200,265 baht/year.

Environmental benefit

Reduced use of weeds amounted to 2,243 baht (Herbicide with the amount of 10 liters could eliminate weeds of 16.5 rais). Therefore, the areas of 44 rais required 26.7 liters of herbicide. As 1 gallon equaled 5 liters, 5.34 gallons were required. The price of 1 gallon was 420 baht. So, 5.34 x 420 = 2,243 baht.

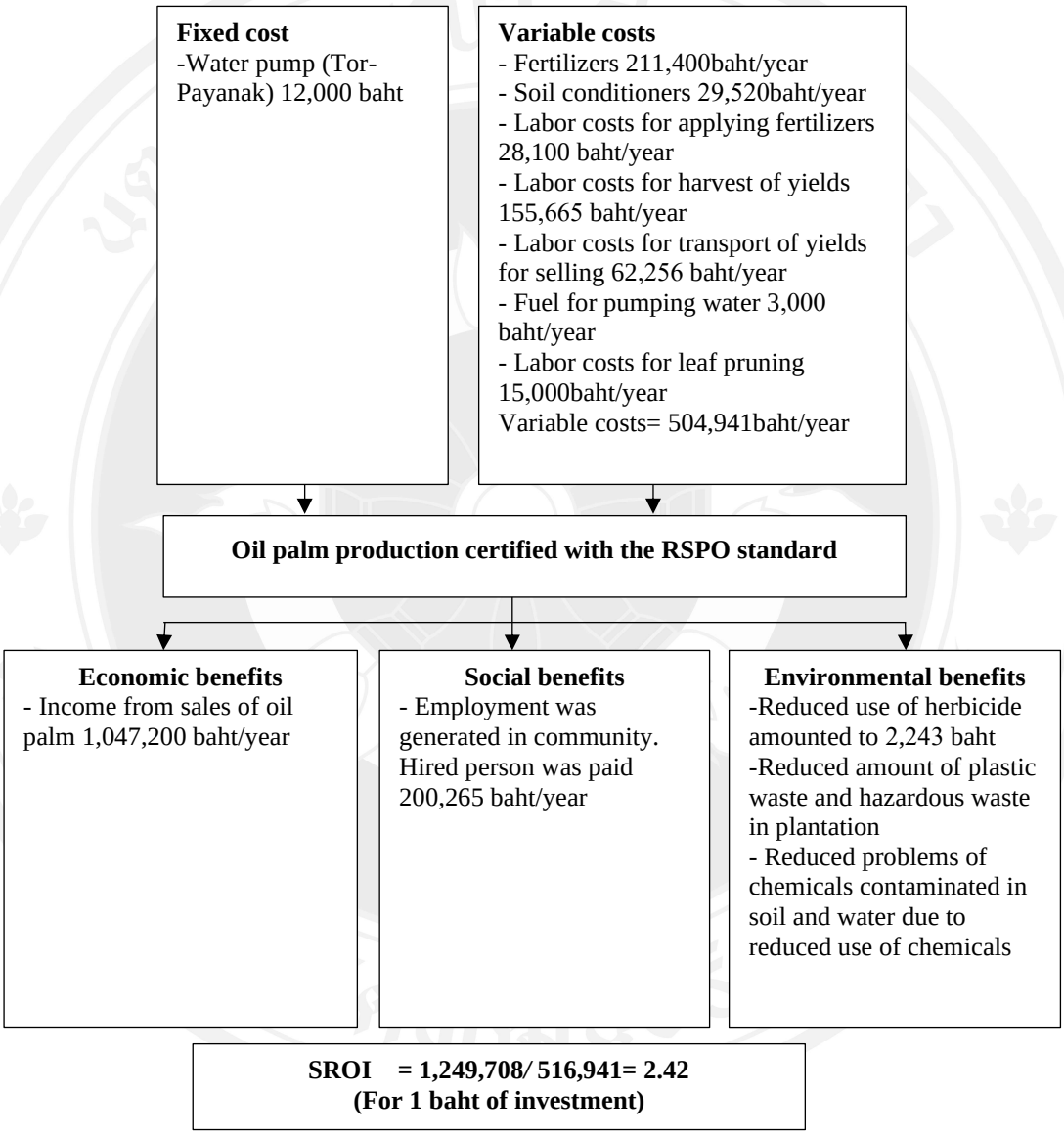

Figure 4.3 Evaluation of SROI in Oil Palm Production Certified with RSPO Standard

The Social Return on Investment in oil palm production certified with RSPO standard equaled 2.42, meaning that for every 1 baht of investment, the social benefit would be 2.42 baht.

4.7.2 Social Return on Investment in Oil Palm Production of the Farmers Not Certified with the RSPO Standard

In terms of the Social Return on Investment in the process of palm plantation care, harvest of yields, and transport of yields for selling, the information used to assess the SROI derived from the interview with one oil palm grower who was not certified with the RSPO standard. The information of oil palm plantation in 2019 was as follows:

Fixed cost

1) Lawn mower 10,900baht

Variable costs

1) Fertilizers (as in Table 4.35)
2) Soil conditioners (as in Table 4.35)

Table 4.35 Costs of Fertilizers and Soil Conditioners

Formula of Fertilizers/Soil Conditioners	**Rate of Use (Kg)/Tree**	**Number of Units (Sacks)/Time**	**Number of Time/Year**	**Price (Baht)/Unit**	**Total Prices (Baht)**
1. 21-0-0	2	35	2	320	22,400
2. 0-0-60	2	35	3	610	64,050
3. 15-15-15	2	35	1	710	24,850
Total					111,300
4. Boron	0.2	2	1	580	1,160
Total					1,160

3) Labor costs for applying fertilizers and soil conditioners for 1 baht per kg (as in Table 4.36)

Table 4.36 Labor Costs for Applying Fertilizers and Soil Conditioners

Formula of Fertilizers/Soil Conditioners	**Amount of Units (Sacks)/Times**	**Number of Time/Year**	**Amount (Kg)/Unit**	**Total Amount (Kg)**	**Labor Costs (Baht)**
1. 21-0-0	35	2	50	3,500	3,500
2. 0-0-60	35	3	50	5,250	5,250
3. 15-15-15	35	1	50	1,750	1,750
4. Boron	2	1	25	50	50
Total					10,550

4) Labor costs for harvest of yields 500 baht/ton

5) Labor costs for transport of yields for selling 200baht/ton

Table 4.37 Labor Costs for Harvest and Transport of Yields

Months	**Amount of Yields (tons)**	**Wages (baht)**	**Transport (baht)**
January	5.70	2,850	1,140
February	5.31	2,655	1,062
March	6.15	3,075	1,230
April	8.06	4,030	1,612
May	9.95	4,975	1,990
June	10.78	5,390	2,156
July	8.84	4,420	1,768
August	7.83	3,915	1,566
September	5.40	2,700	1,080
October	4.67	2,335	934
November	2.54	1,270	508
December	5.93	2,965	1,186
Total	81.16	40,580	16,232

6) Fuel for grass cutting 5,000 baht/year

7) Costs for leaf pruning 18,000 baht/year

8) Costs for grass cutting 12,000 baht/year

Economic benefit

The income from sales of oil palm of2.32 tons/rai/year with the average selling price of 2.97 baht/kg with 40 rais (40x 2.32 x 1000 x 2.97) resulted in the total income of 275,616 baht/year.

Social benefit

Employment was generated in community. The hired person received income of 10,550 baht/year for applying fertilizers, 40,580 baht/year for harvest of yields, 18,000 baht/year for leaf pruning, and 12,000 baht/year for cutting grass (10,550+40,580+18,000+12,000) = 81,130 baht/year.

Environmental benefit

Reduced use of herbicide amounted to 2,016 baht/year (Herbicide with the amount of 10 liters could eliminate weeds of 16.5 rais. Therefore, the areas of 40rais required 24.2 liters of herbicide. As 1 gallon equals 5 liters, 4.8 gallons were required. The price of 1 gallon was 420 baht. So, 4.8 x 420 = 2,016 baht).

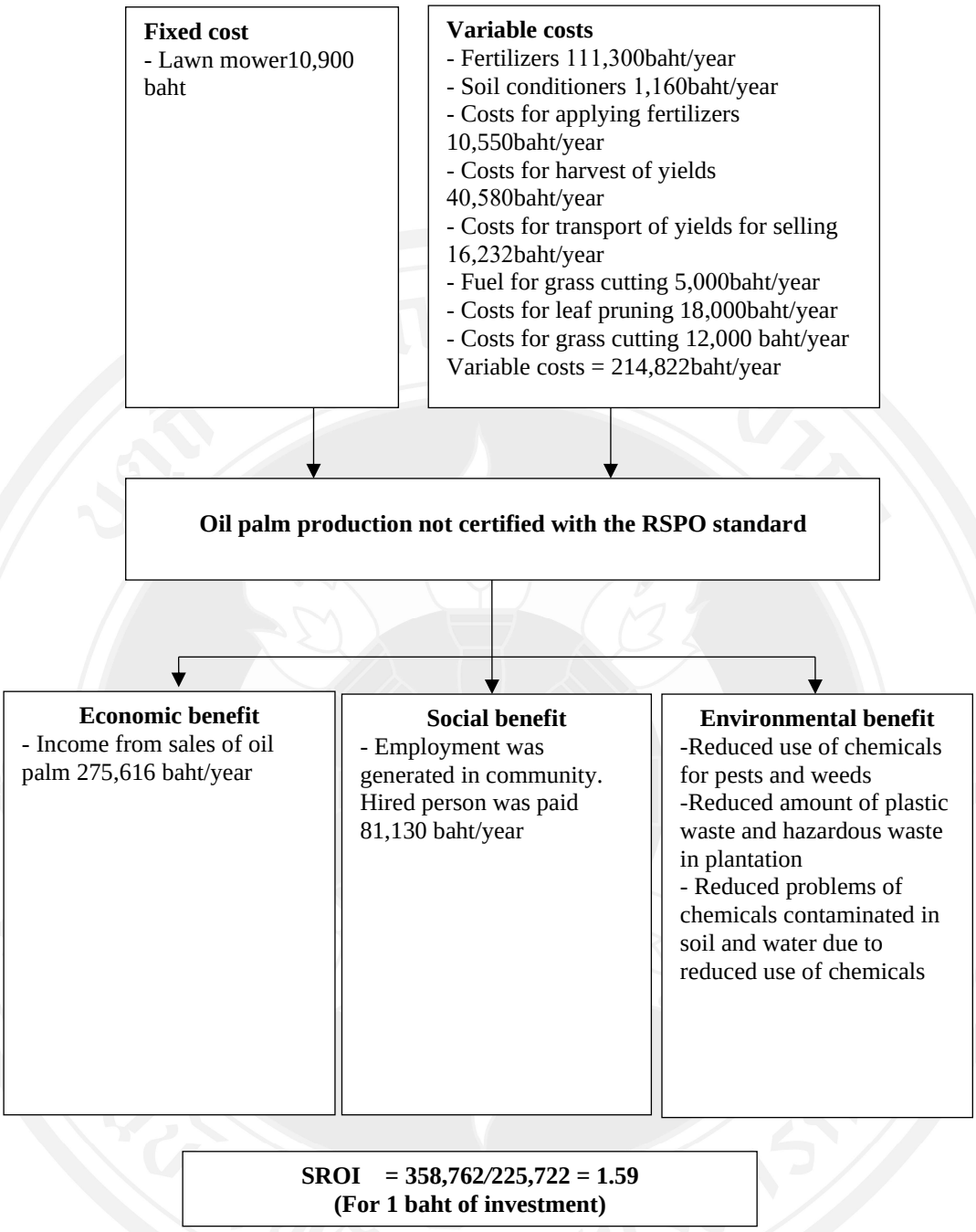

Figure 4.4 Assessment of SROI in Oil Palm Production Without Certification of the RSPO Standard

The Social Return on Investment in oil palm production not certified with the RSPO standard equaled 1.59, meaning that for every 1 baht of investment, the social benefit would be 1.59 baht.

The Social Return on Investment in oil palm production revealed that the SROI of oil palm production certified with RSPO standard exceeded the SROI of oil palm production with non-RSPO standard about 0.83.

4.8 Land Use Change in Land Use of Oil Palm in Chumphon

Chumphon was ranked third as the source of oil palm cultivation in Thailand, following Surat Thani and Krabi. The major sources of oil palm cultivation in Chumphon were scattered to various districts. In 2018, the first four major areas of oil palm cultivation included ThaSae District with most areas or 313,718 rais, followed by Pathio District with the areas of 159,694 rais, Sawi District with the areas of 129,073 rais, and Langsuan District with the areas of 121,275 rais. The areas of oil palm cultivation in Chumphon increased from 843,668 rais to 1,026,000raisin 2014 and 2018 respectively (Office of Agricultural Economics, 2014, Office of Agricultural Economics, 2018) or up 4.85%of the total areas of Chumphon.

According to the information of the areas of oil palm cultivation per district in Chumphon between 2014-2018 by Office of Agricultural Economics, it was found that every district had increased areas of oil palm cultivation in line with the increased demand of oil palm. The districts with most areas of oil palm cultivation included Sawi, ThaSae, and Langsuan or the increase of 1.15%, 0.98%, and 0.88% of the total areas of Chumphon. However, the districts with most areas of oil palm cultivation in 2018 included ThaSae, Pathio, Sawi. The increased areas in Sawi District were the areas that were changed from other agricultural areas or mixed with other economic crops such as coffee plantation, etc. In addition, the areas in ThaSae District which were important areas of palm oil cultivation in Chumphon still had the areas of oil palm cultivation for the past five years as ThaSae District had appropriate topography, strong farmer groups, and locations for delivery of yields in the local areas such as ThaSae Palm Crushing Mill, oil palm bunch collection centers, etc. Therefore, it was appropriate for oil palm cultivation. As for the farmers at ThungTako District and

Phato District, there were least areas of oil palm cultivation. ThungTako District was hilly with sandy soil and beaches. As the terrain of Phato District was mountainous covering NamtokNgao National Park, it was not feasible to modify into the areas of oil palm cultivation as in other districts.

Table 4.38 Changes of Oil Palm Cultivation area Per District in Chumphon between 2014-2018

Districts	**Areas of Oil Palm Cultivation in 2014**		**Areas of Oil Palm Cultivation in 2018**		**Changes**		**Note**
	Areas (rais)	**% of the areas in Chumphon**	**Areas (rais)**	**% of the areas in Chumphon**	**Areas (rais)**	**% of the total palm areas**	
Mueang Chumphon	86,205	2.30	109,407	2.91	23,202	0.62	Increase
ThaSae	276,858	7.37	313,718	8.35	36,860	0.98	Increase
Pathio	145,616	3.88	159,694	4.25	14,078	0.37	Increase
Phato	52,225	1.39	63,020	1.68	10,795	0.29	Increase
Sawi	85,699	2.28	129,073	3.44	43,374	1.15	Increase
Langsuan	88,395	2.35	121,275	3.23	32,880	0.88	Increase
Lamae	71,176	1.90	89,500	2.38	18,324	0.49	Increase
ThungTako	37,494	1.00	40,250	1.07	2,756	0.07	Increase
Total	843,668	22.46	1,026,000	27.32	182,332	4.85	Increase

Source: Office of Agricultural Economics (2018b)

4.9 RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon

Based on the collection of information through the review of relevant concepts, theories, and research works, interviews with public and private agencies relevant to oil palm and palm oil production, oil palm growers certified with the RSPO standard, and questionnaire of oil palm growers not certified with the RSPO standard, the information was analyzed and constructed into the RSPO model compliance of oil palm smallholder farmers in Chumphon before submitting it to experts for assessment and improvement, the details as follows:

1) Formation of smallholder farmers into group, with legal registration, and management structure.

2) Support from government agencies, Ministry of Agriculture and Cooperatives, and academic institutions such as formulation of supporting policies and measures, support of operating budget and sources of funding, support of academic documents, research works, and news and information, provision of specialists with expertise as lecturers for trainings to farmers.

3) Private agencies such as oil palm crushing mills provided academic and relevant information support, organized trainings, production factors, personnel with expertise, venues for arranging activities, and purchase of yields with special prices.

4) Farmer group entered the system of RSPO compliance, trainings to provide knowledge on the RSPO standard, and advice to farmers on sustainable oil palm production.

5) Farmers applied knowledge based on the advice, resulting in good management of oil palm plantation towards sustainability. In this process, evaluation was conducted within the group and from external agency, with regular follow-up of the results.

6) After passing the evaluation, the group could send the evaluation result to be certified by the RSPO agency. Once the agency considered that it should pass, the group would be certified with the RSPO standard. The group would enter into sale contract of yields with oil palm crushing mill for special price.

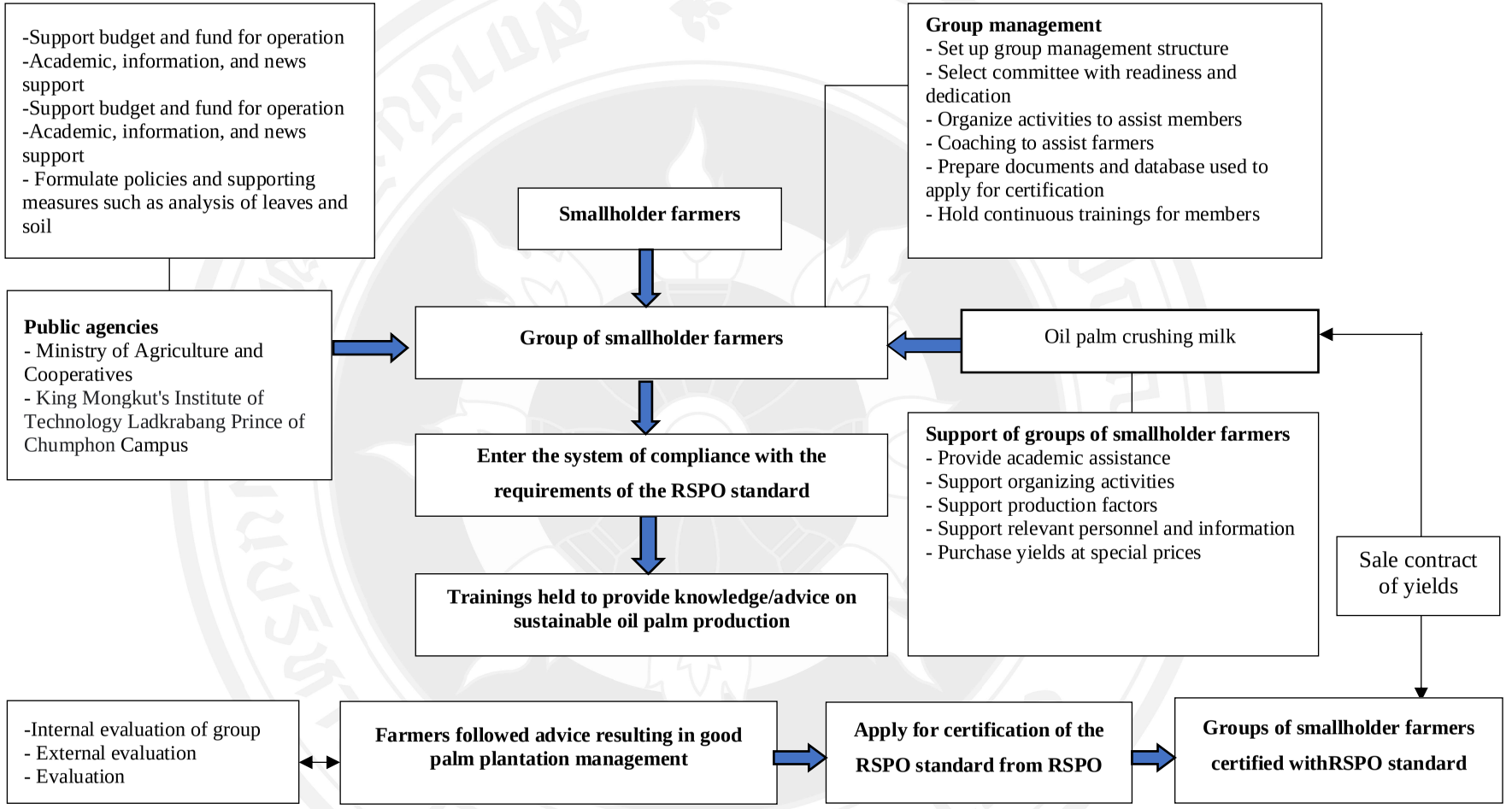

Figure 4.5 RSPO Draft Model Compliance of Oil Palm Smallholder Farmers in Chumphon

4.10 Evaluation Results of the RSPO Draft Model Compliance of Oil Palm Smallholder Farmers in Chumphon

The evaluation of the RSPO draft model compliance of oil palm smallholder farmers in Chumphon was conducted by five experts who made the following comments. The content of the draft model was appropriate and should be arranged in order for easy understanding. The appropriate use of language or words was appropriate with simple language and appropriate to be used as the model and should clearly mention the level of academic institution. The detail of the draft should adapt the connecting line in each line for clarity, and easy understanding and the figures should be clearly ranked for the operation of the model. The appropriateness of the draft model that would be used was appropriate. The general view of the draft was appropriate. The recommendation was that it should be added by the recommendations of the experts.

4.11 Focus Group to Evaluate the RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon

The focus group to evaluate the RSPO model compliance was held on March 18, 2020, at ThaSae Land Settlement Cooperative with ten participants including oil palm growers, officers of ThaSae Land Settlement Cooperative Ltd., and Chief, Environment Department of Oil Palm Crushing Mill of ThaSae Land Settlement Cooperative Ltd. (Shown in Figure 4.6). The participants made comments on the RSPO draft model compliance that it was appropriate and highly useful. However, some process such as was difficult to understand so there should be rectification and explanation for more understanding.

Figure 4.6 Focus Group to Evaluate the RSPO Model Compliance

CHAPTER 5

CONCLUSION, DISCUSSIONS, AND RECOMMENDATIONS

This study aimed to study knowledge, understanding, attitude, motivation, and acceptation of the RSPO compliance of oil palm smallholder farmers in Chumphon, study factors of relationship and impact on the RSPO compliance of oil palm smallholder farmers in Chumphon, and recommend the RSPO model compliance of oil palm smallholder farmers in Chumphon. The conclusion, discussions, and recommendations were as follows:

5.1 Conclusion

The study results of " RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon" were concluded as follows:

5.1.1 Knowledge, understanding, Attitude, Motivation, Acceptation, and Problems in the RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon

5.1.1.1 In terms of knowledge and understanding from the collected information in the questionnaire, it was found that the farmers had knowledge and understanding of the RSPO standard as the standard of sustainable oil palm production with eight requirements. Therefore, information must be prepared on the criteria of RSPO in environmental, social, and legal dimensions for the stakeholders. Palm plantation must be prohibited to use forced labor or human trafficking. The topic that the farmers did not have sufficient knowledge and understanding was the use of chemical pesticides that was not hazardous to health and environment.

In terms of knowledge and understanding, based on the information collection from the interviews with the farmers not certified with the RSPO standard, it was found that each farmer had knowledge and understanding of the RSPO standard differently, depending on whether the farmer wanted to be certified with the RSPO standard or not. If so, the farmer would be more interested to learn.

5.1.1.2 In terms of the farmers' attitude towards the RSPO standard, the farmers much agreed with the attitude that compliance with the RSPO standard required knowledge and understanding of correct practice, and groups had to be formed in order to be certified with the RSPO standard. The attitude that the farmers little agreed was that compliance with the RSPO standard caused higher production costs.

5.1.1.3 The motivation that drove the farmers to comply with the RSPO standard was that the RSPO compliance increased oil palm yields with better quality. The RSPO compliance also increased networks, benefiting oil palm plantation. The low motivation was that the RSPO compliance benefited the farmers' employment of labor.

5.1.1.4 In terms of the farmers' acceptation of the RSPO standard, it was revealed that the farmers accepted that the RSPO compliance ensured sustainable oil palm plantation and adopted the RSPO compliance.

5.1.1.5 According to the analysis of the questionnaire in chapter 4, it was found that the farmers had knowledge and understanding of the RSPO standard at high level. But according to the interviews with the relevant agencies and the farmers, it was found that the problem of RSPO compliance was that the farmers still had low or incorrect knowledge and understanding of the RSPO standard, affecting the RSPO compliance. At the same time, the farmers could not comply with many requirements. Most farmers were advanced in age so it was difficult for them to understand the RSPO compliance.

5.1.2 Factors that Had Relationship and Impacted the RSPO Compliance of Oil Palm Smallholder Farmers in Chumphon

5.1.2.1 Factors from Multiple Regression Analysis

The factors impacting the RSPO compliance of oil palm smallholder farmers in Chumphon included knowledge and understanding of the RSPO standard, motivation of the RSPO compliance, and adoption of the RSPO standard. The three factors influenced the changes in the RSPO compliance of oil palm smallholder farmers in Chumphon with the statistical significance at the level of 0.05 and influenced the RSPO compliance of oil palm smallholder farmers in Chumphon in order from high to low as follows: the motivation of the RSPO compliance had the highest influence, followed by the adoption of the RSPO standard, and the lowest influence was knowledge and understanding of the RSPO influence.

5.1.2.2 Factors from Interviews

According to the interviews with the six public and private agencies relevant to oil palm and palm oil production, the six agencies had not formulated the policy and action plan for smallholder farmers to be certified with the RSPO standard. Instead, there were joint projects between the public and private agencies to support the farmers' certification of the RSPO standard through budget, trainings on knowledge and understanding, documents, information and news, and lecturers with expertise. Other factors influencing the RSPO compliance of oil palm smallholder farmers in Chumphon included the following:

1) Knowledge and understanding of sustainable oil palm production based on the RSPO standard enabled the farmers to reduce production costs and increase yields, as well as formation of farmer groups with consciousness of professional farmers in sustainable oil palm production.

2) Farmers could sell their yields at higher prices as motivation for the farmers to comply with the RSPO standard.

3) Commitment and attention of the farmers in sustainable oil palm production in all production processes from ground leveling, selection of species, cultivation, maintenance, and harvest of yields.

4) Formation of groups and networks of the farmers for exchange of information and news on oil palm production leading to sustainable and systematic practice and management of oil palm plantation.

5.1.3 Social Return on Investment (SROI) of Oil Palm Production Certified and Not Certified with the RSPO Standard

The Social Return on Investment (SROI) of oil palm production certified with the RSPO standard accounted for 2.42 meaning for every 1 baht of investment, the SROI would value 2.42 baht. Economically, the farmers would earn income from the sales of yields. Socially, employment was generated in communities, with residents having occupation and increased income. Environmentally, there was reduced pollution in the soil and waste due to the reduced use of chemicals in herbicides, and the amount of hazardous waste was reduced as well.

Th evaluation of the Social Return on Investment of oil palm production not certified with the RSPO standard accounted for 1.59 meaning for every 1 baht of investment, the SROI would value 1.59 baht. Economically, the farmers would earn income by sales of yield. Socially, employment was generated in the communities. People in the communities were employed and earned more income. Environmentally, there was reduced pollution in the soil and waste due to the reduced use of chemicals in herbicides, and the amount of hazardous waste was reduced as well.

The evaluation of the SROI revealed that for the oil palm production certified with the RSPO standard, the SROI was higher than the oil palm production not certified with the RSPO standard at 0.83.

5.1.4 Changes of Land Use of Oil Palm in Chumphon

In terms of the changes of land use of oil palm in Chumphon, in 2014 the areas for oil palm cultivation constituted 843,668 rais and increased to1,026,000 rais in 2018 or up 27.32% of the areas of oil palm cultivation in 2018. Most of the areas of oil palm cultivation in 2018 included ThaSae, Pathio, and Sawi Districts or 8.35%, 4.25%, and 3.44% respectively of the total areas of Chumphon. The districts with the most areas of oil palm cultivation included Sawi, ThaSae, and Langsuan or the increase of 1.15%, 0.98%, and 0.88% respectively of the total areas of Chumphon.

5.1.5 RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon

The details of the RSPO model compliance of oil palm smallholder farmers in Chumphon were as follows:

5.1.5.1 Use of the principles of participation for clear promotion and support from public agencies, higher education institutions, oil palm crushing mills, land settlement cooperatives, and all local farmers to ensure that the farmers complied with the RSPO standard with the following support:

Government agencies and academic institutions

1) Support budget and funding for relevant research works, academic documents, news and information, specialists with expertise as lecturers to provide trainings for farmers.

2) Trainings held to transfer knowledge to farmers with the support from Chumphon Land Development Station, Chumphon Provincial Agriculture and Cooperatives Office, District Agricultural Extension Office.

3) Formulate policies and supporting measures such as analysis of leaves and soil by Department of Agriculture and Department of Agricultural Extension.

Oil palm crushing mills such as Oil Palm Crushing Mill of ThaSae Land Settlement Cooperative, Vichitbhan Palm Oil Public Company Limited, Chumphon Palm Oil Industry Public Company Limited

1) Academic assistance
2) Trainings and venues for activities
3) Production factors
4) Personnel and relevant information from other provinces such as Krabi, Surat Thani
5) Purchase of yields at special prices

Land Settlement Cooperatives such as ThaSae Land Settlement Cooperative, Pathio Land Settlement Cooperative, Langsuan Land Settlement Cooperative

1) Formation of farmer groups
2) Arrangement of activities

3) Personnel and operating employees

Local farmers

1) Farmers' real wish to sustainably produce oil palm and to be certified with the RSPO standard

2 Engage farmers in making recommendations of guideline, planning, and solving problems that might occur in RSPO compliance

5.1.5.2 Use the motivation principle to ensure that farmers complied with the requirements of RSPO standard. Most local farmers had some knowledge and understanding of sustainable oil palm production due to long years of palm cultivation and trainings received. However, they did not comply with the requirements of the RSPO standard for certification. There was neither leader nor motivation for the farmers' concrete RSPO compliance. To ensure certification of the RSPO standard, motivation should be encouraged as follows:

1) Set up group leader with leadership, able to inspire group members to comply with the requirements of the RSPO standard and to be certified with the RSPO standard.

2 Support and give power of decision-making to group members for RSPO compliance to motivate and stimulate members' enthusiasm.

3) Provide advice and serve as consultant as necessary based on valid reason.

4) Moral encouragement through care, ready assistance, and real support.

5.1.5.3 Group management based on clearly defined management structure with chairman, vice chairman, committee, secretary, and treasurer with coaching team to provide assistance and advice to the farmers, as well as prepare documents and database used to apply for RSPO certification with the following principles:

1) Management structure must have team with diverse abilities, and different expertise and perspectives to combine various thoughts into one, that is, to promote farmers' RSPO compliance such as Salui Oil Palm Farmer Group, Khao Chairat Oil Palm Farmer Group.

2) Establish committee that must be in accordance with and understanding of the context of local farmers.

5.1.5.4 Use the principles of networking between land settlement cooperatives of various districts for exchange of learning and common activities.

5.1.5.5 Various forms of trainings for farmers such as academic trainings on RSPO standard including management requirement, practical guideline, preparation for certification, good plantation management, workshop, study tour of model farmers already certified with RSPO standard.

The processes to support farmers' RSPO compliance and certification were as follows:

1) Formation of legally registered groups of smallholder farmers with management structure such as Ban Suan Sup Oil Palm Community Enterprise, Ban Nern Thong Oil Palm Community Enterprise, Baan Para Oil Palm Community Enterprise.

2) Support from relevant public and private agencies, Ministry of Agriculture and Cooperatives such as Department of Agricultural Extension, Department of Agriculture, Maejo University at Chumphon, King Mongkut's Institute of Technology Ladkrabang Prince of Chumphon Campus, and Oil Palm Crushing Mill of ThaSae Land Settlement Cooperative.

3) Groups entering the system of RSPO compliance.

4) Trainings to provide knowledge to farmers.

5) Farmers' implementation, leading to sustainable and good oil palm plantation management.

6) Groups' internal and external evaluation and regular monitoring of the results.

7) After passing the evaluation, the groups must submit the results of the evaluation to apply for certification from the RSPO agencies. After passing the consideration and the agencies' approval, the groups would be certified with the RSPO standard.

8) The groups would sign sale contract with oil palm crushing mills for yields with special prices.

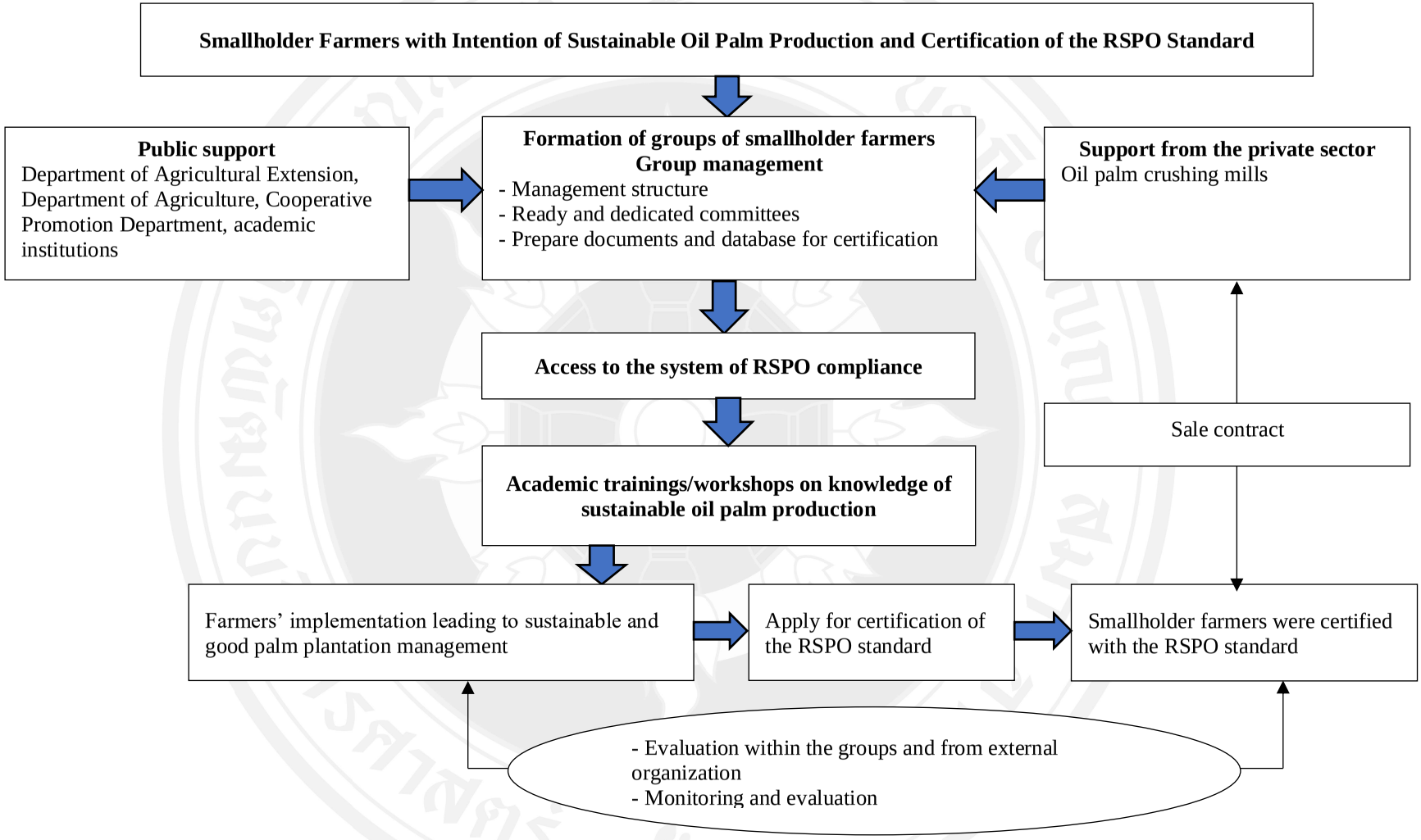

Figure 5.1 Processes of the RSPO Compliance for Sustainable Oil Palm Production and Certification of the RSPO Standard

5.2 Discussions

5.2.1 Farmers' Knowledge and Understanding of the RSPO Standard

Oil palm is an economic crop that generates income for farmers. However, farmers' oil palm production still faces a lot of problems notably lack of knowledge and understanding of good management from selection of palm species, use of fertilizer, water management, harvest of quality yields, high production costs, to low rate of oil percentage. The problems triggered the promotion of oil palm growers to comply with the standard of RSPO (Roundtable for Sustainable Palm Oil). The promotion required many procedures from formation of groups, trainings on knowledge of palm plantation management such as choice of areas, preparation of areas, care, fertilizer, water, leaf pruning, harvest, pile of palm leaves, choice to purchase oil palm species, recording, environmental management, occupational health, accounting, as well as evaluation. This study collected quantitative and qualitative information. The quantitative information was collected from questionnaire with farmers and revealed that farmers had knowledge and understanding of the RSPO standard at high level as well as basic knowledge of oil palm production due to their long years of oil palm cultivation and attendance of various trainings on oil palm production so they were acquainted with the standard of sustainable oil palm production with eight requirements, and knowledge and understanding of requirements and prohibitions such as compliance with laws, rules, and regulations, evidence of land use rights, land use for oil palm cultivation must not disturb other land users, practice to reduce soil erosion and soil degradation, use of mixed techniques in pest management, use of chemical pesticides not hazardous to health and environment, oil palm cultivation prohibited in conservation forest area, prohibited to burn waste materials in preparing areas for new planting or reforestation, prohibition of sexual harassment and violence against women, prohibition of forced labor or human trafficking. The trainings would contribute to farmers' enhanced knowledge and understanding. This was in accordance with Kanjana Thongna (2016) who stated that the transfer of knowledge and understanding in all dimensions of oil palm production technology to farmers could increase production potential and reduce risks of farmers from oil palm plantation in upper northeast. Many farmers did not

know or understand the methods of area preparation, selection of oil palm species, as well as oil palm plantation management in terms of soil and fertilizer management, use of additional water in the dry season, and correct harvesting. The mentioned factors all impacted palm trees, yields, and quality of yields. It was in line with Sutonya Thongrak et al. (2018) who stated that after farmers were provided with correct knowledge of sustainable oil palm production, implementation of knowledge especially palm plantation management, information recording, chemical fertilizer management, use of fertilizers with the main macronutrients instead of mixed fertilizers, reduced and cancelled use of chemicals which increased the productivity of oil palm production, as well as positive impact on environment. The collection of qualitative information through interviews with the farmers revealed that some farmers still lacked knowledge and understanding of sustainable oil palm production based on the RSPO standard as they did not join the group to apply for RSPO membership so they did not attend trainings. It was in accordance with Innocenti and Oosterveer (2020) who stated that smallholder farmers in Thailand still lacked knowledge of sustainable oil palm cultivation contrary to large farmers who were ready in all dimensions to apply for certification of the RSPO standard. RSPO would serve as the link between large farmers, entrepreneurs, and smallholder farmers for transfer of knowledge and experience among themselves.

5.2.2 Farmers' Attitude and Motivation Towards the RSPO Compliance

The attitude of the farmers towards the RSPO standard was at high level. Farmers thought that the RSPO required knowledge and understanding of correct principles, as well as formation of groups to exchange learning and to certify for the RSPO standard. It was in line with Sutonya Thongrak et al. (2018) who stated that farmers were satisfied with group membership because the established group would serve as center of exchange of learning, and facilitate farmers' solutions to problems. Importantly, farmers would learn and realize the power of formation of group. The overall motivation of the RSPO compliance of the farmers was at the highest level and served as variable that influenced the RSPO compliance of the farmers at the highest level. The motivation included more quality and quantity of oil palm yields, positively impacting oil palm plantation, increasing oil palm prices, thus increasing

income, and establishing network. This was in accordance with Theera Eksomtramage (2011) who stated that network factories supported groups and members to solve problems and develop groups in response to the needs of farmers, including accommodations, input factors, and yield prices. The support constituted important factor to motivate farmers to join activities and important drive in operation. With strong motivation to work, enthusiasm, and commitment to work for success would ensue. The motivation increased efforts to work to acquire the motivated object. This was in line with Ketsarin Ngarmlert (2016) who argued that motivation that affected efficiency at work was the success at work and career advancement. The motivation for people to love to work in an organization required direct motivation of work. For example, assignment to operate a project to increase the organization's efficiency by measuring the success of activities that made people proud of the success, as well as promotion based on fairness. This was in line with Seksun Orakul (2014) who stated that the motivation to work that affected efficient work of employees at Metalcom Co., Ltd. was internal motivation factors which included success at work, praise and respect, authority to work and opportunity for career advancement which affected efficiency in the performance of personnel's task.

5.2.3 Changes of Land Use for Oil Palm

In terms of changes of land use for oil palm, the areas for cultivation increased from 2014 at 27.32% of the total areas of Chumphon. In 2018, the increase of the land use for oil palm cultivation responded to the demand of the farmers' oil palm cultivation. Chumphon was the area determined for the land use of oil palm due to favorable physical terrain, with sources to purchase yields especially oil palm bunch collection centers and oil palm crushing mills situated everywhere and within short distance from the cultivated areas. Moreover, the farmers were skillful in cultivation and management of oil palm plantation due to long years, the government's policy to promote oil palm cultivation, and oil palm as economic crop of Chumphon, especially in ThaSae District. As for the areas not appropriate to oil palm cultivation due to elevated grounds, conservation areas, and sandy soil, it was found that there was not much expansion of the areas for oil palm cultivation, in line with the appropriate areas. This accorded with the study of Panupong Buntaotook (2014) who argued that

the changes of land use between 2002-2013 revealed that the cultivated areas had changes in more oil palm cultivation. The areas changed mostly from the cultivation of sugarcane, followed by rubber, and empty areas, respectively. The increase of the areas for oil palm cultivation was the result mainly of economic factor because oil palm growers placed importance on the demand of more yields. It was in line with Piyawan Nuengmatcha et al. (2017) who argued that in the area of swamp forest in Karaked Subdistrict, Chian Yai District, Nakhon Si Thammarat, farmers started to grow oil palm since 1998 but there was not much expansion due to the problems of purchase sources and transport. But between 2005-2011, there was rapid expansion of areas for cultivation due to the government's policy to promote oil palm cultivation and higher prices of oil palm during the period. Moreover, the swamp forest was not appropriate to practice other agricultural activities, leading to a lot of deserted paddy fields and abandoned areas. So, farmers turned to more expansion of the areas of oil palm cultivation. The expansion would be higher than other areas of the subdistrict in 2022 which was more than the areas of all types of agriculture in Karaked Subdistrict.

5.2.4 Promote the RSPO Model Compliance of Oil Palm Smallholder Farmers in Chumphon

The acquired promotion model was appropriate to the farmers in Chumphon through the use of various principles. For example, the clear principles of participation in promotion and support from organizations gave moral encouragement to the farmers in the RSPO compliance; group management with clear management structure used the principle of networking for common practice, exchange learning and experience, and trainings in various forms including academic trainings, workshops, and study tours. It was in accordance with Prasit Chumsri (2012) who argued that the construction of the model of personnel development through practical learning to ensure quality within academic institutions of Surat Thani Primary Education *Service* Area Office 2 used various principles such as participation by relevant agencies to promote and support joint activities to develop personnel, networking at work by related persons to work together in group or teamwork, and support activities of operation. It was in accordance with Kittiwan Manopak (2017) who stated that the model of farmer promotion appropriate to the situations of unrest

in the south basically used the system of trainings and visits to learn of problems of local farmers, promote more farmers to participate in recommendations, planning, solutions to problems in operation, and promote agriculture by focusing on participation of farmers to have more role and importance in working with officers.

5.3 Recommendations

5.3.1 Policy Recommendations

1) Government agencies such as Chumphon Provincial Agriculture and Cooperatives Office, and Chumphon Land Development Station should assume integrated roles to drive the area-based sustainable oil palm production by formulating continuous, long term, provincial development plans which will enable Thailand to be able to produce sustainable oil palm with quality.

2) Support all oil palm growers in Chumphon to form groups for sustainable oil palm production and to be certified with the RSPO standard in order to obtain quality oil palm yields for export.

5.3.2 Practical Recommendations

1) The process to apply for certification of the RSPO standard requires the evaluation with entailed expenses of international agencies. The government should support domestic agencies to be able to evaluate the certification in order to reduce the costs of evaluation.

2) The RSPO model compliance of oil palm smallholder farmers in Chumphon may consist of some principles that need to be applied to fit the situation or period in order to efficiently promote agriculture.

3) The prototype of sustainable oil palm production should be constructed to serve as good example for farmers to learn and implement.

5.3.3 Recommendations for Future Research

1) Study should be conducted on other variables in each dimension with more and specific details which may be the factors that influence farmers' RSPO compliance.

2) This study was conducted on smallholder farmers in Chumphon. Next study should be conducted in other provinces as well.

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APPENDICES

Appendix A

The Questionnaire for Oil Palm Farmers

The Questionnaire for Oil Palm Farmers

Part 1 General Information

1. Gender

☐ male ☐ female

2. Age (years)

☐ 20-30 ☐ 31-40

☐ 41-50 ☐ 51-60

☐ 61-70 ☐ Over 70

3. You have a total area of oil palm cultivation ..... rai split into number ..... convert (if any)

4. Age of oil palm.....years /Fresh bunch yield..... (tons/round)

5. Conditions of areas prior to palm cultivation

☐ Forest ☐ Waste land

☐ Pasture ☐ Paddy fields

☐ Other (specify).....

6. Documents of right to hold your land

☐ Title deed/Nor Sor 4 ☐ Title deed in conservation forest and degraded forest

☐ Certification utilization ☐ Allotment of land for living

☐ A.L.R.O 4-01 ☐ Permit to utilize land in self-help land settlement

☐ No documents ☐ Other (specify)

7. Use of fertilizers

☐ Chemical fertilizers ☐ Organic fertilizer

☐ Chemical fertilizers with organic fertilizers

8. Purchasing sources of yields

☐ Oil palm bunch collection centers ☐ Oil palm crushing mills

☐ Land settlement cooperatives

Part 2. Factors to Promote the RSPO Compliance

1. Reception of news and information

1) What channels do you get information about RSPO? (You can answer more than 1 item)

☐ Radio ☐ Television ☐ Internet

☐ Relevant officers ☐ Sign boards ☐ Brochures

☐ Letters ☐ Newspapers ☐ Friends/relatives

☐ RSPO handbook ☐ Other (specify)

2) What information have you received about RSPO? (You can answer more than 1 item)

☐ Preparation of information

☐ Benefits of certification

☐ Conduct for accreditation

☐ Methods of plantation management for accreditation

☐ Knowledge on the RSPO

☐ Preparation of evidences and documents

☐ Other (specify)

3) Which agency do you think should provide information about the RSPO that will provide you with the appropriate information? (You can answer more than 1 item)

☐ District Agricultural Extension Office ☐ Provincial Agricultural Extension Office

☐ Department of Agriculture ☐ Department of Agricultural Extension

☐ Land Settlement Cooperatives ☐Academic institutions

☐ Oil palm crushing mills ☐ Office of Agricultural Economics

☐ Other (specify)

4) Have you received enough information about the RSPO standard?

☐ Sufficient ☐ Insufficient

2. Knowledge and understanding of the RSPO standard

Explanation: Please put √ in the box that best matches your opinion, only one answer.

Knowledge and Understanding of the RSPO Standard	**Opinions**		
	Yes	**No**	**Not Sure**
1. RSPO was the standard of sustainable oil palm production with eight requirements.			
2. Obligation to prepare information relevant to the RSPO criteria on environmental, social, and legal issues to relevant stakeholders.			
3. Compliance with the RSPO standard contributed to reduction of soil erosion and soil degradation.			
4. Compliance with laws and regulations at local and national levels, and various requirements.			
5. Evidence of rights of land use with no protest of rights by local communities showing rights of land use.			
6. Land use for oil palm cultivation must not cause problems to other land users.			
7. Obligation to implement the methods to reduce soil erosion and soil degradation.			
8. Use of techniques of mixed pest management			
9. Use of chemical pesticides that was not hazardous to health and environment.			
10. Compliance with the RSPO standard caused body to be less exposed to toxic substances as the use of chemical pesticides was not hazardous to health.			
11. Oil palm growers must attend training courses on the RSPO.			
12. Prohibited to practice new oil palm planting in			

Knowledge and Understanding of the RSPO Standard	**Opinions**		
	Yes	**No**	**Not Sure**
forest conservation area.			
13. In preparing the areas for new oil palm planting or reforestation, it was prohibited to burn waste.			
14. In your palm plantation, there was no sexual harassment and no violence against women.			
15. In your palm plantation, there was no forced labor or human trafficking.			

3. Attitude, motivation, and acceptation towards the RSPO standard

Explanation: Please put √ in the box that best matches your opinion, only one answer.

Topics	**Levels**				
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Attitude towards the RSPO standard					
1. You thought that compliance with the RSPO standard required knowledge and understanding of correct practice.					
2. You thought that the certification of the RSPO standard would increase export of oil palm yields.					
3. You thought that compliance with the RSPO standard was complicated with many processes (negative question).					
4. You thought that oil palm					

Topics	Levels				
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
growers were committed to ethical business operation.					
5. Compliance with the RSPO standard increased production costs (negative question).					
6. You thought that the areas of your oil palm plantation were appropriate to comply with the RSPO standard.					
7. You would be treated fairly and transparently from collectors of fresh fruit bunch (oil palm bunch collection centers) and oil palm crushing mills if you were certified with the RSPO standard.					
8.You must form groups to organize activities for exchange of learning among yourselves.					
9. You must form groups to be certified with the RSPO standard.					
Motivation in the RSPO standard					
10. You thought that compliance with the RSPO standard benefited your employment of labor force.					
11.You thought that compliance					

Topics	Levels				
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
with the RSPO standard increased the oil palm prices and your income.					
12. Compliance with the RSPO standard increased oil palm yields with better quality.					
13. Compliance with the RSPO standard increased networks and benefited oil palm plantation.					
Acceptation of the RSPO standard					
14. You accepted to comply with the RSPO standard.					
15. You accepted that compliance with the RSPO standard ensures sustainable oil palm cultivation.					

Part 3. Compliance with the requirements of the RSPO standard

Explanation: Please put √ in the box that best matches your opinion, only one answer.

Requirements of the RSPO Standard	Levels of Practice				
	Not Practiced	**Slightly Practiced**	**Moderate Practiced**	**Preferably Practiced**	**Fully Practiced**
1. Farmers must disclose documents such as land rights documents, health and safety plans.					

Requirements of the RSPO Standard	Levels of Practice				
	Not Practiced	Slightly Practiced	Moderate Practiced	Preferably Practiced	Fully Practiced
2. Compliance with laws and regulations at local, national, and international levels.					
3. Palm plantation management plan such as planning for high quality use, training plan to provide knowledge to increase yields on a continuous basis.					
4. Follow the best methods of oil palm care, appropriate operational processes, and continuous monitoring of operation.					
5. Environmental, natural resource, and biodiversity conservation, identify environmental impact from palm plantation.					
6. Responsibility towards staff and communities affected					

Requirements of the RSPO Standard	Levels of Practice				
	Not Practiced	Slightly Practiced	Moderate Practiced	Preferably Practiced	Fully Practiced
by palm cultivation, solution to problems of complaints, fair compensation, legal employment.					
7. Oil palm cultivation in new areas or expansion of cultivated areas must not be practiced in forest conservation area.					
8. Continuous improvement and development of oil palm plantation, regular monitoring and review of activities.					

4. Problems and obstacles in practice according to the RSPO standard

.....

.....

.....

5. Additional suggestions

.....

.....

.....

Thank You!

Appendix B

The Opened-End Questionnaire for Related Agencies

The Opened-End Questionnaire for Related Agencies

Interviewee.....**position** .....

Organization ....

1. Your agency has policies and measures to encourage oil palm growers. Is it RSPO certified or not?

.....

.....

2. Do you think oil palm growers should be RSPO certified?

.....

.....

3. What factors do you think will affect the promotion of oil palm farmers?

.....

.....

4. What approaches or forms do you think will encourage oil palm growers?

.....

.....

5. Problems and obstacles in promoting oil palm growers meet the RSPO requirements to get RSPO certification and what are the ways to fix it?

.....

.....

6. Recommendations for implementing measures for oil palm growers Comply with RSPO requirements for continued RSPO certification.

.....

.....

Thank You!

Appendix C

The Opened-End Questionnaire for Farmers Certified to RSPO Standards

The Opened-End Questionnaire for farmers certified to RSPO standards

Interviewee.....

Address.....

Group

Name.....

1. History of palm oil plantation before RSPO certification

.....

.....

2. Reasons for interest and decision to plant an oil palm plantation

.....

.....

3. The beginning of the farmer's request for RSPO certification

.....

.....

4. Factors that motivate you to participate in the RSPO accreditation program

.....

.....

5. What are the sponsoring agencies for RSPO certification?

.....

.....

6. What actions must farmers have to be able to pass RSPO certification?

.....

.....

7. The results obtained from participating in the RSPO accreditation program

.....

.....

8. Problems and obstacles arising from the request for RSPO certification

.....

.....

9. Suggestions for RSPO Certification

.....

.....

Thank You!

BIOGRAPHY

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