



FINAL REPORT

Oil Palm Development in Thailand: Trends and Progress of Sustainability Efforts in Palm Oil Production and Procurement

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Executive Summary

The research on “*Oil Palm Development in Thailand: Trends and Progress of Sustainability Efforts in Palm Oil Production and Procurement*” has five objectives: 1) to understand palm oil production and consumption trends and to review the environmental, economic, and social impacts in different parts of Thailand; 2) to assess the benefits and challenges (including costs) faced by Thai smallholders in relation to RSPO certification – with a particular focus on the implementation of the RSPO Independent Smallholder (ISH) Standard; 3) to determine the impact of RSPO on the livelihoods of smallholders, comparing RSPO certified and non-RSPO certified farm households; 4) to assess policy implications on productivity growth, forest protection, mosaic landscapes, land rights and sustainability certification in relation to the palm oil impact on livelihoods and the environment; and 5) to provide recommendations on reducing the environmental, economic and social impacts of oil palm plantations in Thailand, in particular on the elements for improvement in the ISH Standard.

The study areas are in five provinces of southern region, including Surat Thani, Krabi, Chumphon, Trang, and Nakhon Si Thammarat. The primary data were collected through personal interviews, in-depth interviews, focus group meetings, and participation in RSPO meetings and seminars. A personal interview was directed to 158 certified and 144 non-certified smallholders. Seven focus group meetings with the certified group manager and the committee were undertaken. In-depth interviews were also targeted at the key stakeholders in the supply chain, namely the partner mills of the certified groups, the auditor, the President of the Thailand Sustainable Palm Oil Alliance (TSPOA), representatives of the GIZ project, and the Department of Agricultural Extension (DOAE) officials at a provincial and national level. The data were analyzed qualitatively, descriptively, and quantitatively. The quantitative analysis was conducted using a t-test.

Thailand ranks third in world palm oil production, accounting for 4.30% of global production in 2021. The country's oil palm production involves 0.4 million farm households and 6.3 million rai of planted area. 85.5% and 9.0% of the planted areas are in the southern and central regions, respectively. In 2021, Thailand obtained roughly 16.8 million tons of FFB, or 2.768 tons per rai (17.3 tons/ha) on average. The production is mainly used for domestic consumption, with 75% allocated for the domestic market, 52% for the food industry, and 48% for biofuel.

The oil palm and palm oil industries in Thailand have led to economic growth, employment, and returns for stakeholders, particularly in the southern region. Over 0.4 million smallholders earn cash income from their plantations, while input businesses like chemical fertilizer and planting materials also experience growth. Around 2,200 ramps serve as middlemen between smallholders and mills. Oil palm processing, midstream, and downstream industries contribute to economic development and employment, with large companies creating value-added products. Moreover, palm oil-based biofuels can reduce dependence on fossil fuel imports.

Costs, benefits, and challenges of RSPO certification for Thai smallholders

Regarding the costs, benefits, and challenges faced by Thai smallholders in relation to RSPO certification, none of the certified RSPO groups were initiated by the ISH. Most certified groups are connected to crude palm oil (CPO) mills and manage with full mill and third-party support.

Upfront costs for a group with a starting membership of 100 and 60 smallholders were about 1.280 and 1.204 million THB, respectively. Certification procedure expenses accounted for 23.8% and 25.3% of these costs, respectively. The main audit costs for 60–100 members are around 295,000 THB. Recurrent costs for the group sizes of 100, 150, 200, and 250 members were 0.973, 1.120, 1.410, and 1.604 million THB per year, with certification costs accounting for about a quarter of the total annual cost.

Once the smallholders adopted and enhanced their oil palm sustainable practices (OPSPs), the benefits of ISH's RSPO Standard certification in Thailand became apparent. The advantages include increased productivity (yield/rai), higher-quality FFB, lower cost per unit, premium FFB prices, and adoption of environmental and social practices.

RSPO certification generates net economic benefits for certified smallholders, even with smallholder groups as small as 60 members. As the group grows, benefits increase, reaching up to 10.416 million THB per year with 260 members. Adopting OPSPs also generates social and environmental benefits, making RSPO certification an efficient investment for ISH.

The requirements of the RSPO Standard continue to pose significant difficulties for smallholders. These include market factors, governmental policies, public awareness campaigns, the RSPO standard itself, the RSPO administration, smallholders, staff members, and experts to support technical services, as well as the RSPO standard certification procedure.

Impact of RSPO certification on socio-economic and environmental practices of Thai smallholders

Regarding the demographic profile of smallholders, 90% of them are older than 40, with an average age of 55.62. At most, 75% of them completed secondary school. Of them, men make up 55.6%. On their farms, the majority of smallholders continue to rely on hired laborers, and this practice is becoming more common.

85.1% of smallholders grow oil palms as their primary income source, with 83.1% diversifying income sources. Certified smallholders have more experience and larger land holdings and oil palm production areas than non-certified smallholders, at 20.1 and 16.1 years, 42.8 and 30.7 rai, and 31.6 and 21.5 rai on average, respectively. Prior to oil palm, land usage was agriculture, namely rubber and rice.

Certified smallholders adopt OPSPs more than non-certified ones, and well-established-certified smallholders adopt OPSPs more than newly certified ones. 74.1% of them participate in RSPO group activities and are all satisfied with their groups. One-third of non-certified smallholders perceive the RSPO standard as having spillover effects on good agricultural practices (GAPs).

In terms of *the social benefits of RSPO certification* for ISH, it was found that RSPO certification improves knowledge in oil palm production, fosters better relationships among

smallholders, reduces health risks, improves safety, and increases awareness of sustainability among non-certified smallholders.

The economic impacts on the smallholders are evident. Certified smallholders benefit from RSPO certification, which offers better access to inputs, services, market access, and premium prices for fresh fruit bunches (FFB). The average FFB yield of certified smallholders is higher than that of non-certified smallholders, with a net return of 20,776 and 13,773 THB per rai, respectively. The net oil palm income of certified smallholders is higher than that of non-certified smallholders, with 637,826 and 279,943 THB in 2022, respectively. When comparing the economic variables, namely FFB yield, prices, and net return, between the well-established and newly certified smallholders, they are all higher for the well-established certified smallholders.

Certified smallholders in Thailand adopt environmentally friendly practices, with a higher percentage adopting these practices compared to non-certified ones. The negative environmental impacts of oil palm production should not cause concern, as most land was agricultural before oil palm. Other practices include reducing chemical use, conserving soil, water, and natural resources, adopting OHS, controlling weeds, and applying integrated pest management (IPM). However, addressing these issues is crucial for sustainable growth and welfare.

Policy implications related to oil palm industry and sustainability in Thailand

Thailand's Oil Palm Board (TOPB), established in 2008, develops plans and policies for palm oil industrial management. Three national development plans have been implemented, with progress towards targets. The expansion of new planting areas has expanded into agricultural land, but the target yield of 3.5 tons per rai per year has not been achieved.

Oil palm plantations were not encroaching on forests, but land rights issues were a concern. Some Por Bor Tor 5 (8.6%) were not eligible for the RSPO Standard. The government is addressing land tenure challenges and focusing on production standards and sustainability. The RSPO standard is gradually being adopted, with government agencies involving farmers through farmer development projects.

Based on the above results, the research team proposes key recommendations for moving towards the RSPO certification of ISH as follows:

1. Recommendations regarding the model for the RSPO certification of ISH

The Agri-PPP model for ISH in Thailand involves smallholder groups forming alliances with mills and downstream industries, focusing on Public-Private Partnerships for Agribusiness Development. This approach has potential for sustainable oil palm development, including smallholders, and a win-win situation. The public is expected to play a larger role in achieving RSPO certification in the oil palm and palm oil sectors (*Figure 1*).

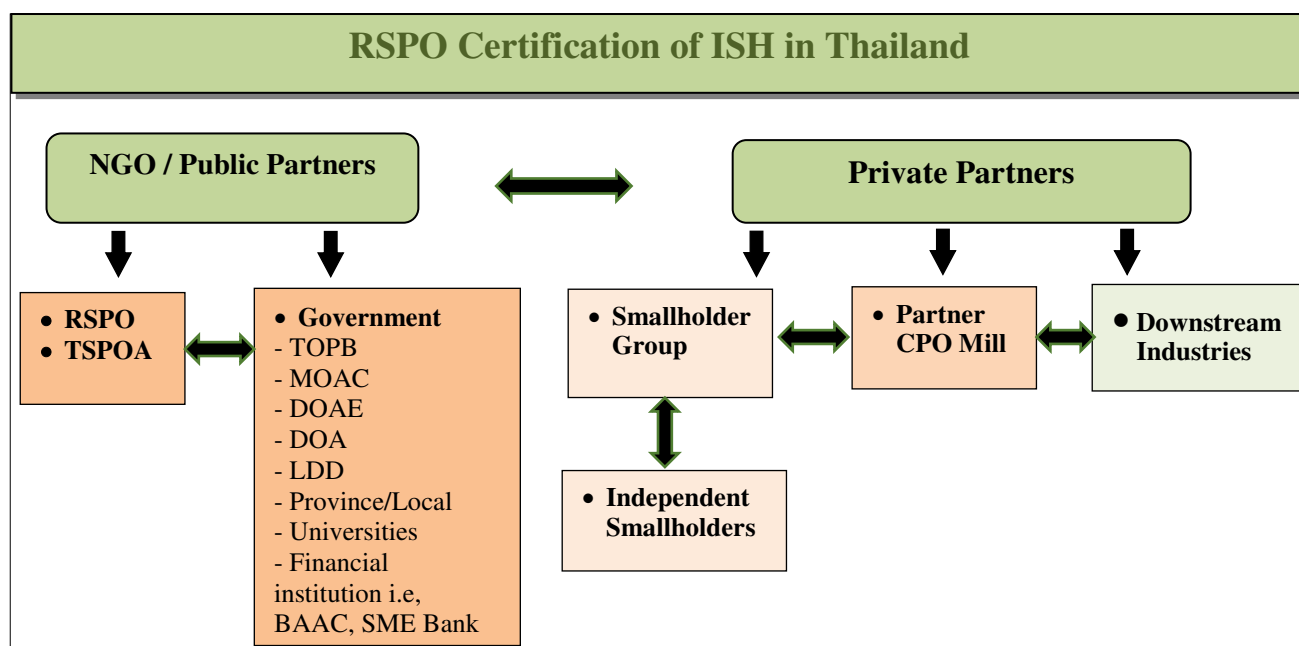


Figure 1: Model for the RSPO certification of ISH in Thailand

2. Recommendations to RSPO

1) RSPO should increase staff presence in Thailand, particularly locally, to better facilitate smallholders' understanding of the standard and certification process. This should include Q&A sessions on the standard and certification.

2) RSPO should review its communication systems between RSPO and certified groups concerning the standard and certification process.

3) RSPO should lead initiatives to raise public awareness about the RSPO standard and certification. This can be achieved through various channels, such as the Thailand Sustainable Palm Oil Alliance (TSPOA), government officials at all levels (like the DOAE), and others in the supply chain. Information on RSPO, including benefits and costs, should be communicated appropriately through a combination of online and offline channels.

4) Regarding the internal audit, where smallholder groups are required to conduct audits for 100% of members, RSPO should review this requirement and consider a staggered approach based on the group's development and CSPO prices.

5) RSPO, especially its representatives in Thailand, should communicate more effectively with smallholder groups regarding the details of criteria and indicators that often cause confusion. Major issues appear to pertain to environmental aspects such as criteria 4.1–4.2 and 4.6–4.7.

6) RSPO should strive to streamline the auditing process to reduce the time spent, such as completing audits within three months and approvals within two weeks. This requires collaboration between auditors and RSPO groups. Additionally, RSPO should aim to expedite processes like LUCA, add new group members, and expand oil palm production areas.

7) RSPO should develop or modify the application for the HCV assessment to make it more stable and user-friendly for smallholders. The supervision process should also be easily accessible.

8) RSPO should undertake additional efforts to enhance the capacity of Thai auditors, allowing RSPO groups to secure services promptly and affordably. The RSPO may take the initiative in estimating certification demand, training new auditors with a focus on ISH standards for the Thai environment, and involving mill personnel and group managers. In the process of increasing capacity, RSPO could consider subcontracting auditors as an alternative, which may foster competition and help determine acceptable audit fees.

9) RSPO should actively engage in strengthening group managers by enhancing their capabilities in all essential aspects, including entrepreneurship, which is often lacking.

10) Thus far, RSPO's focus has primarily been on certification process-related issues. Therefore, RSPO should also emphasize technical assistance, coordinating with academic and governmental institutions as necessary.

3. Recommendations to the smallholders

1) We kindly suggest that certified smallholders who may not have attended sufficient group activities consider allocating more time for these, especially for trainings. By participating more actively, their understanding and adoption of OPSP will be enhanced. In addition, we encourage a deeper comprehension of the RSPO criteria and the habit of receiving regular updates about the certification process to minimize misunderstandings.

2) For certified smallholders who might have incomplete farm records, we recommend better record-keeping and maintenance for improved farm management. This will facilitate self-evaluations on technical, economic, and financial aspects of the farm on a regular basis.

3) Certified smallholders who experience challenges implementing BMPs should feel encouraged to share their concerns with the group. This could encompass matters such as soil and leaf analysis, collective purchasing of chemical fertilizer, forming harvesting teams, credit, etc.

4) We invite certified smallholders who excel in their performance to generously share their knowledge and experiences regarding RSPO criteria and certification with others, including non-certified smallholders. This could significantly help in raising awareness among smallholders.

5) We encourage non-certified smallholders to consider joining local RSPO groups for potential additional benefits while acknowledging the associated costs. Participation in group activities, particularly training and internal auditing, is crucial for a better understanding of RSPO requirements and, thus, improved OPSP adoption. Enhancing their comprehension of RSPO criteria is also recommended.

6) Non-certified smallholders who are already group members and aspire to leverage RSPO certification to boost productivity and livelihood could express their needs to the group for progression. The group committee could explore external assistance and learn from certified groups with similar structures.

7) Non-certified smallholders who are not yet part of an oil palm group might find it beneficial to join one and actively engage in group activities to comprehend the developmental steps and appreciate the benefits therein.

8) We advise smallholders to seek improvements in both oil palm production and the production of other agricultural commodities. This could create alternative income sources for families.

4. Recommendations to the smallholders' group

1) Certified groups, functioning as business units, should frequently update information regarding key factors that may influence the group's performance and members' livelihoods. This includes, but is not limited to, marketing trends (prices of CSPO, demand for CSPO), and climatic conditions.

2) It's advisable for the smallholder group to enhance communication and coordination among its members and with other related agencies, such as DOAE officials, RSPO, and more.

3) We recommend strengthening smallholder groups by regularly and comprehensively boosting committee capacities, with a focus on nurturing entrepreneurship. This will mitigate reliance on external support, thereby fostering group resilience.

4) Emphasizing members' training and excursions should be a priority for the smallholders' group. Regular organization of these activities can expedite the adoption of OPSP.

5) The certified group should remain committed to the RSPO ISH Standard, treating them as routine practices. Active solutions to reduce Corrective Action Requests (CARs) should be sought.

6) For the development and strengthening of the certified group, hiring some permanent staff, such as Farm Advisors (FA) and information management personnel, could prove efficient and effective.

7) Beyond ensuring compliance with the RSPO criteria, the certified group should concentrate on resolving members' challenges that directly impact their economic livelihoods. These may include soil and leaf analysis, collective purchasing of chemical fertilizer, arranging harvesting teams, credit, etc.

8) The certified group should aim to enhance efficiency in managing the group with a serious business-oriented approach. This can be achieved not just by increasing revenues but also by reducing costs. Regular monitoring and evaluation can aid in identifying the right solutions.

9) Smallholder groups that are members of RSPO but are not ready for certification should seek potential partner mills to ensure sustainability.

10) Smallholder groups that aim for RSPO certification but still lack technical and financial assistance should explore partnerships with potential mills, seek assistance, or consider hiring consulting organizations and freelance teams, which are now readily available in Thailand.

11) Based on findings from Chapter 5, which highlight the existence of economies of scale and the relatively high initial cost per member for small group sizes, it is recommended that newly formed groups aim to recruit at least 100 members to ensure efficient administration.

5. Recommendations to mills

1) It is advisable for mills to assess the market demand for Certified Sustainable Palm Oil (CSPO) across the supply chain, aiming to encourage increased consumption of CSPO within the food industry and others. Mills and their supply chains should also consider addressing emerging challenges. Implementing via the Thailand Sustainable Palm Oil Alliance (TSPOA) could be a beneficial option to explore since TSPOA covers key stakeholders in the oil palm supply chain in Thailand.

2) Mills can contribute to the development of strong and genuine commercial partnerships with farmers by actively assisting in the formation of farmers' groups. It is important for mills to establish a clear policy that supports these groups and their members. Allocating resources and budgets in advance to prepare smallholder groups for certification, along with providing incentives to individual smallholders during the setup phase (such as premium prices and other benefits), can be helpful.

Priority should be given to establishing partnerships with farmers who sell Fresh Fruit Bunches (FFB) directly to mills, mill ramps, or partner ramps. Mills should also ensure that the benefits of RSPO certification are effectively communicated to smallholders, and the income generated from CSPO should be distributed equitably among the members.

3) Mills and group managers should actively involve the group committee in group administration and the Internal Control System (ICS) to enhance participation.

4) Collaboration between mills and government organizations is essential to secure resources such as technical assistance, inputs, credit, and funding for smallholder groups and their members.

5) Mills should focus on providing smallholders with valuable marketing information and updates relevant to the industry, keeping them informed about the latest developments.

6) To support cost reduction in production, mills can consider assisting or collaborating with certified groups to procure chemical fertilizers for their members and smallholders who supply FFB. Additionally, mills could offer free empty bunches to smallholders in proportion to the quantity of FFB they supply.

7) Mills that aid smallholder groups in achieving RSPO certification should maintain transparent records of all resources invested in the group, ensuring accurate recognition of the actual expenses incurred.

6. Recommendations to the government

These recommendations to the government are based on the study results, responding to the goals of the 2017–2036 oil palm and palm oil reform strategic plan, and addressing past policy implementation inefficiencies. The value-based RSPO standard should serve as a tool

for agricultural development to improve efficiency, promote sustainable resource use, restructure the industry, and compete in the global market.

The suggestions to the government agency are as follows:

1) Given the lack of awareness about RSPO standards and certification among oil palm smallholders and government officials, DOAE should cooperate with RSPO organizations to raise public understanding and awareness. This could include producing and disseminating informational materials, conducting educational programs in schools, and establishing oil palm learning centers in each community.

2) The Thailand Oil Palm Board (TOPB) should direct concerned institutions, such as the DOAE, to promote the RSPO standard and its adoption by farmers on a wider scale. This could include education and training programs, encouraging the implementation of RSPO standards in all extensive oil palm production provinces, forming and developing RSPO trainers, supporting budgets for learning activities, and developing digital support systems for the RSPO standard's implementation.

3) The Office of Agricultural Economics (OAE) should revise the comprehensive oil palm and palm oil reform strategy 2017–2036 to include additional plans and projects supporting RSPO standards. OAE should also establish a provincial-level oil palm and palm oil industry development plan.

4) DOAE should promote the adoption of the RSPO standard among oil palm Plang Yai through collaboration with the private sector, civil society, and educational institutions.

5) In provinces with extensive oil palm plantations, the DOAE and Provincial Office should consider establishing a local administrative division responsible for driving development. This could involve integrating budgets, human resources, and project implementation.

6) The role of the Sub-district Administrative Organization should be promoted in supporting the adoption of RSPO standards. This could be achieved by integrating projects with the DOAE, DOA, and RSPO groups.

7) The Department of Lands (DOL) should pay more attention to land ownership and land rights issues, which are currently structurally complex and hinder the promotion of RSPO standards.

8) The National Bureau of Agricultural Commodity and Food Standards (ACFS) should speed up the implementation of Thailand Sustainable Palm Oil (TSPO) standards according to the RSPO framework to enforce them as national production standards.

9) Despite the low environmental impacts of oil palm production in Thailand, government agencies should establish an oil palm sustainability platform to develop Thailand's sustainable oil palm and palm oil industries through supply chain collaborations.

10) The DOA and DOAE should increase financial support and local-level staffing to enhance palm oil production efficiency, reduce production costs, adapt oil palm plantation technology, and support farmer group activities. In addition, the Land Development Department (LDD) should improve the services for soil analysis so that most smallholders can get access to them.

11) Through MOAC, the government must focus on developing human resources among government officials and related personnel involved in oil palm production, standards, markets, and farmer group development.

12) The government needs to enforce rules, regulations, and standards, including the FFB standard, ramp standard, ramp registration, and the Palm Oil and Palm Oil Products Act.

13) The government should apply incentive measures, such as tax breaks and investment promotion schemes, to downstream industries (oleochemical and refinery manufacturing) to support all aspects of production and enhance global market competitiveness with the RSPO standard.

Table of Content

Content	Page
Acknowledgements	(2)
Executive Summary	(3)
Table of Content	(12)
List of Table	(14)
List of Figure	(16)
List of Abbreviation	(17)
Definition	(19)
CHAPTER 1 Introduction	1
1.1 Background	1
1.2 Objective	2
1.3 Scope of the study	2
CHAPTER 2 Literature Review	4
2.1 Development of RSPO certification in Thailand	4
2.2 Oil palm smallholders in Thailand and management practices	8
2.3 Difficulties and challenges faced by the smallholders	10
2.4 Benefits, costs, and challenges faced by ISH, concerning RSPO certification	11
2.5 Theory of change, and concept of livelihood	23
CHAPTER 3 Research Methodology	28
3.1 Data collection	28
3.2 Data Analysis	33
3.3 Conceptual framework	33
CHAPTER 4 Oil Palm and Palm Oil Production, Consumption, and the Economic, Social and Environmental Impacts in Thailand	35
4.1 Situation of oil palm production	35
4.2 Thailand's palm oil production	41
4.3 Palm oil consumption and trade	42
4.4 Price of CPO in Thailand	43
4.5 Economic, social and environmental impacts from oil palm production	44
4.6 Summary	48
CHAPTER 5 Costs, Benefits, and Challenges Faced by Thai smallholders in Relation to RSPO Certification	49
5.1 The context of ISH groups with RSPO certification and membership	49
5.2 RSPO certification costs and benefits for ISH in Thailand	49

Table of Content (cont.)

Content	Page
5.3 Challenges faced by Thai ISH in complying with the RSPO Standard requirements	59
5.4 Summary	61
CHAPTER 6 Impact of RSPO Certification on the Livelihoods of Smallholders	63
6.1 Demographic profile of smallholders	63
6.2 Farm characteristics and oil palm practices	64
6.3 Opinion on RSPO certification	75
6.4 Social impacts	76
6.5 Environmental impacts	77
6.6 Economic impacts	78
6.7 Problems faced by smallholders, support and training needs, and suggestions	84
6.8 Summary	88
CHAPTER 7 Assessment of Policy Implications Related to the Oil Palm Industry and Sustainability in Thailand	90
7.1 Overview of oil palm development policy in Thailand	90
7.2 Oil palm and palm oil industry development plan 2008–2012	92
7.3 Oil palm and palm oil industry development plan 2013 – 2017	93
7.4 Comprehensive oil palm and palm oil development strategy in 2017–2036	95
7.5 RSPO development at the provincial level	97
7.6 Assessment of policy implications for new planting, productivity, and land rights	98
7.7 Assessment of policy implications for production standards and sustainability	99
CHAPTER 8 Conclusions and Recommendations	101
8.1 Conclusions	101
8.2 Recommendations	105
8.3 Problems and obstacles in conducting research	112
References	113
Appendix	124
Appendix 1	125
Appendix 2	128
Appendix 3	139

List of Table

Table		Page
2.1	RSPO Certified ISH members in Thailand	5
2.2	Summary of the difficulties and challenges faced by Thai smallholders	10
2.3	Important upfront and recurrent cost items for ISH certification	13
3.1	Scope and data collection summary	28
3.2	Number of RSPO certified groups in Thailand, 2021	30
3.3	The certified groups selected for data collection	30
3.4	Number of sample sizes for certified and non-certified smallholders	32
4.1	Oil palm planted and harvested area in Thailand by region, 2012-2021 (in rai)	36
4.2	FFB yield of the country, and classified by production region, 2012-2021 (unit: ton)	37
4.3	Thailand FFB productivity, and by production region, 2012-2021 (unit: kg/rai)	38
4.4	Oil palm household in Thailand, 2012-2021	39
4.5	CPO production and OER, 2012-2021	41
4.6	Thailand's domestic use of palm oil, 2012-2021 (tonnes)	42
4.7	Quantity of Thailand's palm oil exports and imports, 2012-2021	43
5.1	Characteristics of the RSPO-certified groups	50
5.2	Total upfront cost of RSPO certification for ISH	52
5.3	Annual audit cost for RSPO certification (THB)	53
5.4	Recurrent costs of RSPO certification for two cases of certified groups, A and B	54
5.5	Recurrent costs of RSPO certification in 2022 for two cases of certified groups, C and D	54
5.6	Recurrent costs of RSPO certification for ISH, classified by group size	55
5.7	Average annual benefits of RSPO certification for smallholders (THB)	58
5.8	Net economic benefits of RSPO certification for the smallholders (M.THB/group)	58
6.1	Demographic profile of the smallholders	64
6.2	Farm characteristics	65
6.3	Age of oil palm	67
6.4	Frond & leaf and pest management	68

List of Table (Cont.)

Table		Page
6.5	Labor management	69
6.6	Application of fertilizer	70
6.7	Farm records	71
6.8	Selling the FFB	71
6.9	Percentage of smallholders attended OPSP training	72
6.10	Adoption of good and sustainable management practice	73
6.11	Opinion on RSPO certification, and participation	75
6.12	Social benefits from RSPO certification	77
6.13	Selected practices that create environmental benefits in percentage	78
6.14	Smallholders' access to inputs and services	79
6.15	Smallholders' access to the market and the premium price of FFB	80
6.16	FFB yield in 2021 and 2022	81
6.17	Average cost, return, and net return from oil palm production in 2021 and 2022	83
6.18	Average cost, return, and net return from oil palm production in 2021 and 2022, comparing the well-established and newly certified smallholders	84
6.19	Problems faced by smallholders in oil palm production and group participation	85
6.20	Support needed by the RSPO-certified smallholders	86
6.21	Support needed by the non-certified smallholders	86
6.22	Key suggestions to the development of oil palm production and sustainability	87
7.1	Assessment of policy for new planting, productivity	98

List of Figure

Figure		Page
2.1	RSPO Roadmap by ToC	23
2.2	Sustainable livelihoods framework	25
3.1	Study area in five provinces and location of the certified groups	31
3.2	The conceptual framework	34
4.1	Map of Thailand, Oil palm producing provinces in 2021	36
4.2	FFB productivity by production region, 2019-2021	38
4.3	Distribution of CPO mill throughout Thailand	40
4.4	Average FFB price received by the farmers, 2012-2022	41
4.5	Prices of CPO in Bangkok and Malaysia, 2012-2021	44
5.1	Summary of the benefits of RSPO standard certification for ISH in Thailand	57
6.1	Land use before oil palm production	67
6.2	Adoption of good and sustainable management practice, comparing certified and non-certified smallholders	74
6.3	Adoption of good and sustainable management practices, comparing well-established and newly certified smallholders	74
6.4	Average oil palm yield: certified and non-certified smallholders	81
6.5	Average oil palm yield: well-established and newly certified smallholders	82
7.1	Structural relationship between the oil palm industry development plan and various levels of development plans	91
7.2	Government structure related to the implementing mechanism of the development plan	92
7.3	RSPO-certified group map in Thailand in 2022	100
8.1	Model for the RSPO certification of ISH in Thailand	106

List of Abbreviations

ACFS	National Bureau of Agricultural Commodity and Food Standard
Agri-PPPs	Public Private Partnerships for Agribusiness Development
BMP	Best Management Practice
CARS	Corrective Action Requests
CPD	Cooperative Promotion Department
CPO	Crude Palm Oil
CSPO	Certified Sustainable Palm Oil
CSPKO	Certified Sustainable Palm Kernel Oil
CSPKE	Certified Sustainable Palm Kernel Expeller
CSR	Corporate Social Responsibility
DOA	Department of Agriculture
DOAE	Department of Agricultural Extension
DOL	Department of Lands
EGAT	Electricity Generating Authority of Thailand
EUR	The currency unit of the European Union
FA	Farm Advisor
FFB	Fresh Fruit Bunch
GAP	Good Agricultural Practice
GIZ	German Agency for International Cooperation
HCV	High Conservation Value
ICS	Internal Control System
IPM	Integrated Pest Management
ISH	Independent Smallholder
LDD	Land Development Department
LUCA	Land Use Change Analysis
M-D	Man-day
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOE	Ministry of Energy
MOI	Ministry of Industry
M.THB	Million Thai Baht
OAE	Office of Agricultural Economics
OER	Oil Extraction Rate
OHS	Occupational Health and Safety
OPSP	Oil Palm and Sustainable Practice
RSPO	Roundtable on Sustainable Palm Oil
RSSF	RSPO Smallholder Support Fund

List of Abbreviations (cont.)

S.D.	Standard Deviation
SCPOPP	Sustainable and Climate-Friendly Palm Oil Production and Procurement Project
TFS	Task Force on Smallholders
THB	Thai Baht
ToC	Theory of Change
TOPB	Thailand Oil Palm Board
TOPSA	Thailand Oil Palm Smallholder Academy
TSPO	Thailand Sustainable Palm Oil
TSPOA	Thailand Sustainable Palm Oil Alliance
ToT	Training of Trainers

Definition

Harvesters	Hired harvesting labor on a job-basis, most hiring per ton of FFB
Well-established certified smallholders	Oil palm smallholders who are members of the certified RSPO groups that obtained certification during 2012–2016. They are part of groups that have been certified against RSPO P&C during that period.
Newly certified smallholders	Oil palm smallholders who are members of the certified RSPO groups that have obtained certification since 2019. They are part of groups that have been certified against the RSPO-ISH Standard.
Non-certified smallholder	Oil palm smallholders who live and have plantations in the same area as the certified smallholders
Partner CPO mills	The CPO mills that are tied to the farmer group or support the farmer group by purchasing FFB from the group members
Rai	Land unit of Thailand (6.25 rai = 1 hectare)

CHAPTER 1

Introduction

1.1 Background

Palm oil is the most important economic crops producing by ASEAN region, where Malaysia and Indonesia account for more than 84% of palm oil production. The global production and consumption reached to 70.6 million tons and 66.4 million tons which represent more than one - third of vegetable oil production and consumption. 68% of palm oil is used in food industries and 27% is used by industrial applications and consumer products.

Thailand is the third largest producer of palm oil which produced 2.9 million tons but it accounts only 3.9% of global production. In 2022, total plantation is at 1.01 million hectares, which is expected to rise over the next few years by 0.48 million ha per year. Oil palm plantation and crude oil palm mill are mainly in southern provinces accounts 85.0% of total areas such as Chumphon, Krabi, and Surat Thani. The rest of 15.0% of oil palm plantation is found in the news area such as the center, north, and north-east regions. New plantation at average 48,000 ha per year had expanded in the past few years under the government's strategy to develop renewable and alternative energy supply. Meanwhile, domestic demand for palm oil is projected to increase to over 3.2 million tons per year in response to economic growth.

Oil palm growers in Thailand are mainly small-scale farmers and medium-scale companies. In 2021, oil palm farmers were about 0.404 million households of which 79% accounted by small-scale farmers owning less than 50 ha. The larger and medium-scale farms typically invest in their own mills to extract crude palm oil. Palm oil expansion has contributed to economic growth and promoted rural livelihood as well.

In response to expansion criticism in negative environmental and social impacts such as deforestation, loss of biodiversity, and threats to livelihoods, the Roundtable on Sustainable Palm Oil (RSPO) was established to drive the sustainable production and procurement of palm oil. However, the Thailand oil palm sector faced a major hurdle in achieving RSPO certification due to its large number of small-scale farmers or smallholders within the industry. Over the years since the establishment of the RSPO, it has been continuously reported that smallholders face multiple challenges and barriers in achieving RSPO certification. RSPO recognizes the importance of smallholder farmers in the palm oil industry and as part of RSPO's effort to increase the inclusion of smallholders into its system, the RSPO Independent Smallholder (ISH) Standard was adopted in 2019.

Following these developments, it is imperative to conduct a study to gain a better understanding of the current palm oil production and consumption trends, as well as to review the environmental, economic, and social impacts in different parts of Thailand. In addition, it will be crucial for the RSPO to learn more about the outcomes and impacts of RSPO certification, especially on the implementation of the ISH Standard, on palm oil production in Thailand.

1.2 Objective

This study has 5 objectives which are as follows:

- 1) To understand palm oil production and consumption trends and to review the environmental, economic, and social impacts in different parts of Thailand.
- 2) To assess the benefits and challenges (including costs) faced by Thai smallholders in relation to RSPO certification – with a particular focus on the implementation of the RSPO ISH Standard.
- 3) To determine the impact of RSPO on the livelihoods of smallholders, comparing RSPO certified and non-RSPO certified farm households.
- 4) To assess policy implications on productivity growth, forest protection, mosaic landscapes, land rights and sustainability certification in relation to the palm oil impact on livelihoods and the environment.
- 5) To provide recommendations on reducing the environmental, economic and social impacts of oil palm plantations in Thailand, in particular on the elements for improvement in the ISH Standard.

1.3 Scope of the study

1) Study areas

The study areas were selected purposefully in oil palm production areas with RSPO-certified smallholder groups. Therefore, five provinces in the southern region (Surat Thani, Krabi, Chumphon, Trang, and Nakhon Si Thammarat) were chosen for the field survey and the RSPO certification for the ISH impact assessment. These five provinces are also the top oil palm-producing areas of the country.

2) Population

The research population in this study consists of several parties:

- (1) Oil palm smallholders, including certified and non-certified smallholders;
- (2) RSPO-certified group managers and committees;
- (3) Partner CPO mills and downstream industries;
- (4) Government officials at both the provincial and national levels; and
- (5) Others, such as GIZ project representatives and auditors

3) Content

(1) To assess the costs and benefits of RSPO certification for Thai oil palm smallholders, the cost calculation is limited to that at a group level, including the upfront and recurrent costs. While the benefits are narrow, they can be quantified, namely the economic benefits to smallholders.

(2) To determine the impacts of RSPO on the livelihoods of smallholders, the impacts include social, environmental, and economic impacts. The impacts have been assessed by comparing those variables between the certified and non-certified smallholders.

CHAPTER 2

Literature Review

This chapter presents the results of the literature review. It is divided into five sub-sections. The first section is a short review of the development of RSPO certification in Thailand. In the second section, an overview of oil palm smallholders in Thailand and their management practices will be presented. Thirdly, the difficulties and challenges faced by Thai oil palm smallholders will be summarized. In the fourth sub-section, the benefits, costs, and challenges faced by ISH concerning RSPO certification are presented. In the last sub-section, the theory of change and the concept of livelihood and their applications will be examined.

2.1 Development of RSPO certification in Thailand

The RSPO standard has been established for nearly two decades, since 2004, to promote the growth and use of sustainable oil palm and products worldwide through credible global standards and the engagement of stakeholders. It is a non-profit organization that unites stakeholders from seven sectors of the palm oil industry, oil palm farmers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental conservation, and social or developmental organizations (NGOs) to develop and implement global standards for sustainable palm oil (RSPO, 2012). The RSPO is the first global standard-setting initiative for palm oil.

Thailand has been supportive of the RSPO since the beginning through the participation of government agencies and private companies. In 2005, the RSPO established a project called the Task Force on Smallholders (TFS) to support smallholders in the process of RSPO certification (Thongrak and Kiatpathomchai, 2012; Nupung et al., 2022b). And five years later, in 2010, RSPO certification was supported in Thailand by the German agency for development cooperation (GIZ) to achieve sustainable palm oil production for bio-energy. GIZ, in cooperation with the Thai government, led by the Office of Agricultural Economics (OAE), and other partners started a project to increase productivity, improve FFB quality, and internalize sustainability through BMPs by organizing training. In collaboration with four CPO mills: United Palm Oil and Univanich in Krabi province, Southern Palm Oil in Surat Thani province, and Saksomboon Palm Oil in Chonburi province, plus the Aoluek cooperative in Krabi province (GIZ, 2012; Innocenti, E. D., & Oosterveer, P., 2020).

In 2012, four oil palm groups, with around 500 members, in Thailand became the first smallholder groups worldwide to be certified under the RSPO smallholder group certification scheme. These groups were: the Community Enterprise Group for Sustainable Palm Oil Production (Chonburi); the Community Enterprise Group for Sustainable Palm Oil Production UPOIC (Nuakhleng-Khaopanom); the Sustainable Oil Palm Smallholders Production (Univanich-Plaipraya) Community Enterprise Group; and the Community Enterprise Group-Surat Thani. They were supported by the Saksomboon Palm Oil Company, the United Palm

Oil Industry Public Company, the Univanich Palm Oil Public Company, and the Southern Palm Oil Industry Company (1993), respectively (GIZ, 2014).

In 2014, these four certified smallholder groups produced about 9,488 metric tons of CSPO. It was about 0.47% of all crude palm oil (CPO) produced in Thailand in the same period. These amounts of CSPO were from oil palm plantation areas of 2,767.33 ha (0.46% of the total oil palm area in Thailand) and 52,713.40 metric tons of fresh fruit bunches (FFB).

Since then, RSPO-certified ISH groups have slowly developed due to various obstacles and challenges (see Chapter 5). After May 2022, RSPO Thailand oil palm smallholder membership consists of 63 groups of small-scale and large-scale farmers, of which 19 are RSPO certified ISH groups, characterized by over 5,400 farmers with a certified area of 170,591.81 rai (27,295 ha), or 2.8% of the total oil palm plantation area (*Table 2.1*) (RSPO, 2022a; RSPO, 2022b).

Table 2.1: RSPO Certified ISH members in Thailand

No.	Group name	No. of ISH	Certified area	FFB	Assessment type	Status of certificate	Member since
Surat Thani							
1	Phanom Land Settlement Cooperatives Limited	1,129	3,309.97	60,682.78	ASA 4	Active	2017
2	Community Enterprise Group - Suratthani				ASA 11	Expired	2012
3	Sustainable Palm Oil Production (Thachana-Chaiya) Community Enterprise	279	1,318.88	20,415.04	ASA 2	Active	2019
4	Lumnarn Kradae Pattana Oil Palm community Enterprise Group	250	1,296.82	14,752.5	ASA 11	Active	2014
5	Smothong Sustainable Oil Palm Production Community Enterprise Group	177	1,145.27	12,381.83	ASA 1	Active	2019
6	Tapi-Ipun Sustainable Oil Palm community Enterprise Group	281	1,948.31	26,565.44	ASA 11	Active	2014
7	Palmtongkum RSPO Community Enterprise	86	511.41	1,4775.78	Initial Certification	Active	2019
8	Saikueng Bangsawan Community Enterprise Group	420	2,742.7	60,285.16	ASA 4	Active	2014
9	Community Enterprise Group - Suratthani				ASA 12	Expired	2012
Krabi							
1	Aoluek Land Settlement Cooperative Limited	280	937.57	24,420	ASA 1	Active	2019
2	Srijaroen Sustainable Oil Palm Production Community Enterprise Group	315	2,630.67	19,322.88	ASA 11	Active	2014

Table 2.1: RSPO Certified ISH members in Thailand (cont.)

No.	Group name	No. Of independent smallholders	Certified area	FFB	Assessment type	Status of certificate	Member since
Krabi							
3	Nueakhleng-Khaophanom Community Enterprise	337	1,788.94	39,133.16	ASA 2	Active	2012
4	Univanich-Plaipraya Community Enterprise Group	240	1,248.27	13,802	ASA 4	Active	2012
5	Srijaroen Green Palm Oil Production Community Enterprise	264	1,669.1	32,338.81	ASA 1	Active	2019
6	Sustainable Krabi Oil-Palm farmers Cooperative Federation				ASA 4	Expired	2015
Chumphon							
1	Langsuan Oil Palm Smallholders Community Enterprise	114	458.33	8,749	ASA 2	Active	2019
Trang							
1	Thappitak Community Enterprise Group	534	3,371.72	85,997.98	ASA 4	Active	2016
2	Community enterprise growers palm oil and palm oil sustainability Sikao - Wangwiset	164	977.29	22,593.59	ASA 11	Active	2015
Nakhon Si Thammarat							
1	Sichon Palm Yangyuen Community Enterprise Group	279	899.16	9,334.41	ASA 11	Active	2014
2	Sustainable Palm Oil Enterprise Network Pakpanang	123	393.75	3,445.31	E1	Active	2020

Source: RSPO, 2022

Moreover, 34 groups representing 1,386 smallholder farmers covering 27,766.83 rai (4,442.7 ha) are in the process of achieving certification and are expected to be completed by the end of 2022 (*Appendix 1*). As a result, Thailand will have 279,406.81 rai (44,705 ha) of RSPO-certified sustainable oil palm plantations, accounting for 4.58% of Thailand's total oil palm plantation area (RSPO, 2022a; RSPO, 2022b).

Apart from those members, RSPO Thailand also has supply chain members, including 11 consumer goods manufacturers, 32 processors and traders, 39 supply chain associates, and 1 associated company, for a total of 146 companies (RSPO, 2022a; RSPO, 2022b).

As for the new groups, which are in the process of achieving certification, acknowledgement must be given to GIZ under the Sustainable and Climate-Friendly Palm Oil Production and Procurement (SCPOPP) Project (2018-2022) (GIZ, 2022).

Even though the Ministry of Agriculture and Cooperatives (MOAC) has set a policy to promote sustainable agricultural development following the 12th National Economic and Social Development Plan 2017–2021, the large-scale rollout of intensive smallholder training courses is proving difficult for the government. This is partly due to budget constraints as well as a shortage of suitably qualified national instructors. Capacity deficits also exist in the areas of GHG measurement and reporting, which means that mitigation actions cannot be tracked or documented. As a result of these requirements, the Thai government is looking at ways in which sustainable palm oil production can be expanded even more rapidly, e.g., through certification of an entire jurisdiction.

The SCPOPP project aims to enable the national government and relevant stakeholders to mainstream sustainable and climate-friendly palm oil production in Thailand.

The project closely cooperates with the Thai government and palm oil businesses to 1) create qualified national instructors and enhance oil palm smallholders' capacities in sustainable farming practices and meeting an internationally recognized sustainable palm oil standard (i.e., RSPO) through an intensive Training of Trainers (ToT) curriculum; 2) promote cooperation along the value chain for smallholder engagement together with increasing awareness and market demand of sustainable palm oil in the country; and 3) promote and demonstrate appropriate GHG reduction practices for oil palm cultivation to smallholders. In addition, develop a system for monitoring and reporting GHG reduction, and 4) recommend a policy framework upscaling sustainable and climate-friendly palm oil production towards a "landscape" or "jurisdictional approach" with a commitment from local government and key stakeholders to ensure that all palm oil produced from one jurisdiction area (i.e., district, province, or national level) is sustainably produced and certified.

The project closely worked with public and private partners to promote international sustainability standards for palm oil production and support smallholder farmers in achieving sustainable palm oil certification. The project also offers access to sustainability markets for the smallholder farmers who join the training. The public partners are the Department of Agriculture (DOA) and the Department of Agricultural Extension (DOAE), MOAC. The areas of implementation are in Surat Thani, Krabi, and Chumphon Provinces.

Regarding private partners, 19 palm oil mills have engaged with and are willing to cooperate with smallholders with incentives (i.e., source oil palm fruits from smallholders with a fair price based on better quality, support the RSPO membership fee, fast track to deliver oil palm fruits, and office space for farmer groups) through a partnership agreement. So far, nine partnership agreements have been signed between palm oil mills and smallholder groups.

The results relating to sustainable practices showed that about 400 farmers were RSPO-certified in 2021. Another 1,500 farmers are expected to achieve RSPO certification within December 2022 (GIZ, 2022).

2.2 Oil palm smallholders in Thailand and management practices

To get insight and understand the oil palm smallholders in Thailand and their oil palm management practices, the study team reviewed various research reports and articles. Most of them were undertaken in the southern region. There are a few pieces of research undertaken in the central region, in Prachuap Khiri Khan, Pathum Thani, and Prachin Buri provinces, and only two pieces of research from the northeastern region, in Bueng Kan province.

Appendix 2 summarizes key socio-economic characteristics of oil palm smallholders and their oil palm management practices. However, the coverage of the information from each research project varies widely depending on the research objectives of the project. Therefore, the study teams only take out the information that fits our section.

2.2.1 The characteristics of the smallholders

The majority of the oil palm "smallholders" in Thailand are mid-aged and older, and most of them obtained at most secondary education. They have 4 household members, and only 2 household members work in oil palm activities. Membership in an oil palm group may vary depending on the concentration of oil palm smallholders in that particular area; for example, in Surat Thani, Krabi, and Chumphon, many oil palm groups (Plang Yai) were set up and supported by DOAE. This opens an opportunity for the growers to join the group.

As for occupation, most of the smallholders (in some studies > 90%) depend on their incomes from more than one source since most have secondary occupations, and most are still from agricultural activities such as rubber farming. However, it is difficult to generalize the proportion of oil palm smallholders that grow oil palm for their main source of income since it varies extremely among the respondents to the research, from 36.0 to 89.7%. It is worth noting here that the results from the RSPO-certified group reveal that 89.7% of the members grow oil palm as a primary source of income (Benchasri & Jaisamut, 2014).

Concerning experiences in oil palm production, they vary a lot among the smallholders in different oil palm production areas, i.e., old or new production areas, from a few to more than 20 years. On average, the smallholders in Krabi, Chumphon, and Surat Thani have more experience in oil palm production than in new areas such as Nakhon Si Thammarat (*Appendix 2*).

Relating to the average household landholding area of the oil palm smallholders, it varies from a few ha (19 rai) to around 8 ha (47.6 rai). This area is larger than the average household landholding area of the country, which is only 2.81 ha (17.58 rai) per agricultural household in 2020 (Department of Agricultural Extension, 2021).

Regarding household income and oil palm income, recent research (2019–2021) showed that those differ greatly (*Table 2.2*). There are many factors behind the variation, especially oil palm income depending on the harvested area, FFB productivity, FFB prices, and cost of production. It is interesting to note here that oil palm income per rai was higher in RSPO-certified farmers than in non-RSPO-certified farmers, at 14,681.6 and 13,037.8 THB/rai, respectively (Benchasri & Jaisamut, 2014).

Concerning the debt status, most oil palm smallholders, some 50–72%, have debt. The average household debt was also very high: 739,827, 575,774, and 615,635 THB in Thongrak et al. (2019), Thongrak (2020), and Thongrak et al. (2021), respectively. These amounts are much higher than the country's average, which was about 225,090 and 262,317 THB per agricultural household in 2020 and 2021, respectively. (Office of Agricultural Economics, 2021a-2022a)

2.2.2 Oil palm management practices

1) Household oil palm plantation area and land use before oil palm plantations

From *Table 2.2*, the results showed that the smallholders own oil palm plantation areas, on average, are between 1.93 and 7.13 ha (12.1-44.6 rai), and most of the research reported that average plantation areas are between 2.0 and 5.0 ha. In the northeast, most smallholders own around 2 ha (Sritawan, 2013; Pongkaw, 2016). Most smallholders throughout Thailand own only one oil palm plot. In the southern region, around one-fourth of the smallholders own two oil palm plots (Thongrak and Kiatpathomchai, 2011; Thongrak, 2020).

Relating to land use before oil palm plantation, in many studies in the southern region, most of the farmers have converted other agricultural land to oil palm plantation, mainly from rubber, paddy, and fruit trees, respectively. However, in the northeast, agricultural land before oil palm production differs from the southern region, where, for example, paddy comes first, followed by cassava and sugarcane, respectively (Pongkaw, 2016).

2) Key aspects of oil palm management practices by smallholders

Most oil palm smallholders grow tenera (variety) and depend on the seedlings from the private nursery and the Oil Palm Research Center, DOA, respectively. Most depend only on rainfall as a water source for oil palm production. However, in some studies, for example, 61 percent of the farmers apply irrigation because they can access the irrigation systems in the community (Thongrak et al., 2019).

Most oil palm smallholders depend on 1-2 farm household laborers, and I have hardly found any oil palm farms that do not use hired laborers at all. The activity on which the oil palm smallholders depend most on hired labor is FFB harvesting. In hiring labor, most wages were paid on a job-by-job basis. However, wages vary among activities and production areas. Also, job-basis wages are always higher than daily minimum wages. It is known that when their wages are set on a job-by-job basis, the laborers appear to work more efficiently.

As for applying fertilizer, nearly all smallholders apply a chemical fertilizer, but most of them apply compound fertilizer. However, in an RSPO-certified group, most smallholders used strength fertilizers (Benchasri & Jaisamut, 2014; Kunsangkaew et al., 2019). Overall, only a small proportion of the smallholders applied fertilizer based on soil and leaf analysis. Although in an RSPO-certified group and the Plangyai group, only 13% and 17% of the smallholders used fertilizer based on soil and leaf analysis, respectively (Kunsangkaew et al., 2019; Thongrak, 2020), one of the main reasons is that they have limited access to soil and leaf analysis facilities,

which are still not available throughout the oil palm production area. About the chemicals used, not much research has investigated this aspect. However, for those who examined the use of chemicals, the results showed that 20–94.4% of the smallholders still applied chemicals. The differences depend on the existing pests and the individuals' awareness of the adverse impacts. It is also observed that the smallholders, who have highly adopted GAP, will reduce chemical use or stop using it. They tend to choose other practices to control pests, such as IMP.

Regarding farm records, they varied enormously between smallholders who are members of the RSPO or TSPO farmer's group and non-members. For RSPO or TSPO members, all members keep farm records (Kunsaengkaew et al., 2019; Thongrak et al., 2019), while only 10.9% of non-members keep a record (Benchasri & Jaisamut, 2014). The reasons for not keeping farm records are, for example, complexity, the inability to see the benefit, and the lack of time available.

About harvesting management and selling FFB, most researchers indicated that most smallholders harvested FFB approximately twice a month, once every 14–15 days. However, for some studies, the average harvest cycle was longer—20 days (Thongrak and Kiatpathomchai, 2011). This usually happens in areas where harvesters are in short supply. Research in *Appendix 2* indicated that in most studies, >70% of smallholders sold FFB to a ramp that was not far from their plantation (see more in Chapter 6).

2.3 Difficulties and challenges faced by smallholders

During the past decade, many research articles have reported the problems and challenges faced by oil palm smallholders. Their problems were similar. Examples are summarized in *Table 2.2*.

Table 2.2: Summary of the difficulties and challenges faced by Thai smallholders

Difficulties and challenges	Authors
Production	
- Lack of proper knowledge in oil palm production resulted in poor management practices	- Thongrak et al. (2011); (2019); (2021); Thongrak (2020); Chaisan (2013); Nillaket and Wattanakul (2014); Wonsuman et al. (2015); Worastit (2016); Riyapun (2016); and Sawasdichan and Banchirrit (2022)
- Lack of capital and credit	- Thongrak et al. (2011); Thongrak (2020); Wonsuman et al. (2015); Worastit (2016)
- Lack of water in dry season	- Thongrak et al. (2011); (2019); (2021); Thongrak (2020); Chaisan (2013); Wonsuman et al. (2015); and Worastit (2016)
- Shortage of labor	- Wonsuman et al. (2015); Riyapun (2016); and Thongrak (2020)
- Poor quality seedlings	- Thongrak et al. (2011) and Chumsri et al. (2017)
- Expensive chemical fertilizer	- Thongrak et al. (2011); (2019); (2021); Thongrak (2020); Nillaket and Wattanakul (2014); Wonsuman et al. (2015); Worastit (2016); Riyapun (2016); Pongkaw (2016); Benchasri & Jaisamut (2014); and Sermphol (2019)

Table 2.2: Summary of the difficulties and challenges faced by Thai smallholders (Cont.)

Difficulties and challenges	Authors
Production (cont.)	
- Pest i.e. rat, Rhinoceros beetle, <i>Ganoderma</i>	- Wonsuman et al. (2015); Worastit (2016); Chumsri et al. (2017); and Thongrak (2020)
- Long flood in plain areas	- Nillaket and Wattanakul (2014), Wonsuman et al. (2015), Pongkaw (2016), Worastit (2016); Thongrak (2020); and Thongrak et al. (2021)
- Climate variability	- Chumsri et al. (2017)
- Harvesting of unripe FFB, low FFB quality	- Thongrak et al. (2011) and Chumsri et al. (2017)
- Low productivity	- Sawasdichan and Banchirrit (2022)
- High cost of production	- Chumsri et al. (2017) and Sawasdichan and Banchirrit (2022)
Marketing/selling of FFB	
- Fluctuation of FFB prices Low FFB prices	- Thongrak et al. (2011); (2019); (2021); Chaisan (2013); Worastit (2016); Chumsri et al. (2017); Benchasri & Jaisamut (2014); and Sermphol (2019)
- Few CPO mills in production area	- Thongrak et al. (2021)
- Ramp & mill are far from plantation	- Thongrak et al. (2021)
Policy and others	
- Lack of regular government policy	- Thongrak et al. (2021)
- No successor	- Thongrak et al. (2021)
- Weakness of the farmers group	- Thongrak et al. (2021)

2.4 Benefits, costs, and challenges faced by ISH concerning RSPO certification

This section reviewed the benefits, costs, and challenges faced by ISH concerning RSPO certification from the previous studies. It consists of reviews in other countries and in Thailand, respectively.

It is important to highlight that the majority of the studies examined in this report focused on evaluating the impacts of and challenges associated with RSPO P&C certification for independent smallholders. Since then, the RSPO has introduced and officially released a new standard tailored for independent smallholders in 2019, known as the RSPO Independent Smallholder Standard (ISH) 2019.

2.4.1 Benefits and costs of RSPO Standard certification for ISH in other countries

In a report entitled "Sustainability Certification in the Indonesian Palm Oil Sector" by Clara Brandi et al. (2013), the benefits and challenges for smallholders were summarized.

The benefits of RSPO certification for smallholders include economic, ecological, and social benefits. In connection with economic benefits, an increase in yields is one of the most significant and realizable benefits. A higher yield is achieved by applying good agricultural practices (GAPs). In addition, an increase in the quality of oil palm fruits creates another

potential economic benefit of RSPO certification. Nonetheless, it depends on whether smallholders are integrated into a selling structure that compensates for better quality, which is often not the case.

As for ecological benefits, only small-scale effects can certainly be realized. These include reduced chemical usage via the application of an integrated pest management (IPM) system, soil quality improvements (e.g., higher soil fertility), erosion control, improved waste management, and buffer zones near rivers.

Relating to social benefits, smallholder certification can contribute, for instance, to the reduction of negative health and safety impacts as well as to providing mechanisms for dissolving land conflicts.

Another research paper that addressed the costs and benefits of RSPO certification for independent smallholders was by Rietberg, et al. (2016). This paper assessed the monetary costs and benefits of smallholder RSPO certification based on available data sources and focused mainly on Indonesia and Malaysia.

The results revealed that ISH cannot meet the requirements for RSPO certification without help. Thus, the certification process involves the support of third parties, which is costly. Upfront costs of certification for three groups of independent smallholders in Indonesia (two groups) and Malaysia (one group) were 87, 263, and 114 EUR per ha, or 191, 402, and 751 EUR for each farmer, respectively. These upfront costs were estimated to be equivalent to between 5% and 14% of the members mean annual revenue from oil palm in Indonesian groups. Upfront costs were mostly borne by external donors, NGOs, and mills.

Estimated recurrent costs at the group level ranged between 21 and 65 EUR for each farmer per year, excluding costs for group management. Recurrent costs at the farm level depended on the situation before certification and the emphasis put on the adoption of good agricultural practices and were found to increase up to 127 EUR per ha (excluding fees of 202 EUR per ha that needed to be paid to the cooperative in one case). The smallholders were responsible for most of the recurrent costs.

The category and item of upfront costs and recurrent costs of certification were summarized in *Table 2.3*. Upfront costs were categorized into documentation and materials, training and organization, land assessment and management, and the certification process.

As for recurrent costs, those were classified into a group level and a farm level.

Table 2.3: Important upfront and recurrent cost items for ISH certification

Costs	Category	Item
Upfront costs	- Documentation & materials	- Farmers' document - Group certification document - Materials and facilities
	- Training & organization	- ICS establishment - ICS training - Group member training
	- Land assessment and management	- HCV identification, and management - EIA, SIA
	- Certification process	- Internal assessment I & II - RSPO register fee - Pre-audit - Remedial CARS - Main audit (third party)
	- At a group level	- RSPO fee - Annual surveillance audit - Certification audit (once in 5 years) - Labor cost for group management and ICS
Recurrent costs	- At a group level	- RSPO fee - Annual surveillance audit - Certification audit (once in 5 years) - Labor cost for group management and ICS
	- At a farm level	- Increased or decreased depends the agricultural practices applied prior to certification, and on the emphasis that is put on improving ag. practices in the certification process

Source: Rietberg, et al. (2016)

Concerning RSPO certification, it potentially has economic benefits for independent smallholders. Those include increased yield, improved market relations, access to inputs, training, and finance, and price premiums through the sale of Green Palm certificates. But there is little conclusive evidence for these benefits. This was partly due to a lack of data.

Smallholders were likely to benefit most from certification projects if they focused on the adoption of GAPs and creating enabling conditions for increasing yield. There was a large potential for improvement in smallholder yields and agricultural practices in Indonesia and Malaysia. A scenario study showed investing in GAPs could pay off, although revenues do not outweigh costs in the initial years.

Hutabarat et al. (2018) also assessed the costs and benefits of the certification of oil palm ISH in Indonesia.

The results revealed that the upfront costs of certification were 86 EUR per ha. Moreover, despite generating up to 21% higher revenues from sales, a certification created up to an 8% loss of net income per ha on average per smallholder in the first year after certification, compared to the situation before certification. To motivate smallholders for RSPO certification, the economic performance of certified oil palm smallholders should be improved. This can result from further yield increases, and a guaranteed premium price to provide additional income.

Abazue et al. (2019) published a research paper about "Oil palm smallholders and certification: Exploring the knowledge level of independent oil palm smallholders toward certification". This research was investigated in Malaysia.

The results revealed that most of the independent smallholders do not have certification, with a reasonable number of them having little or no knowledge of certification (RSPO or MSPO). The study also revealed that though policies are in place to support smallholders participation in certification for them to gain the enormous benefits, including wider market access, quality fresh bunches, and technical skills, more should be done in terms of implementation in reaching out to the smallholders, especially through sensitization programs, including workshops and extension services, to properly educate smallholders on the benefits of certification since they are an important player in the global palm oil market.

A strong indication that smallholders in the study area, Sarawak, have a low level of awareness of certification, whether in regard to RSPO or MSPO. In recent times, smallholders have begun to show interest in participating in oil palm certification.

It is important that the government and policymakers in the industry continue in their efforts to get more smallholders to participate in certification by providing the necessary incentives, especially because of their role in the overall contribution to the country's economy. Smallholders should also be provided with facts about how a lack of best practices affects the environment; this becomes critical considering that the majority of farmers disagree that their farming practices have any negative impact on the environment.

In addition, a research paper entitled "Independent oil palm smallholder management practices and yields: can RSPO certification make a difference?" by Rosanne, et al. (2021) aimed to determine if and how certified smallholders perform differently from their non-certified counterparts in terms of management practices and yields, and to what extent this is related to RSPO certification.

This research paper concluded that the certified smallholders had significantly higher management scores and higher yields. They scored better on aspects that facilitate higher yields, such as good-quality planting materials and good nutrient management. The pre-certification conditions of the certified smallholders, such as prior experience as plasma smallholders, high-level group organization, and access to agricultural inputs and credit through the cooperative, may explain higher scores for management practices and higher yields. In contrast, in areas where smallholders are relatively new to oil palm, where the infrastructure and supply chain around palm oil are not yet well established, where smallholders are not organized in groups, and where they lack the required legal documents, it

will be more challenging for smallholders to achieve certification. Further examination into how RSPO certification can include smallholders that have less-favorable precertification conditions is needed.

Another paper was "Financial costs and benefits of the Roundtable on Sustainable Palm Oil Certification among independent smallholders: A probabilistic view of the Monte Carlo approach" by ShengTey et al. (2022).

In this paper, the authors emphasize that financial impacts continue to be a crucial issue in encouraging ISH to adopt sustainability or RSPO standards. Departing from past studies, which leveraged a single-point average estimate, this study examines, through a probabilistic view, independent smallholders' financial costs and benefits that are associated with their RSPO certification. Using the Monte Carlo approach with backtracked information that treated 2019 as the base, a range of net present values was estimated. In comparison with "to-be-certified" (prospective) and non-certified independent smallholders, the findings indicate that certified independent smallholders are associated with a higher range of net values at a 95% confidence level. Such relative over-performance has a high likelihood of persisting, even under scenarios of a self-funding model and/or the removal of any price premium. Conceptualizing the financial impacts associated with RSPO certification along a continuum may help to move advocacy in a more productive direction by emphasizing the financial risks and growth opportunities. Such an approach allows for greater consideration of smallholders' variable conditions and needs.

2.4.2 Benefits and costs of RSPO Standard certification for ISH in Thailand

1) Benefits of RSPO Standard certification for Thai ISH

So far, a few studies have been undertaken to examine the benefits of RSPO Standard certification to smallholders. Some examples are reviewed as follows:

The first research that highlighted the benefit of RSPO Standard certification for Thai smallholders was "Impact Study of the Project on Sustainable Palm Oil Production for Bioenergy in Thailand" by Thongrak and Kiatpathomchai (2012). In this project, the first four ISH groups in the world were RSPO-certified.

The impact study revealed that the smallholders, members of the RSPO group, realized and accepted the key concepts of sustainable palm oil production and the principles and criteria of the RSPO Standard (even though they were new to them at the beginning of the project). They were very positive about the knowledge gained from joining the group.

The most significant changes in management practices after joining the group were: farm record keeping; fertilizer management; oil palm farm management, such as re-arrangement of oil palm fronds and leaves and reduced chemical usage; practices related to OHS issues; and changed soil, water, and environmental practices. Major changes in fertilizer management were the use of fertilizer according to soil and leaf analysis, the use of strength fertilizer, and organic fertilizer. On average, the smallholders applied more fertilizer, namely 5.0 and 6.3 kg per tree per year in 2010 and 2011, respectively.

These changes contributed positively to the oil palm yield and the income of the smallholders. The smallholders gained an increase in income due to yield increases of 412 kg per rai on average and an additional price of FFB 50 THB per ton. From these factors, the smallholders' income increased by 94,536 THB per household per year (from a 39-rai oil palm production area). The smallholders also saved on the cost of production from discounted prices for fertilizer purchases, which accounted for 10,810 baht per household per year (from a 39-rai oil palm production area), or 10-15% below the market price.

In addition, the smallholders obtained extra services and benefits from the group, such as free soil and leaf analysis, a free empty bunch, savings on chemical costs, and being able to sell FFB during peak through Fast Track. The smallholders and workers could also improve their lives by practicing RSPO P&C, namely reducing the health risks due to the appropriate use of chemicals and using more caution in regard to work safety.

Moreover, the project (the ISH certification process) created intangible impacts on the pilot farmer groups and communities. The major benefits to the farmer groups and communities were the existence of the center for oil palm and the sharing of sustainability knowledge among members. There were also some oil palm BMP members within each group so that other smallholders could visit and learn. In addition, the smallholders, who were members of the farmer groups, opened up the opportunity for them to expand their oil palm network. The smallholders have also learned about the power of bargaining and negotiation while being in a farmer group.

In sum, this impact study reveals that the smallholders, members of the RSPO group, adopted good practices and gained substantial benefits. These include: 1) access to high-quality training and knowledge improvement; 2) access to high-quality and cheaper inputs such as chemical fertilizer, seedlings, etc.; 3) improving FFB quality; 4) receiving a higher price of FFB; 5) increasing FFB yield; and 6) health benefits from reducing the use of chemicals.

Furthermore, research relating to the "Development of Smallholders through Participation in Sustainable Oil Palm Production: A Case Study of the Members of Tapitak Palm Community Enterprise, Trang Province" by Thongrak et al. (2018) confirmed similar results regarding the benefits to smallholders by moving towards sustainable oil palm production through group processes. This study attempted to solve the fundamental problems of smallholders in oil palm production by sharing knowledge and encouraging them to adopt sustainable oil palm management practices (SMP). The study emphasized public, private, and smallholder participation (Agri-PPPs). This study carried out several important activities, such as selecting the palm oil crushing mill and smallholders, creating the farmers' group, setting up the group administration according to the RSPO Standard, preparing training materials, arranging training and excursions, monitoring, and evaluation. Data were collected from a total of 101 members of the farmer group. Statistical tools such as descriptive statistics and t-tests were employed. The findings showed that most of the smallholders' problems in oil palm production could be solved by the group's process and with the support of the palm oil crushing mill and the research project.

It was also found that after obtaining appropriate knowledge of SMP, the smallholders considerably changed their practices in oil palm production, particularly in adjusting oil palm plantation management, recording farm data, improving the application of chemical fertilizer by using strength fertilizers, and stopping and reducing chemical uses. As a result, the farmers' productivity in oil palm production increased, as did the environmental quality. The smallholders were also satisfied with being members of the group. In addition, the farmers' group acted as a center for sharing knowledge and experience. Therefore, the smallholders themselves can solve their problems in oil palm production. More importantly, they have learned and realized the power of working as a group. Additionally, the partner crushing mill obtained the target quantity and quality of oil palm fresh fruit bunches.

Thongrak et al. (2019) conducted research entitled "Study of the Implementation of Principles for Sustainable Production of Oil Palm and Palm Oil (TSPO)". This study developed the trial on the two oil palm smallholder groups towards the TSPO standard and assessed the impacts of the research project on the stakeholders and spillovers.

The results revealed that for the first farmers group, TSPO Palmdee Srinakorn, after joining the project, the farmers managed the oil palm plantation more appropriately and sustainably in various aspects, such as using oil palm fronds to cover the entire plantation, applying fertilizer according to the observation of oil palm leaf symptoms, replacing bulk compound with strength fertilizer, reducing chemical use, and applying more IPM. Nearly all farmers still sell FFB to the partner mill. More farmers should keep oil palm records, participate in group activities, and revise and improve their plantation management annually. In addition, some key problems could be solved. More proper practices have been applied, such as oil palm plantation management, applying fertilizer, visual leaf analysis, putting cut-frond to block soil erosion and increase soil humidity, reducing the use of herbicide, increasing awareness of occupational health and safety practices, and production planning.

The results also showed that the FFB yield from oil palm plots in the project increased from 3,759 kg/rai in 2018 to 4,557 kg/rai in 2019 (significant at $\alpha = 0.01$). All farmers are satisfied with the project.

As for the second farmers group, TSPO Satun, after joining the project, the farmers manage the oil palm plantation more appropriately and sustainably in various aspects, however, the proportion of those adopted SMP was less than those in the first group.

The farmers in this group have also shown better performance in terms of FFB yield. Oil palm yield increased from 2,672 kg/rai in 2018 to 3,127 kg/rai in 2019 (significant at $\alpha=0.01$). Almost all farmers are satisfied with the project.

Recently, a related article on "Governing sustainability in the Thai palm oil supply chain: the role of private actors" by Npueng et al. (2022) revealed comprehensive factual findings with regard to Thai palm oil sustainability.

In this article, the CSPO and NCPO value chains in Thailand concerning input supply and production, collection and sales, processing and storage, and distribution were compared. The results showed that the CSPO value chain in Thailand indicates efficiency and quality compared with the NCPO value chain. The integration of sustainability through the RSPO

certification system creates innovations in the management and private governance arrangements of the palm oil value chain and offers opportunities to access new markets. The RSPO, as a voluntary certification scheme, offers smallholder farmers in Thailand an interesting opportunity to increase productivity and promote sustainability because it formalizes the collaboration between private actors in the Thai palm oil value chain. The findings support the idea that stakeholders involved in the chain have major roles in transforming the palm oil supply chain. Governing sustainability in the Thai palm oil chain relies on the involvement of private actors, and public authorities are not engaged. This study, thus, shows that the international market is an active driver in promoting sustainability in supply chains. Only when there is a substantial dependence on exports of palm oil and when key value-chain actors are concerned about their CSR goals is the process of moving toward more sustainability actively driven by private companies and NGOs and supported by the government. It is questionable whether smallholder producers will take such initiatives themselves.

The private actors, especially the millers, have the main role in promoting and governing the CSPO value chain. They are involved in getting the smallholder groups certified, mainly to strengthen their reputation and improve their relationship with farmers. The CSPO chain is shorter and more transparent than the NCPO chain because its FFB is collected without passing through ramps.

This research also found that the CSPO chain has several advantages, including 1) smallholder farmers' improved profit, 2) good relationships between farmers and millers, 3) strong networks among certified farmers and others, 4) training opportunities aimed at transferring knowledge and new technologies to increase the productivity of oil palm cultivation, 5) easy access to inputs for producers, 6) pride of certified farmers in their sustainable practices, 7) an increase in the quality of FFB, and 8) the creation of CSPO value-chain links to international markets. In addition, this paper cited Schmidt and De Rosa (2020) (Tan et al. 2009), which confirmed that RSPO-certified oil produced in Indonesia and Malaysia reduces GHG emissions by 35% compared to the non-certified alternative.

2) Cost of RSPO Standard certification for Thai ISH

With regards to the cost of ISH Standard certification for Thai smallholders, not much research has been done so far. There was no detail on the cost structure. It was only reported that the cost was too high to achieve it, especially the cost of the audit (see details in Section 5.2.2).

2.4.3 Challenges faced by ISH in complying with RSPO Standard requirements

1) Challenges faced by ISH in complying with RSPO Standard requirements in other countries

Some studies addressed the challenges faced by ISH in complying with RSPO Standard requirements.

In a report entitled "Sustainability Certification in the Indonesian Palm Oil Sector" by Brandi et al. (2013), the challenges for smallholders were also reviewed.

This paper demonstrated many gaps between the standard requirements and current practices. Examples of the gaps are land titles, documentation, capacity, information gaps, motivation and incentives, financing gaps, etc.

A research paper entitled "Assessment of Smallholders' Barriers to Adopt Sustainable Practices: Case Study on Oil Palm (*Elaeis Guineensis*) Smallholders' Certification in North Sumatra, Indonesia" by Chalil (2013) revealed some barriers to the adoption of sustainable practices.

In 2013, only a few smallholders obtained the certificate. One possible reason is that the RSPO P&C might be too complex for smallholders. This study found that lack of information, cost of adoption, incompatibility with the stage of farm development, social values, and farming conditions, inadequate managerial skills, and profitability were the barriers for smallholders to adopt the RSPO's P&C. These barriers need to be addressed to improve the adoption of sustainable practices among oil palm smallholders.

Blandi et al. (2015) wrote an article on "Sustainability Standards for Palm Oil: Challenges for Smallholder Certification under the RSPO".

The empirical findings suggest that smallholders, and specifically independent smallholders, often lack both the information and the degree of organization that certification demands. The article also identifies the most important compliance challenges for independent smallholders in relation to land titles, seedlings, pesticide usage, fertilization, and documentation and outlines how smallholders can be supported so that they can be included in certification schemes.

Rietberg et al. (2016) wrote a paper about "Barriers to Smallholder RSPO Certification." This paper mainly focuses on Indonesia but also utilizes material from Thailand, Malaysia, and Ghana.

The results revealed that there are at least eight barriers to smallholder RSPO certification. These are as follows:

- 1) Lack of smallholder organization and the costs and skills needed to meet RSPO's organizational demands hamper smallholder certification, especially for independent smallholders.

- 2) Proving compliance with laws and regulations was difficult in smallholder certification projects. Where smallholders do not possess the necessary legal documents, obtaining those is costly and time-consuming, and it can be impossible when land use is contested.

- 3) Most uncertified independent smallholders do not use appropriate best practices or keep records. Adoption of best practices proved both crucial and challenging for smallholder certification projects. These challenges are linked to smallholders' motivation and to wider agronomic and institutional constraints.

4) Smallholders lack the skills and knowledge to conduct HCV assessments and digital mappings. Little is known about the conservation of wildlife and HCV areas by certified smallholders.

5) Requirements about conditions that cannot easily be changed, notably prior land use and the availability of legal documents, led to the exclusion of an estimated 5–10% of farmers from certified groups. Larger numbers of smallholders are expected to be excluded when the whole smallholder population is considered.

6) Smallholders need organizational and technical support to meet RSPO requirements, but funding and capacity to provide this support are limited.

7) Certification costs, in combination with low CSPO uptake and low premium prices, hamper smallholder certification. Smallholders' motivation to comply with certification requirements is hampered by limited visible benefits, while time and/or financial investment are required.

8) Consideration of smallholders' needs and perspectives in designing rules and procedures at the RSPO is essential to spur smallholder engagement and certification.

Apriani et al. (2020) wrote a research article on "Non-state certification of smallholders for sustainable palm oil in Sumatra, Indonesia".

The results revealed that most of the challenges of RSPO certification are not well understood by smallholders, except for the need for organizational support. In both sites, extensive external support from a local NGO was the key factor that facilitated RSPO certification. Most of the respondents recognize both non-financial (e.g., knowledge, market access, and social recognition) and financial benefits (e.g., sales from RSPO credits) of certification. Although direct financial benefits may be small, they can be a motivator for farmers to continue with certification and for others to consider joining the group when disbursed equitably in non-monetary and communal forms, such as shared food. In contrast, indirect and long-term benefits were not enough to motivate smallholders to maintain RSPO certification.

Raharja et al. (2020) published an article entitled "Institutional Strengthening Model of Oil Palm Independent Smallholders in Riau and Jambi Provinces, Indonesia". The results revealed the following:

There are many institutional issues that have a considerable influence on the bargaining positions of independent smallholders in the oil palm supply chain. Some important issues that need attention are the legality of land, the low quality of FFB production (which impacts the selling price), the dilemma of the platform's existence as an intermediary between independent smallholders and oil palm processing companies (which lengthens the supply chain and negatively impacts sufficient price separation), and the lack of organizational managerial ability (which causes independent smallholders to distrust cooperatives), as well as other technical capability issues related to GAP that have an impact on the quality of FFB production.

Problems that occur at the level of business actors have a direct or indirect impact on independent smallholders because of problems at the strategic level. The issue of cross-sectoral coordination and harmonization, which has an impact on the establishment of policy rules, is a

fundamental problem that must be addressed jointly by the relevant governments. Because of this, institutional improvement is absolutely necessary, both in the context of the vertical relationship between the government and business actors in the oil palm agro-industry supply chain as well as horizontal relationships at the government level and the level of business actors in the supply chain.

Bakhtary et al. (2021) published an article entitled "Promoting sustainable oil palm production by independent smallholders in Indonesia: Perspectives from Non-State Actors." In this paper, the authors highlighted the key challenges for forest-friendly independent smallholders. These include:

- 1) The lack of access to finance and technical support remains a key barrier to smallholder productivity, which is a major factor driving the expansion into forests.
- 2) The lack of tenure documentation continues to be an obstacle for independent smallholders to access finance for intensification.
- 3) The lack of organization among independent smallholders hinders collective action to improve productivity and environmental practices.
- 4) Companies face challenges in establishing smallholder traceability and helping them comply with sustainability requirements.
- 5) Independent smallholders face barriers and lack incentives to join certification schemes.

2) Challenges faced by ISH in complying with RSPO Standard requirements in Thailand

Wangrakdiskul and Yodpojit (2015) wrote an article concerning "Trends Analysis and the Future of Sustainable Palm Oil in Thailand". This article reveals that oil palm farmers should comply with RSPO standards. However, there are limitations to the farmers' implementation of the standard. Because most of them are smallholder farmers and have many constraints, such as a lack of budget, low education, and a negative farming attitude.

Kunsaengkaew et al. (2019) conducted research relating to the "Practices of Smallholders in Surat Thani Province, in Compliance with the RSPO Standard for Sustainable Palm Oil Production". Regarding the barriers of the smallholders in adopting the RSPO Standard, the results showed that a lack of knowledge regarding the P&C of the RSPO Standard and unfavorable certified FFB prices are the key challenges.

Recently, a related article on "Governing sustainability in the Thai palm oil supply chain: the role of private actors" by Npueng et al. (2022) revealed several barriers to moving ISH towards RSPO certification. These include the following:

- 1) Mills provide limited support. In addition, the large distance between the smallholder's oil palm plantation and the mill makes it impossible to deliver FFB to the mill and inconvenient to attend group activities such as training, meetings, and monitoring activities.
- 2) Adequate access to the required knowledge and information is often problematic. For example, most smallholders are not informed about RSPO certification.

3) The Thai government is barely promoting RSPO certification despite the numerous government agencies working closely with the smallholders.

4) The seasonal nature of the production cycle leads to an FFB oversupply in some months and an undersupply in others, affecting the price of FFB. Most smallholders emphasize that farmers' income is more important than environmental sustainability, considering the small premium price for certified FFB.

5) Accessing the global market is challenging. Most Thai palm oil is sold on the domestic market because, on the global market, CPO produced in Thailand cannot compete with other producing countries.

6) CPO mills are barely motivated to engage in promoting, organizing, advising, and managing the process of certification throughout the chain because there seem to be few advantages for them.

7) The RSPO requirement to form groups of farmers is seen as difficult. As most farmers do not join a group, they do not have the opportunity to become certified. In addition, smallholders are particularly concerned about the expensive membership fees and the costs of the certification-auditing procedure.

This research confirms that the CSPO chain is innovative in driving sustainability in the production, processing, distribution, and governance of palm oil in Thailand. Nevertheless, the structural characteristics of the Thai palm oil supply chain do not appear at present to be favorable for expanding the CSPO chain.

In addition, Chaivijitmalakoon et al. (2022) analyzed the problems with Thai oil palm development toward the RSPO standards. The problems are reviewed as follows:

The Thai oil palm industry faces various problems and is unable to develop sustainable production standards. This study also found that the problem of obtaining the RSPO certification in Thailand is complex and involves many groups of people. In the past decade, the problems have not been resolved, and the RSPO-certified land area in 2021 was only 3.97% of the country's total planted land. Although there was currently a solution to the oil palm problem through the Oil Palm and Palm Oil Reform Strategic Plan for 20 years, it lacked clear details in solving some issues of oil palm, such as a lack of labor and funds for doing RSPO, arable land that tends to decrease, farmers lack of motivation for sustainable production, policy conflicts, high transportation costs, etc.

Hence, these issues should be promoted, such as creating a new generation of farmers, motivating farmers, supporting funding, allocating land to farmers for rent, reviewing conflicting policies, encouraging farm management, and promoting joint transportation, etc. These solutions will increase the chances of entering the RSPO.

The results from these reviews are used for Chapter 5 of this study.

2.5 Theory of change and the concept of livelihood

2.5.1 Theory of Change

The Theory of Change (ToC) is a comprehensive description and illustration of how and why the desired change is expected to happen in a project development context. It is now widely used in impact evaluations. ToC is a flexible approach meant to be useful for impact evaluation in the design, implementation, and evaluation of development activities. This guidance offers a means for evaluators to assess and decision-makers to think through the hypotheses of change and assumptions that underpin their work. As many sources indicate, ToC describes the set of assumptions that explain both the intervention steps that lead to the long-term goal and the connections between program activities and outcomes that occur at each step of the intervention. Understanding the causal links was important from the input and activities; early presentations tended to be simple illustrations of what outputs were expected to lead to what outcomes and long-term impact on outcome chains (White H., 2009; Rogers P., 2014).

Regarding the RSPO roadmap, *Figure 2.1* showed that the ToC is a roadmap to demonstrate how RSPO will achieve its vision: to make sustainable palm oil the norm. The ToC infographic and supporting narrative outline the key strategies and activities RSPO will implement, together with the support of members, partners, and other actors, to trigger the transformation of the palm oil sector.

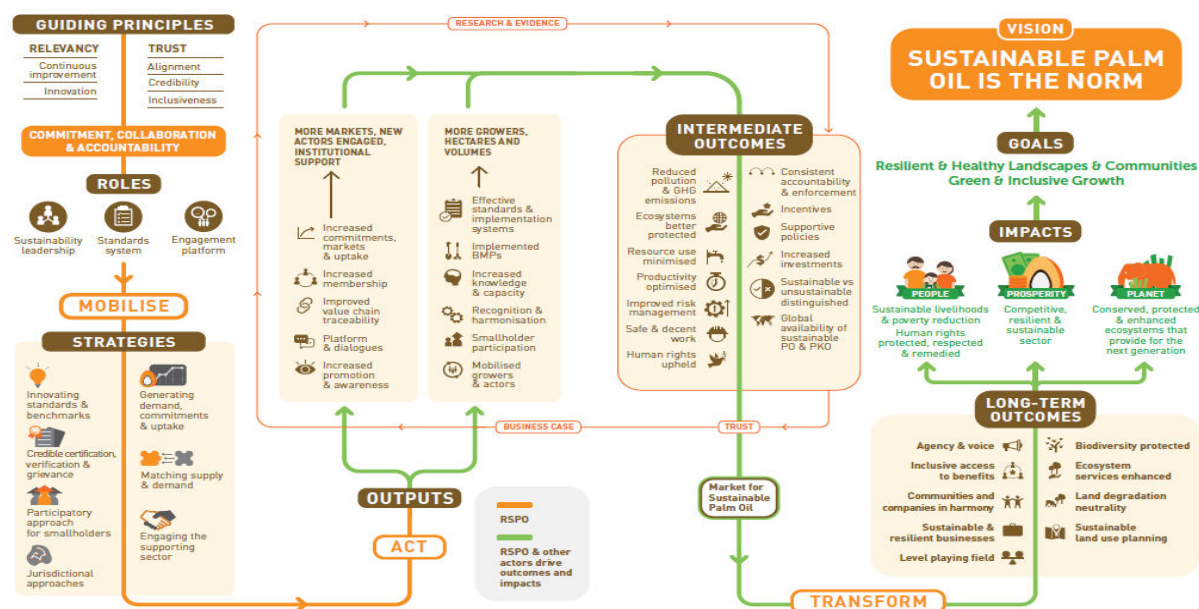


Figure 2.1: RSPO Roadmap by ToC

Source: RSPO, 2022c

The strategies are intended to bring about direct outputs in the form of increased adoption of the RSPO standards, greater transparency and inclusivity in the RSPO system,

increased market uptake of sustainable palm oil, and an improved enabling environment. RSPO's outputs lead to outcomes that are expected to improve the quality of life of oil palm farmers, create a more prosperous palm oil industry, and enable us to better conserve our planet and its resources. These benefits are then reciprocated by companies and consumers in the palm oil supply chain as they realize the importance of sustainable sourcing, which leads to increased market demand for sustainable palm oil. When the ToC is fully realized, it delivers change where the oil palm industry, the environment, and local communities can co-exist in harmony (RSPO, 2022).

2.5.2 Sustainable livelihood approach

The livelihoods approach is a way of thinking about the objectives, scope, and priorities for development. The definition of livelihood in this study is adapted from Chambers, R., and G. Conway (1992) and the DFID (2007): *"A livelihood comprises the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future while not undermining the natural resource base"*. The framework summarizes the main components of and influences on livelihoods in *Figure 2.2*. The starting point for all livelihoods (or livelihood analysis) is the vulnerability context, which, through a series of permutations, yields livelihood outcomes. Livelihoods are shaped by a multitude of different forces and factors that are constantly shifting. The people-centered analysis is most likely, to begin with a simultaneous investigation of people's assets, their objectives (the livelihood outcomes they are seeking), and the livelihood strategies they adopt to achieve these objectives. Important feedback is likely between (1) transformative structures and processes and the vulnerability context; and (2) livelihood outcomes and livelihood assets. Other feedback relationships affect livelihoods that are not shown (DFID, 2007).

1) Vulnerability context

Vulnerability is characterized as insecurity in the well-being of individuals, households, and communities in the face of changes in their external environment. People move in and out of poverty, and the concept of vulnerability captures the processes of change better than poverty line measurements. The vulnerability has two facets: an external side of shocks, seasonality, and critical trends; and an internal side of defenselessness caused by a lack of ability and means to cope with these. The vulnerability context frames the external environment in which people exist. People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality, over which they have limited or no control. Different components of the vulnerability context affect different people in different ways. Thus, natural shocks may have a more adverse effect on agricultural activity than on urban employment. Likewise, changes in international commodity prices will affect those who grow, process, or export such commodities but have a little direct effect on those who produce for, or trade in, the local market. Understanding the nature of vulnerability is a key step in sustainable

livelihood analysis. Most externally driven change in the vulnerability context is a product of activity at the level of transforming structures and processes (e.g., changes in policy). Another way of managing the vulnerability context is to help people become more resilient and better able to capitalize on its positive aspects. This is a core aim of the sustainable livelihood approach. It can be achieved by supporting poor people to build up their assets.

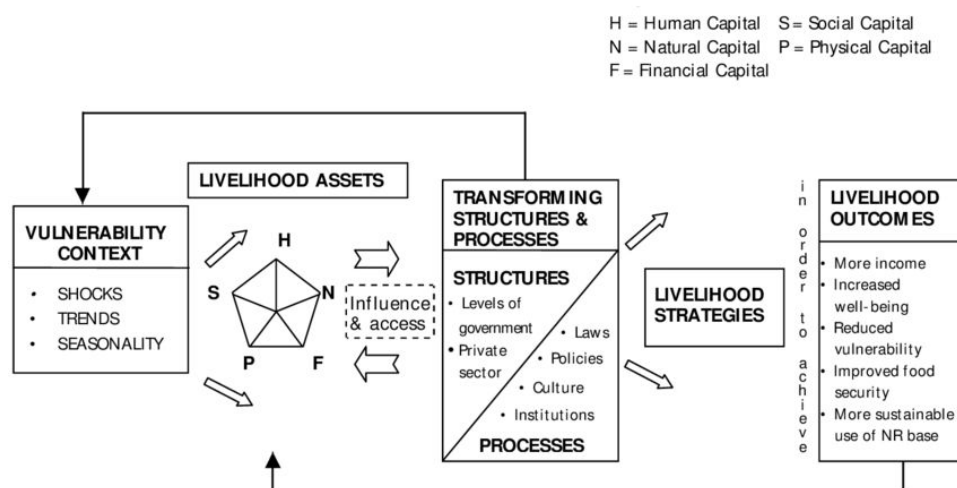


Figure 2.2: Sustainable livelihoods framework

Source: DFID, 2007

2) Capital assets

The livelihood framework identifies five core asset categories or types of capital upon which livelihoods are built (Serrat, O. 2008):

Human capital, e.g., health, nutrition, education, knowledge and skills, capacity to work, capacity to adapt

Social capital, e.g., networks and connections (patronage, neighborhoods, kinship), relations of trust and mutual understanding and support, formal and informal groups, shared values and behaviors, common rules and sanctions, collective representation, mechanisms for participation in decision-making, leadership

Natural capital, e.g., land and produce, water and aquatic resources, trees and forest products, wildlife, wild foods and fibers, biodiversity, environmental services

Physical capital, e.g., infrastructure (transport, roads, vehicles, secure shelter and buildings, water supply and sanitation, energy, communications), tools and technology (tools and equipment for production, seed, fertilizer, pesticides, traditional technology)

Financial capital, e.g., savings, credit and debt (formal and informal), remittances, pensions, and wages

The approach is founded on the belief that people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek. This is particularly true for poor people, whose access to any given category of assets tends to be very limited. As a result, they

have to seek ways of nurturing and combining what assets they do have in innovative ways to ensure survival. Assets combine in a multitude of different ways to generate positive livelihood outcomes. Two types of relationships among assets are sequencing and substitution. Livelihood analysis emphasizes the relationship between assets and other framework components, such as DFID (2007).

3) Transforming structures and processes

Transforming structures and processes within the livelihoods framework are the institutions, organizations, policies, and legislation that shape livelihoods. The influence of transforming structures and processes extends throughout the framework. They affect all levels, from the household to the international arena, and in all spheres, from the private to the public. They effectively determine accessibility to assets, the exchange between capital, and economic return by a given livelihood strategy, including providing a direct impact on whether people can achieve a feeling of inclusion and well-being. A policy and institutional environment that supports multiple livelihood strategies and promotes equitable access to competitive markets for all. Livelihood strategies and outcomes are not just dependent on access to capital assets or constrained by the vulnerability context; they are also transformed by the environment of structures and processes. Structures are the public and private sector organizations that set and implement policy and legislation, deliver services, and purchase, trade, and perform all manner of other functions that affect livelihoods. Processes embrace the laws, regulations, policies, operational arrangements, agreements, societal norms, and practices that, in turn, determine how structures operate. Policy-determining structures cannot be effective in the absence of appropriate institutions and processes through which policies can be implemented. Processes are important to every aspect of livelihood. They provide incentives that stimulate people to make better choices. They grant or deny access to assets. They enable people to transform one type of asset into another through markets. They have a strong influence on interpersonal relationships.

4) Livelihood strategies

Livelihood strategies comprise the range and combination of activities and choices that people undertake to achieve their livelihood goals. Livelihood strategies aim to achieve livelihood outcomes. They have to be understood as a dynamic process in which people combine activities to meet their various needs at different times and on different geographical or economic levels, whereas they may even differ within a household. Their direct dependence on asset status and transforming structures and processes becomes clear through the position they occupy within the framework. Scoones (1998) explained that three broad clusters of livelihood strategies are identified. These are agricultural intensification/extensification, livelihood diversification, and migration. These are seen as covering the range of options open to rural people.

5) Livelihood outcome

Livelihood outcomes are the achievements of livelihood strategies, such as more income, increased well-being, reduced vulnerability, improved food security, and more sustainable use of natural resources. Scoones (1998) suggested that five key elements of the definition can be recognized as livelihood outcomes, comprising the creation of working days, poverty reduction, well-being and capabilities, livelihood adaptation, vulnerability and resilience, and natural resource base sustainability. The first three focus on livelihoods, linking concerns over work and employment with poverty reduction and broader issues of adequacy, security, well-being, and capability. The last two elements add the sustainability dimension, looking, in turn, at the resilience of livelihoods and the natural resource base on which, in part, they depend. Livelihood outcomes directly influence the assets and change their level dynamically, offering a new starting point for other strategies and outcomes.

Regarding a holistic and integrated view of the sustainable livelihood approach, the applications of the framework are manifold and not restricted to livelihood thinking only, as the approach includes ideas from other recent theoretical approaches. Its flexible design and openness to changes make it adaptable to diverse local settings, where it can be applied to different extents associated with development research or project objectives (DFID, 2007). Some documents showed that oil palm-rubber farming showed higher physical capitals, household assets, and productive resources on average than other farming systems, but the social capitals were quite low (Kongmanee, C., et al., 2022). Chaya, W., and Gheewala, S. H. (2022) stated that group formation is key to enhancing farmer livelihood sustainability in Thailand. Ogahara, Z., et al. (2022) argued that palm oil production can both decrease and increase smallholders' livelihood security. The opportunity to diversify and generate off-farm incomes may be an important factor in improving livelihood security and financial benefits from oil palm production. A major advantage of oil palm is that it gives a higher return on labor than competing cash crops such as rubber, where labor is often a key constraint for smallholder production. Furthermore, Chiriaco, M. V., et al. (2022) stated that oil palm production plays an important role in economic growth and rural livelihoods in developing producer countries, substantially contributing to poverty reduction and food security. This leads to enhanced socio-economic livelihoods for a community in the production areas, with a consequent increase in education quality, poverty reduction, and better access to food and healthcare systems.

CHAPTER 3

Research Methodology

This chapter consists of three parts. The first part is about data collection, whereas the second and third elements involve its analysis and the conceptual framework, respectively, as follows:

3.1 Data collection

To achieve the objectives of this research, the scope and data collection for each objective are summarized in *Table 3.1*. Details of the study areas, including the number of RSPO-certified groups and members and the oil palm production areas of the members, are revealed in *Table 3.2*. In *Table 3.3*, the numbers of RSPO-certified groups that were chosen and the surveyed samples for each group and the non-certified smallholders in the same areas are summarized.

3.1.1 Data collection summary

Table 3.1 summarizes the scope and data collection for each objective, including desktop and primary data collection. The primary data were collected through a personal interview, an in-depth interview, and a focus group meeting.

Table 3.1: Scope and data collection summary

Objectives	Content/scope	Data collection		
		Desktop	Primary data	
			In depth-interview	Personal Interview
1. To understand palm oil production and consumption trends and to review the environmental, economic, and social impacts in different parts of Thailand.	(1) Trends of palm oil production and consumption in Thailand from 2017 to 2022.	/		
	(2) Economic, environmental and social impacts of palm oil production in different parts of Thailand. a. Socio-economic impact (e.g., income, market access, employment) b. Environmental impact (e.g., deforestation, loss of biodiversity)	/		
2. To assess the benefits and challenges (including costs) faced by Thai smallholders in relation to RSPO certification – with a particular focus on the implementation of the RSPO ISH Standard.	(6) Cost and benefit of ISH Standard certification for Thai smallholders a. certification (external and internal audits) b. Formation/organization/maintenance (including additions of members) of a group c. Assessments required for compliance with criteria and indicators d. Training of ISH group members as per indicator requirements	/	/	/
	(5) Challenges faced by certified Thai smallholders in complying with ISH Standard requirements. a. Social requirements b. Labor requirements c. Environmental requirements d. The Internal Control System (ICS) requirements for ISH groups	/	/	/

Table 3.1: Scope and data collection summary (cont.)

Objectives	Content/scope	Data collection		
		Desktop	Primary data	
			In depth-interview	Personal Interview
3. To determine the impact of RSPO on the livelihoods of smallholders, comparing RSPO certified and non- RSPO certified farm households	(3) Profile of palm oil farmers (RSPO certified, prospective certified and non- certified) across different parts of Thailand. a. Previous livelihood activity prior to oil palm b. Total land holding size owned by ISHs by land use (types of crops planted) c. Trend in hiring of labor by an ISH d. Income source of an ISH e. Access to support	/	/	/
	(4) Uptake of RSPO certification by Thai smallholders, including assessment of the motivation behind uptake.	/	/	/
	(7) Impact of RSPO certification on livelihoods of smallholders in Thailand, comparing between certified, prospective certified and non-certified smallholders	/	/	/
4. To assess policy implications on productivity growth, forest protection, mosaic landscapes, land rights and sustainability certification in relation to the palm oil impact on livelihoods and the environment.	Oil palm development policy Assessment of policy implications for - new planting, productivity, and land rights. - production standard and sustainability	/	/	
5.To provide recommendations on reducing the environmental, economic and social impacts of oil palm plantations in Thailand, in particular on the elements for improvement in the ISH Standard.	(8) Recommendations on elements of the Standard and all requirements which require amendment during the next revision process	/	/	

3.1.2 Study areas

Since this study involves many aspects of the certified groups, the study areas are in five provinces in the southern region where most certified groups take place, namely Surat Thani, Krabi, Chumphon, Trang, and Nakhon Si Thammarat. In these provinces, there are 17 RSPO-certified groups, with a total of 5,272 smallholders and certified areas of 26,648.16 hectares (*Table 3.2*).

Table 3.2: Number of RSPO certified groups in Thailand, 2021

Province	No. RSPO-certified group	Members	Certified area (ha)
1. Surat Thani	7	2,622	12,273.36
2. Krabi	5	1,436	8,274.55
3. Chumphon	1	114	458.33
4. Trang	2	698	4,349.01
5. Nakhon Si Thammarat	2	402	1,292.91
Total	17	5,272	26,648.16

Source: RSPO, 2022

3.1.3 Primary data collection

Primary data were collected from various stakeholders during November 2022 and March 2023, namely certified and non-certified smallholders, certified group managers and committees, partner mills, government officials, and other related parties. The atmosphere during data collection is shown in *Appendix 3*.

In addition, the research team also participated in RSPO meeting and seminar.

These were mainly undertaken to achieve objectives 2 and 3 of this study. The details of the primary data collection are as follows:

1) The certified groups that were selected for data collection

A total of seven RSPO-certified groups in the study areas mentioned above that must have been certified for at least three years were chosen. Because three years are long enough to see both direct and indirect impacts from the adoption of the standards and practices, these groups included both well-established and newly certified groups. The well-established groups are those certified before 2019, while the new groups are those certified in 2019.

The groups in each province are presented in *Table 3.3* and *Figure 3.1*. There are two certified groups each in Surat Thani and Krabi, and one group each in Chumphon, Trang, and Nakhon Si Thammarat.

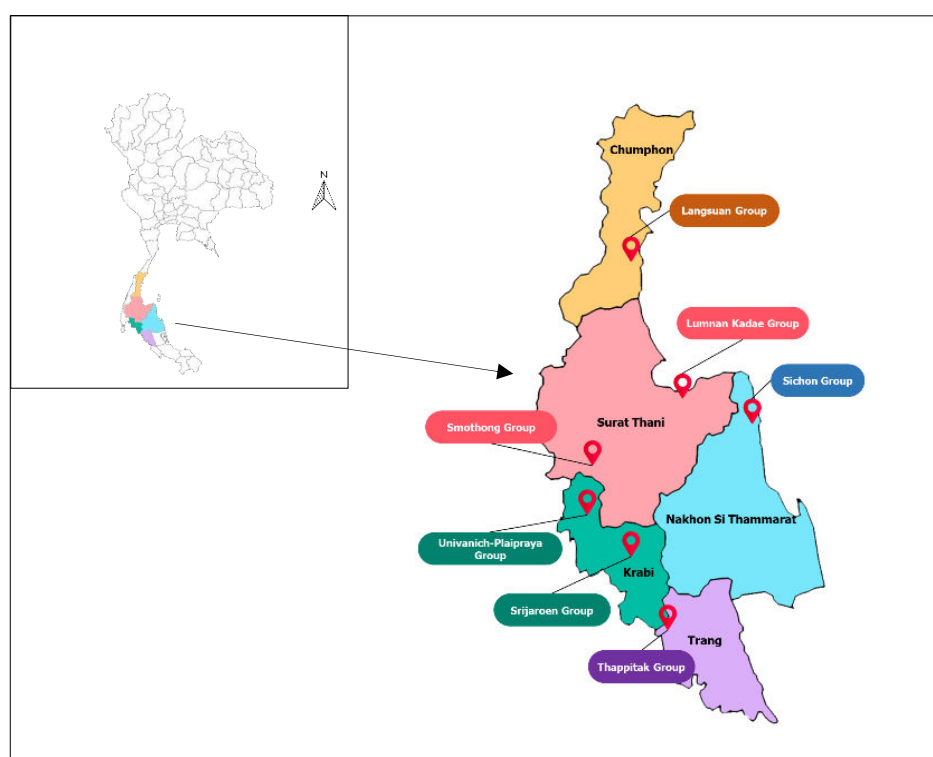
Among them, there are five well-established and two newly certified groups. These certified groups are used for arranging the focus group meeting and conducting personal interviews with both certified and non-certified smallholders.

Table 3.3: The certified groups selected for data collection

Province	Certified group
1. Surat Thani (2 Groups)	- Lumnamkadaepattana Oil Palm Community Enterprise Group (certified since 2015: well-established group) - Smothong Sustainable Oil Palm Production Community Enterprise Group (certified since 2019: new group)
2. Krabi (2 Groups)	- Srijaroen Sustainable Oil Palm Production Community Enterprise Group (certified since 2014: well-established group) - Univanich-Plaipraya Community Enterprise Group (certified since 2012: well-established group)

Table 3.3: The certified groups selected for data collection (cont.)

Province	Certified group
3. Chumphon	Langsuan Oil Palm Smallholders Community Enterprise (certified since 2019: new group)
4. Trang	Thappitak Community Enterprise Group (certified since 2016: well-established group)
5. Nakhon Si Thammarat	Sichon Palm Yangyuen Community Enterprise Group (certified since 2015: well-established group)

**Figure 3.1:** Study area in five provinces and location of the certified groups

2) A focus group meeting

To achieve objective 2, costs, benefits, and challenges faced by smallholders toward certification, the research teams arranged seven focus group meetings with the group managers and the committee. The total number of participants in all groups was about 50; 5–10 people joined each meeting. In each meeting, the group manager and the group leader joined the meeting.

Prior to the meeting, guidelines were sent to the group. The guidelines of the meeting include such topics as: general information about the ISH group; development and certification; selling certified palm oil; the group's income; costs (upfront and recurrent); benefits to members; challenges towards certification; suggestions; etc. For each meeting, it took at least 3 hours.

3) An in-depth interview

Apart from the focus group meetings, the research teams also conducted in-depth interviews with the partner mills, downstream industries, government officials at the national and provincial levels, the auditor, and representatives from non-government organizations such as the GIZ project. Altogether, the research teams interviewed 14 people. Before the in-depth interview, a list of questions has been directed to their preparation.

4) Personal interview

To achieve the third objective of analyzing the impact of RSPO on the livelihoods of smallholders, personal interviews with certified and non-certified smallholders were undertaken. A total of 302 smallholders, including 158 certified and 144 non-certified smallholders, were interviewed. The sample size for each group is shown in *Table 3.4*. The sample size of certified smallholders from each group and province was determined by considering the total number of certified smallholders; for example, in Surat Thani and Krabi, more samples were selected (see members of certified groups in *Table 3.2*). Moreover, the sample size for non-certified smallholders was chosen accordingly for the purpose of quantitative analysis, namely comparing the certified and non-certified smallholders regarding the key economic livelihood variables. The samples were taken using a convenient sampling technique.

A personal interview was conducted using two sets of structured questionnaires, one for the certified and another for the non-certified smallholders. The structure of these questionnaires is similar, but the details are different. The questionnaire has seven parts, including 1) socio-economic characteristics of oil palm smallholders, 2) oil palm growing practices, 3) oil palm trainings, 4) opinion towards RSPO certification, 5) problems facing oil palm smallholders, 6) support needs, and 7) farmer's suggestions and opinions towards RSPO certification for ISH.

Table 3.4: Number of sample sizes for certified and non-certified smallholders

Certified group/Province	No. of smallholders*		Total sample size
	Certified	Non- certified	
1. Surat Thani	53	39	92
- Lumnamkadaepattana Oil Palm Community Enterprise Group (certified since 2014)	28	24	52
- Smothong Sustainable Oil Palm Production Community Enterprise Group (certified since 2019)	25	15	40
2. Krabi	45	45	90
- Srijaroen Sustainable Oil Palm Production Community Enterprise Group (2014)	25	25	50
- Univanich-Plaipraya Community Enterprise Group	20	20	40
3. Chumphon: Langsuan Oil Palm Smallholders Community Enterprise (2019)	20	20	40
4.Trang:Thappitak Community Enterprise Group (2016)	20	20	40
5. Nakhon Si Thammarat: Sichon Palm Yangyuen Community Enterprise Group	20	20	40
Total	158	144	302

3.2 Data analysis

This study uses both descriptive and quantitative analysis. A descriptive analysis is based on percentage, frequency, mean, and standard deviation. A descriptive analysis was used to assess the demographics of the smallholders, oil palm practices, training, opinion towards the certification, problems, support needs, suggestions and opinions towards RSPO certification, and the costs and benefits in relation to RSPO certification for ISH.

However, to examine the impact of the certification on the livelihoods of smallholders, both descriptive and t-tests were employed. An independent t-test was applied for comparative analysis between the certified and non-certified smallholders, and between the well-established and newly certified smallholders regarding the key economic livelihood variables, such as yield, costs, and net income.

The details about the analysis of the costs and benefits in relation to RSPO certification for ISH and the impact of the certification on the livelihoods of smallholders are in Chapters five and six, respectively.

3.3 Conceptual framework

The conceptual framework of this study is illustrated in Figure 3.2. The research team has drawn this framework based on the Theory of Change (ToC) and the concept of livelihood, which have been reviewed in Section 2.5, Chapter 2.

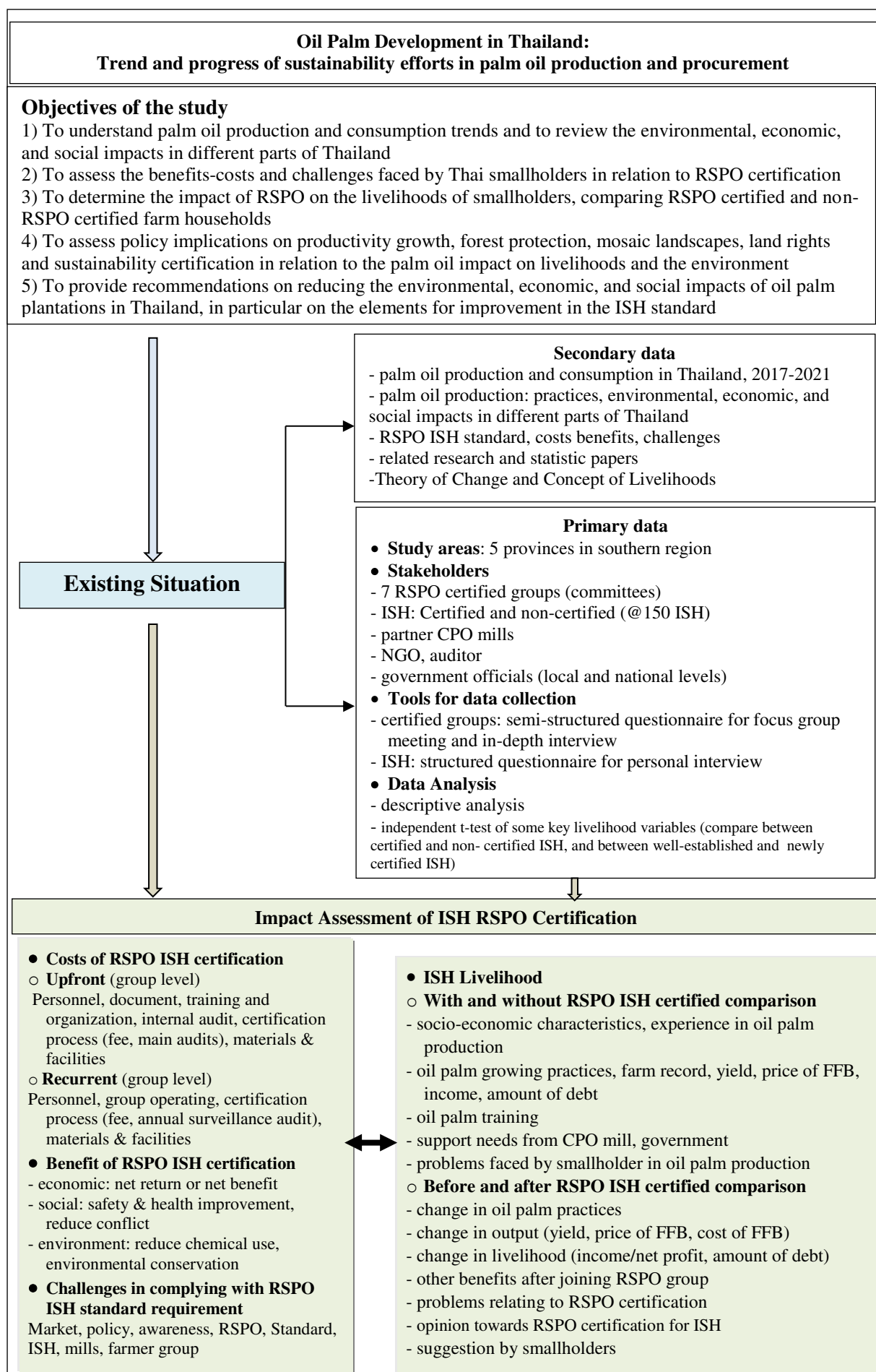


Figure 3.2: The conceptual framework

CHAPTER 4

Oil Palm and Palm Oil Production, Consumption, and the Economic, Social and Environmental Impacts in Thailand

Oil palm is an economic and industrial crop in Thailand. The industry developed in Thailand about 50 years after Malaysia, where it started more than a century ago. Thailand's oil palm supply chain includes all upstream, midstream, and downstream industries. Thailand ranks third in world palm oil production (produced about 4.30% of world production in 2021) after Indonesia and Malaysia, the top producers and exporters (84.32% of world production in 2021) (Office of Agricultural Economics, 2022).

This chapter summarizes an overview of oil palm and palm oil production, consumption, and the economic, social, and environmental impacts. It consists of six sub-sections. 1) the situation of oil palm production; 2) Thailand's palm oil production; 3) palm oil consumption and trade; 4) the price of CPO in Thailand; 5) the economic, social, and environmental impacts of oil palm production; and 6) a summary.

4.1 The situation of oil palm production

This sub-section has five topics: 1) planted and harvested area; 2) total FFB yield and productivity; 3) the number of oil palm growers; 4) difficulties and challenges faced by smallholders; 5) the cost of FFB production; and 6) FFB selling and prices received. Details will be presented as follows:

1) Planted and harvested areas

During the past decade, oil palm planted area increased sharply from 701,728.6 ha (4.38 M. rai) in 2012 to 1,018,777.0 ha (6.367 M. rai) in 2021, or at an average rate of 4.66% per year (*Table 4.1*). It shows an upward trend in planted and harvested areas. The majority of the planted area—**85.5% of the country's planted area in 2021—is in the southern region**. The rest of the planted area is in the central, northeast, and north, which accounted for 9.0%, 4%, and 1.5%, respectively, in 2021 (*Table 4.1*). Oil palm has been planted in 74 out of the 77 provinces of Thailand, where the top 5 planting provinces are Surat Thani, Krabi, Chumphon, Nakhon Si Thammarat, and Phang Nga, respectively (*Figure 4.1*).

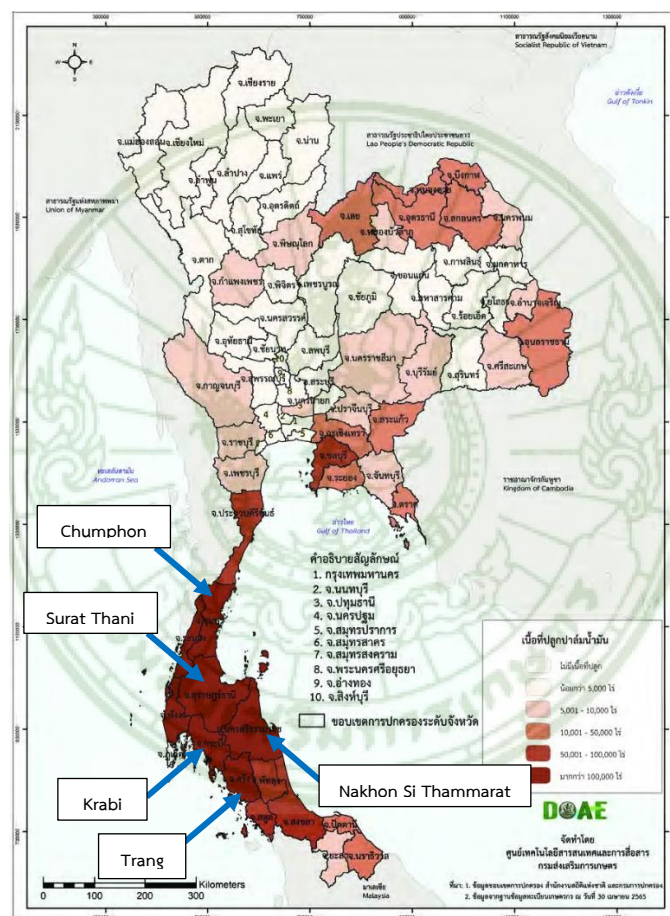
As for the oil palm harvested area in 2021, it was about 95.3% of the total planted area. However, the percentage of the harvested area varies among the regions, with the highest in the South (95.6%) and the lowest in the North (87.4%) (*Table 4.1*)

Table 4.1: Oil palm planted and harvested area in Thailand by region, 2012–2021 (in rai)

Year	North		Northeast		Central		South		Country	
	Planted area	Harvested area	Planted area	Harvested area	Planted area	Harvested area	Planted area	Harvested area	Planted area	Harvested area
2012	44,347	8,768	102,067	37,160	422,795	321,552	3,816,595	3,333,028	4,385,804	3,700,508
2013	54,626	12,556	120,183	45,462	443,285	335,108	3,871,025	3,379,997	4,489,119	3,773,123
2014	68,648	29,771	137,079	95,040	473,624	374,917	4,014,037	3,620,447	4,693,388	4,120,175
2015	75,411	44,668	159,493	106,730	492,520	405,880	4,355,676	3,760,337	5,083,100	4,317,615
2016	80,683	59,518	168,523	127,033	503,231	429,312	4,655,763	3,905,097	5,408,200	4,520,960
2017	84,645	65,303	191,867	153,980	511,048	473,040	4,877,288	4,289,727	5,664,848	4,982,050
2018	88,753	75,975	203,694	167,247	516,691	487,720	5,068,989	4,621,699	5,878,127	5,352,641
2019	92,585	79,450	225,318	189,178	550,812	511,355	5,234,137	4,883,014	6,102,852	5,662,997
2020	97,963	84,994	241,384	202,599	576,107	532,052	5,395,404	5,057,297	6,310,858	5,876,941
2021	98,936 (1.5%)	86,512 (87.4%)	254,653 (4.0%)	236,236 (92.8%)	571,158 (9%)	541,184 (94.8%)	5,442,610 (85.5%)	5,201,473 (95.6%)	6,367,357	6,065,405 (95.3%)
GR (%) 2012-2021	6.80	22.68	9.75	18.69	3.14	6.11	4.61	5.86	4.66	6.32

Source: Office of Agricultural Economics, 2013b-2021b

Note: 1 ha = 6.25 rai

**Figure 4.1:** Map of Thailand, Oil palm producing provinces in 2021

Source: Department of Agricultural Extension, 2022

2) Total FFB yield and productivity

As for FFB yield, it increased from 11.312 million metric tons in 2012 to 16.975 million tons in 2021, or an increase of 50.01% (an increase of 4.78% per year). However, it was observed that there was a reduction in FFB yield in some years within this period. In 2021, most of the production, 15.141 million tons, or **90.16%, came from the southern region**. The rest, 7.43%, 1.85%, and 0.56%, came from the central, northeastern, and northern regions, respectively (*Table 4.2*).

However, overall FFB productivity declined by 1.44% per year in the same period (although it increased from 2012 to 2013). In 2021, **Thailand achieved only 2,769 kg/rai, or 17.31 tons/ha**. The southern region, the main production area, obtained the highest productivity of 2,911 kg/rai (or 18.19 tons/ha) in 2021. FFB productivity was 2,307, 1,313, and 1,090 kg/rai (or 14.42, 8.21, and 6.81 tons/ha) in the central, northeastern, and northern regions, respectively (*Table 4.3 and Figure 4.2*).

In general, FFB productivity in Thailand is lower than that of Malaysia and Indonesia, respectively. But an exception was in 2021, when there was a serious shortage of labor due to COVID-19 and average FFB productivity in Malaysia was lower than in Thailand. It was only 15.47 tons/ha (MPOB, 2022).

There are several factors contributing to the decrease in FFB productivity in Thailand, such as an expansion of the planted areas to other regions where land is less suitable for oil palm production as well as the amount of rainfall, a lack of good knowledge in oil palm production, the relatively low price of FFB received because CPO mills are far away from the plantation, delayed replanting in an old production area in the south, the young age of oil palm in the new production area, etc.

Table 4.2: FFB yield of the country, and classified by production region, 2012-2021
(unit: ton)

Year	North	Northeast	Central	South	Country
2012	9,045	60,787	809,597	10,432,872	11,312,301
2013	13,941	66,775	914,708	11,439,096	12,434,520
2014	31,383	119,828	991,657	11,481,091	12,623,959
2015	42,004	119,961	981,645	11,253,072	12,396,682
2016	55,570	153,454	939,436	10,514,099	11,662,559
2017	77,419	212,880	1,124,673	13,037,289	14,452,261
2018	97,611	257,827	1,212,210	13,915,886	15,483,534
2019	94,134	285,294	1,258,437	14,784,987	16,422,852
2020	92,782	301,073	1,223,254	14,604,810	16,221,919
2021	94,283 (0.56%)	310,172 (1.85%)	1,248,542 (7.43%)	15,141,624 (90.16%)	16,794,621
GR (%) 2012-2021	24.35	20.44	4.47	4.55	4.78

Source: Office of Agricultural Economics, 2013b-2021b

Table 4.3: Thailand FFB productivity, and by production region, 2012-2021
(unit: kg/rai)

Year	North	Northeast	Central	South	Country
2012	1,032	1,636	2,518	3,130	3,057
2013	1,110	1,469	2,730	3,384	3,296
2014	1,054	1,261	2,645	3,171	3,064
2015	940	1,124	2,419	2,993	2,871
2016	934	1,208	2,188	2,692	2,580
2017	1,186	1,383	2,378	3,039	2,901
2018	1,285	1,542	2,495	3,021	2,902
2019	1,185	1,429	2,461	3,028	2,895
2020	1,143	1,384	2,336	2,893	2,763
2021	1,090	1,313	2,307	2,911	2,769
GR (%) 2012-2021	1.60	0.93	-1.46	-1.22	-1.44

Source: Office of Agricultural Economics, 2013b-2021b

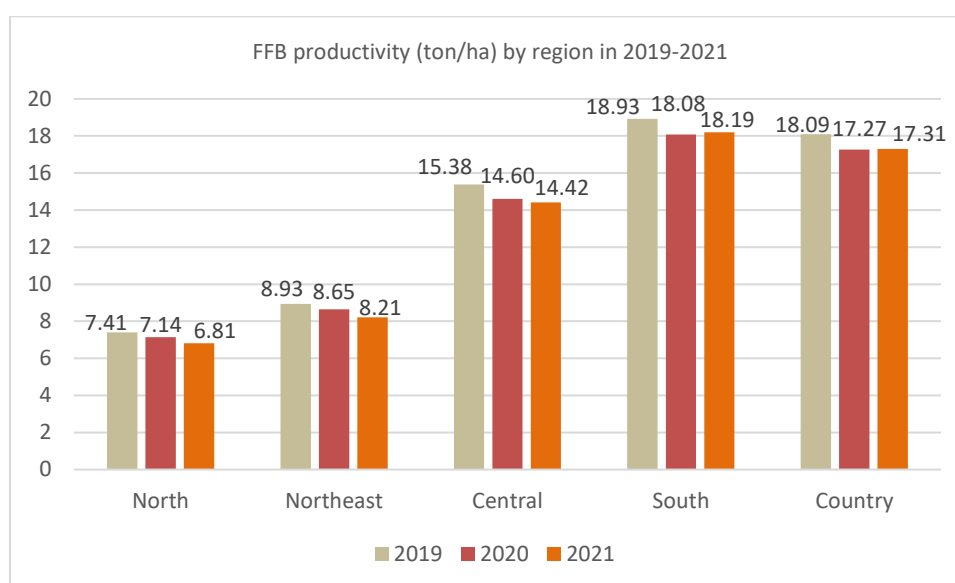


Figure 4.2: FFB productivity by production region, 2019-2021

3) The number of oil palm growers

As mentioned earlier, Thailand's upstream is dominated by smallholders. During 2012–2021, the number of oil palm households in Thailand increased, corresponding to the expansion of the oil palm production area indicated above, from 177,065 households in 2012 to 4000,000 households in 2021 (an increase of 8.87% per year) (Table 4.4). The growth rate was the lowest in the South, at 12.43%, between 2012 and 2019.

A significant increase in the number of oil palm households in the past decade has resulted from the combination of several factors, such as the government's policy to

promote oil palm production for renewable and alternative energy supplies (Sowcharoensuke, 2022), the very low prices of rice and rubber that can be produced on similar land, etc.

Table 4.4: Oil palm household in Thailand, 2012-2021

Year	Region				Country
	North	Northeast	Central	South	
2012	2,549	11,775	9,149	153,592	177,065
2013	2,850	12,153	9,509	155,866	180,378
2014	4,871	13,755	19,052	216,719	254,397
2015	6,091	16,853	20,191	238,057	281,192
2016	6,736	19,619	21,060	256,074	303,489
2017	7,020	22,240	21,766	273,104	324,130
2018	7,237	23,663	22,040	285,191	338,131
2019	7,520 (2.06%)	27,067 (7.42%)	23,923 (6.56%)	306,354 (83.96%)	364,864
2020	na	na	na	na	394,125
2021	na	na	na	na	403,984
GR (%) 2012-2021	24.38 (2012-2019)	16.23 (2012-2019)	20.19 (2012-2019)	12.43 (2012-2019)	8.87

Source: Office of Agricultural Economics, 2013b-2021b

4) The cost of FFB production

During 2012–2021, the cost of FFB production did not change much. It was about 2,847 THB/ton in 2012 and 3,030 THB/ton in 2021, which increased by 1.21% per year (Office of Agricultural Economics, 2013b-2021b). However, the cost varies enormously among the smallholders. Smallholders who adopt good management practices usually have a higher cost per unit area but always obtain a higher yield, resulting in a low cost of FFB production. Thongrak & Kiatpathomchai (2012); Thongrak et al. (2019); and (2021) reported that some smart farmers achieved a cost of as low as 1,700–2,000 THB/ton of FFB.

However, the farmers who adopted good practices, in general, had to invest more in the farm. This leads to higher costs per unit area. For example, for a farmer who obtained an average yield as high as 7 tons/rai, the variable cost of production was at least 10,000 THB/rai per year, while other farmers who spent a lesser amount on inputs or inappropriately used them gained less FFB yield (Thongrak et al., 2019).

5) FFB selling, and prices received

As we all know, oil palm is an industrial crop in the major producing countries. After harvesting, FFB will be transported to the ramp or CPO mill in the production area. Most oil palm smallholders, 80%, sell their FFB to ramps nearby the plantation. In some provinces where there is no CPO mill, a ramp is the only option for farmers to sell FFB. The farmers, whose plantations are close to the CPO mill and do not have other constraints such as a vehicle or harvesting labor, tend to sell their FFB to the CPO mill. In Thailand,

there were about 2,274 ramps and 149 CPO mills in 2022 (data updated until August 2022). Most of the ramps and CPO mills, 78.6% and 66.4%, are in the top 5 oil palm-producing provinces (*Figure 4.3*) (Department of Internal Trade, 2022a). Most of the ramps are owned by individual entrepreneurs and CPO mills. There are a small number of ramps owned by cooperatives or community enterprises.

It is worth noting that ramps play a crucial role in the oil palm supply chain in Thailand, where the percentage of smallholders is high, and disperse throughout Thailand.

The average FFB price received by the farmers for FFB bunch weights over 15 kg fluctuated during 2012–2022 (*Figure 4.4*). The lowest price was only 2.60 THB/kg in 2019, while the average production cost was higher (3.01 THB/kg). However, from 2020 until now, the FFB price has been higher; for example, it was 6.25 THB/kg in 2021. A very low price in 2019 has resulted from a surplus supply of palm oil on the world market. The price of FFB is very sensitive to supply.

Whatever the market price, the smallholders generally obtained a higher price for high-quality FFB.

However, in some oil palm production areas (in the northeastern region or in the southern border provinces), where the planted areas are not large enough to supply FFB, ramps or mills are far from the plantations, the farmers have to accept the lower prices (Krahomwong, 2016; Nillaket & Wattanakul, 2014).

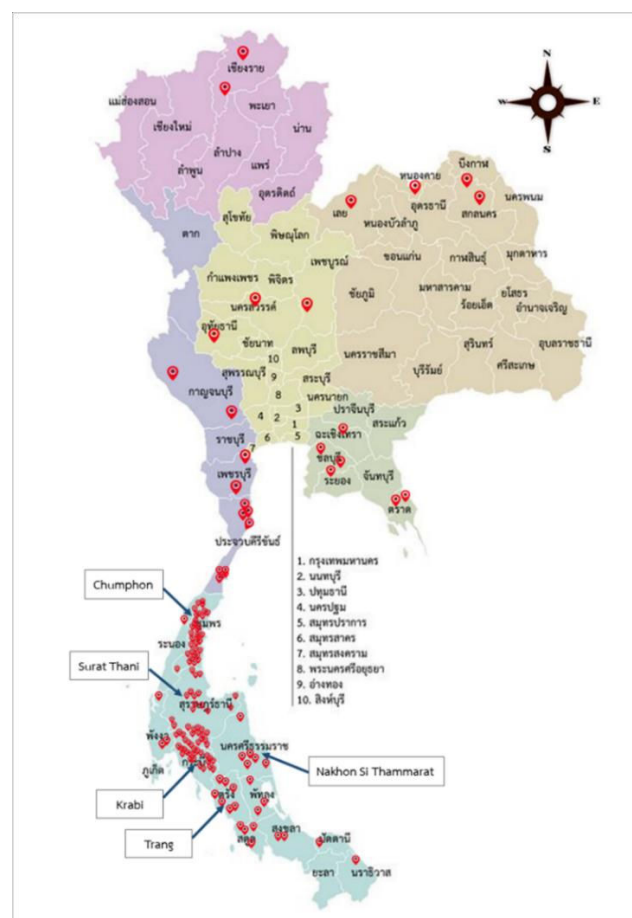


Figure 4.3: Distribution of CPO mill throughout Thailand

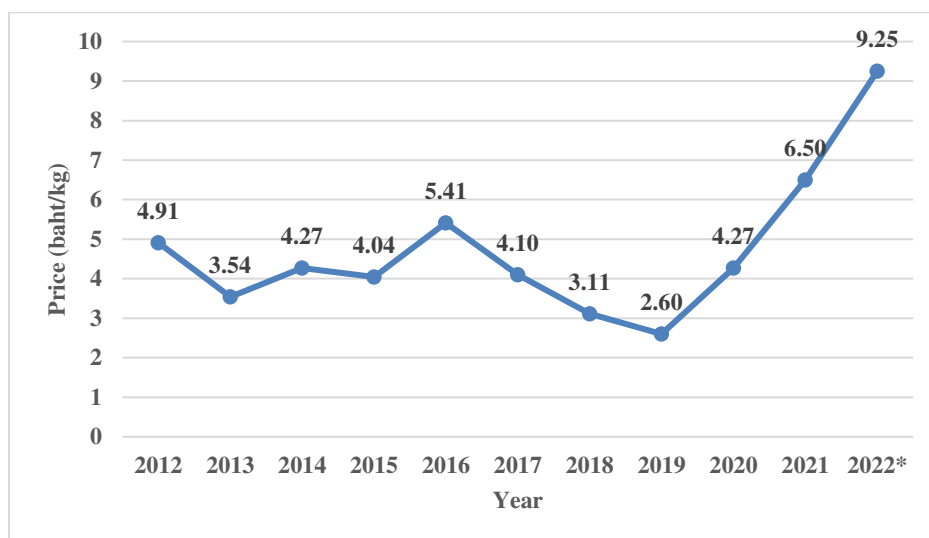


Figure 4.4: Average FFB price received by the farmers, 2012-2022

Source: Office of Agricultural Economics. 2022c

Remark: * prices during January- July, 2022

4.2 Thailand's palm oil production

Yearly palm oil, or CPO, production varies due to FFB production and the OER. From 2012 to 2021, CPO production in Thailand increased from 1.893 million tons to 2.960 million tons, or 5.64% per year (*Table 4.5*). However, those increases were mainly from FFB growth from the expansion of the production area and slightly (0.69% per year) from OER improvement. Thailand still has a big gap in improving FFB productivity and enhancing OER to raise CPO production.

Table 4.5: CPO production and OER, 2012-2021

Year	CPO production (million ton)	OER (%)
2012	1.893	16.73
2013	2.135	17.17
2014	2.001	15.85
2015	2.068	17.44
2016	1.804	17.22
2017	2.626	17.61
2018	2.778	18.04
2019	3.034	18.21
2020	2.826	17.70
2021	2.960	17.89
GR (%) 2012-2021	5.64	0.69

Source: Department of Internal Trade of Thailand, 2022

4.3 Palm oil consumption and trade

Thailand's CPO balance for a given year has six components, namely opening stock, annual production, import, export, domestic uses, and ending stocks. However, in this sub-section, importance is placed on domestic use and trade as follows:

1) Palm oil domestic use

Up until now, Thailand has produced palm oil mainly for domestic use. This has largely resulted from low productivity in the Thai palm oil sector. The industry could not compete in world markets. Thailand uses palm oil domestically for more than 80 percent of its annual production. Domestic uses increased from about 1.559 million tons in 2012 to 2.889 million tons in 2019, which was the highest in 2019 (*Table 4.6*). However, during 2020–2021, domestic use decreased due to a fall in production. The growth in domestic palm oil use was due to biodiesel production and other consumption, especially as cooking oil. For instance, in 2018, palm oil was used for biodiesel, cooking, and other industrial uses at approximately 49%, 32%, and 19%, respectively (Sowcharoensuk, 2020). However, the proportion of its use for biodiesel depends a lot on the government policy on renewable energy, which is most important considering CPO annual production and CPO price (The Alternative Energy Development Plan: AEDP). For example, in 2021, the percentage use of biodiesel was less than other uses because of the high CPO price (Sowcharoensuk, 2022).

Table 4.6: Thailand's domestic use of palm oil, 2012-2021 (ton)

Year	Cooking oil and other uses	Biodiesel	Total
2012	932,258 (59.8%)	626,380 (40.2%)	1,558,638
2013	999,237 (59.5%)	680,000 (40.5%)	1,679,237
2014	939,000 (52.7%)	842,000 (47.3%)	1,781,000
2015	1,053,000 (55.8%)	833,000 (44.2%)	1,886,000
2016	988,000 (54.8%)	816,000 (45.2%)	1,804,000
2017	1,166,000 (54.6%)	971,000 (45.4%)	2,137,000
2018	1,227,000 (50.6%)	1,200,000 (49.4%)	2,427,000
2019	1,310,000 (45.3%)	1,579,000 (54.7%)	2,889,000
2020	1,164,985 (46.1%)	1,363,651 (53.9%)	2,528,636
2021	1,235,300 (51.9%)	1,146,381 (48.1%)	2,381,681
GR (%) 2012-2021	3.25	8.30	5.28

Source: Office of Agricultural Economics, 2013a-2021a

2) Exports and imports of palm oil

As mentioned above, Thailand's oil palm sector is not as large as Indonesia's and Malaysia's, and its ability to compete in the world market is inadequate. Therefore, palm oil international trade, which includes exports and imports, has been limited. However, it still showed some exports and imports during 2012–2021. When there is an oversupply, the government will push palm oil exports to reduce domestic supply, and when supply is in short supply, imports are essential to serving domestic demand. Nevertheless, palm oil imports have to get permission from the government on request.

Table 4.7 revealed Thailand's palm oil exports and imports during 2012–2021. Regarding palm oil exports, they fluctuated a lot due to the foregoing factors. Concerning imports, there was a decreasing trend. This was mainly a result of the high growth in palm oil production domestically.

Table 4.7: Quantity of Thailand's palm oil exports and imports, 2012-2021

Year	Palm oil exports (ton)	Palm oil imports (ton)
2012	411,925.54	158,458.36
2013	725,222.44	110,587.52
2014	355,330.60	127,737.53
2015	131,189.49	158,007.99
2016	117,537.97	116,077.75
2017	429,957.78	81,789.17
2018	472,037.68	70,651.10
2019	380,877.31	72,749.70
2020	297,939.27	105,415.78
2021	789,495.01	59,215.72

Source: Office of Agricultural Economics, 2013a-2021a

4.4 Price of CPO in Thailand

The CPO price in the Bangkok market fluctuated due to several factors, namely the quantity of CPO production, domestic uses and stock, and the price of CPO in the world market.

From *Figure 4.5*, it can be seen that the highest CPO price was achieved in 2021 and the lowest price was in 2019, which was 38.00 and 18.23 THB/kg, respectively. The CPO price in Thailand has been higher than that in Malaysia. But the difference varies widely. In 2016 and 2020, Thai CPO prices were higher than Malaysian prices at around 8.91 and 6.78 THB/kg, respectively.

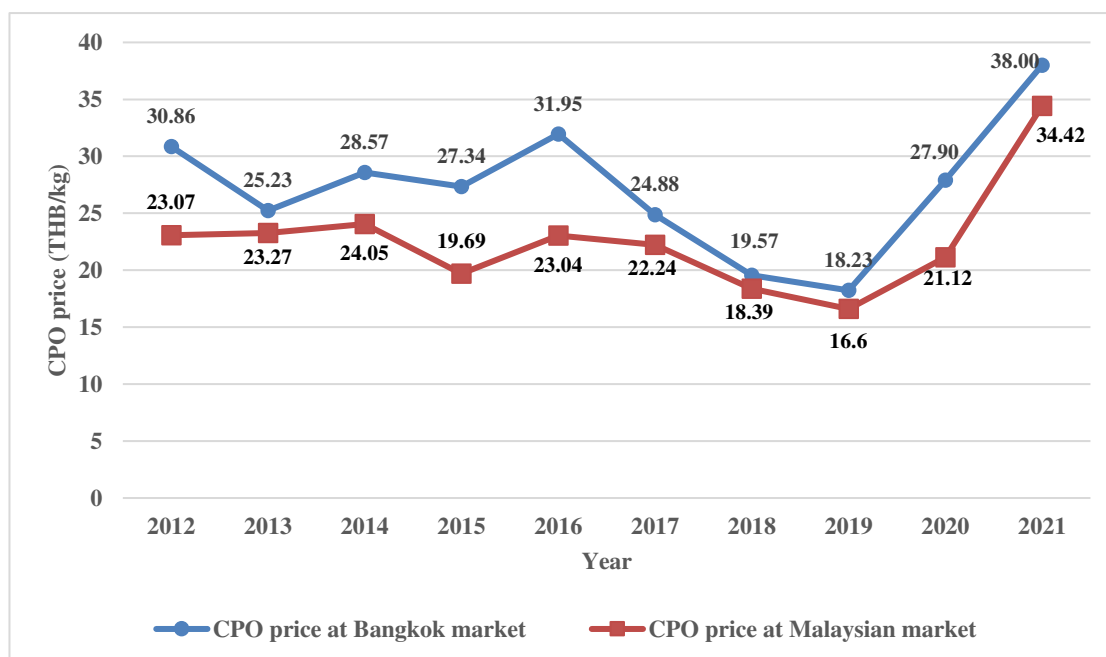


Figure 4.5: Prices of CPO in Bangkok and Malaysia, 2012-2021

Source: Department of Internal Trade, 2022; and
Office of Agricultural Economics, 2013b-2022b

4.5 Economic, social and environmental impacts from oil palm production

As mentioned earlier, presently, oil palm production in Thailand involves 0.4 million farm households and 6.3 million rai (approximately 1 million hectares) of the total planted area. Oil palm planted area has gradually increased by approximately 2 million rai (0.32 million hectares) during 2012–2021. In 2021, Thailand obtained roughly 16.8 million tons of FFB, or 17.3 tons/ha on average (OAE, 2022). Currently, total crude palm oil production is mainly used for domestic consumption, both as food and biofuel. The palm oil supply chain, hence, can create economic growth, increase farm household income, create employment, and improve quality of life in the local community, but may generate negative environmental impacts in some areas. Those impacts are summarized and discussed as follows:

4.5.1 Economic and social impacts

The palm oil industry has been a crucial driver of economic growth in Southeast Asia and has shown a significant role in generating employment (World Bank, 2011). Similar to the Thailand context, oil palm production has contributed to economic growth and provided economic returns to stakeholders along the supply chain, especially in the southern region, where the climate is suitable for oil palm trees and the industry is geographically concentrated.

At the farm level, oil palm FFB is practically harvested every 15 days. Therefore, smallholders can earn regular cash income from their plantations, which they can then spend on their household expenses as well as their children's education. Moreover, oil palm

production generates employment in the local community. A recent study by Thongrak et al. (2021) revealed that even though smallholders have 3 hectares of oil palm plantations on average, approximately 65% of smallholders hire local laborers for several activities, especially harvesting. These confirm that oil palm production impacts farm household and labor income and the improvement of their welfare. It contributes to income gains, capital accumulation, and higher expenditures on food, health, education, and durable consumer goods in smallholder farm households (Qaim et al., 2020).

Relating farm businesses, input businesses, particularly chemical fertilizer and planting materials, show similar growth as a result of rising demand from oil palm expansion. In addition, the oil palm FFB market has improved and developed. Smallholders can easily sell their FFB to buyers due to better infrastructure. Ramps play a vital role as middlemen connecting smallholders and CPO mills. There are approximately 2,200 ramps spread across the country. Overall, about 75% of total FFB outputs are sold via ramps (Krungsri Research, 2022). In rural areas, 97% of smallholders sell their FFB to ramps (Thongrak et al., 2021). It can be concluded that oil palm production impacts the strengthening of income and employment in local upstream businesses as well as local non-agricultural businesses.

For oil palm processing, midstream and downstream industries also play a significant role in economic development and employment due to the large companies involved. In 2021, 75% of CPO was allocated for the domestic market, 52% was used for the food industry and oleochemical products, and the rest (48%) was used for biofuel (Krungsri Research, 2022). The food industry and oleochemical products create value-added products for palm oil. The export of palm oil and products containing palm oil can also generate income and employment for those businesses. Furthermore, palm oil-based biofuels can reduce dependence on fossil fuel imports. In 2022, petroleum diesel mixed with 7% and 20% biodiesel will be marketed as B7 and B20 (Department of Energy Business, 2022).

4.5.2 Environmental Impacts

Although the oil palm production boom has positive impacts on economic growth, it has led to substantial criticism due to negative environmental impacts. Several studies mentioned that the expansion of the oil palm area has contributed to land use change, tropical deforestation, biodiversity loss, carbon loss, greenhouse gas emissions, land degradation, forest and peatland fires, as well as air and water pollution (Krishna and Kubitza, 2021; Qaim et al., 2020; Gaveau et al., 2016; Saswattecha et al., 2016).

In Thailand, oil palm plantations have not been linked to large-scale logging, burning peatlands, or dying orangutans (Dallinger, 2011). The majority of the oil palm plantations exist on marginal land areas, old rubber plantations, orchards, paddy land, and other field crops (Dallinger, 2011; Mukherjee and Sovacool, 2014; Korfak, 2018; Dumrongrojwathana et al., 2020; Thongrak et al., 2021). Most oil palm plantations are private landholdings. It means that most oil palm plantations have been converted from agricultural land. Therefore, these changes prevent encroachment on forest areas.

In the south, Saswattecha et al. (2016) examined land use and the effects of land use change on ecosystem services in the Tapi river basin (spanning three provinces: Surat Thani, Nakhon Si Thammarat, and Krabi). The results revealed that the oil palm plantation areas doubled between 2000 and 2009, with an average annual expansion rate of 12%. The increase in oil palm plantation areas is a result of policies promoting the use of biodiesel at the national level and enhancing oil palm development at the provincial level. On the other hand, the total rubber plantation areas, paddy fields, and abandoned paddy fields have decreased considerably since 2000. Approximately two-thirds of the oil palm areas in 2009 were converted from rubber plantations (68%), unused land (12%), and forest (4%). For the period of 2009–2012, oil palm still expanded with an annual average rate of 2%, lower than the period 2000–2009. These new oil palm plantations were mostly established on cropland rather than on natural land.

In addition, the Department of Land Development under the MOAC has implemented agricultural land use changes from abandoned paddy land to oil palm projects in southern provinces since 2005 (Narathiwat Land Development Station, 2006). The project supports initial investment costs (land preparation and planting materials) and provides training for the farmers.

However, the evidence found in land clearing for oil palm production in the Kuan Kreng peat swamp forest, Nakhon Si Thammarat province (Dallinger, 2011; Nuengmatcha & Nuengmatcha, 2015). Oil palm has been expanded in this area since 2004–2009, and oil palm areas are increasing continuously. This expansion was due to the attractive high price of FFB. The chemical fertilizer uses in oil palm plantations, and the effects of oil palm expansion on environmental change were assessed. The results showed that soil in oil palm areas had higher phosphorus levels than soil in undisturbed and disturbed peat lands (Nuengmatcha & Nuengmatcha, 2015). In addition, Srisunthon & Chawchai (2020) assessed oil palm expansion and anthropogenic impacts in the Princess Sirindhorn Wildlife Sanctuary (PSWS) in Narathiwat province. The results show that the total oil palm plantation area has increased from 0.04% in 2000 to 6.84% in 2016, because of a Thai government policy promoting the use of biodiesel and increasing the capacity of palm oil production in 2005. Paddy fields and evergreen forests were the main areas being replaced. Paddy fields have dramatically decreased from 13.91% in 2000 to 6.92% in 2016. Evergreen forests have also decreased from 13.32% to 7.32%, respectively. The conversion of those natural landscapes to oil palm plantations also had a negative effect, with carbon stock changes of 4 million Mg C during 2000–2016 (0.25 million Mg C/year).

Land use change, especially deforestation, is the driver of biological loss. Jaroenkietkajorn et al. (2021) analyzed the biodiversity impacts of land use change on oil palm plantations in five regions of Thailand. The results showed that the differences in species density between forests and old oil palm plantations are higher than between forests and all oil palm plantations. The species density of birds and insects in all plantations, including new plantations, is higher than in old palm plantations (≥ 12 years old). Therefore, the prospect of species loss in oil palm plantation areas rises with the increasing age of plantations. During 2000–2012, the total area and the share of original habitat forests

that were converted to oil palm plantations in the southern region were higher than in other regions.

Moreover, in Khao Pra-Bang Khram Wildlife Sanctuary and the surrounding areas and Bang Khram National Reserve Forest in Krabi Province, the conversion of lowland forest to commercial oil palm and rubber plantations caused a reduction in bird species richness of at least 60%, with insectivores and frugivores suffering greater losses than more omnivorous species (Aratrakorn et al., 2006). Woodpeckers, barbets, broadbills, leafbirds, and babblers, for example, are well represented in the forest. But they were absent or poorly represented on plantations.

The emissions of greenhouse gases (GHGs) have been reported along the production chain, particularly methane (CH_4) emissions from wastewater in open ponds at the milling phase and nitrous oxide (N_2O) emissions from nitrogen fertilizer application in the cultivation phase. In addition, applying nitrogen and phosphorus fertilizers for maximizing oil palm yields causes eutrophication in surface waters. It has been observed that highly toxic herbicides, which are possibly harmful to human health and nearby watersheds, are used in oil palm plantations (Saswattecha et al. 2015). The increase in greenhouse gas emissions is mainly due to the excessive use of chemical fertilizers (Jaroenkietkajorn & Gheewala, 2021).

Oil palm plantations are rather water-intensive, require around 100 mm of precipitation monthly, and can tolerate a drought period of no longer than three months. Silalertruksa et al. (2017) assess the water scarcity footprint of oil palm plantations in different regions of Thailand, especially in the north and northeast, where oil palm has recently been established due to the non-suitable climate conditions. The result reveals that oil palm plantations in the South have the lowest water scarcity footprint, followed by the East, North, Central, and Northeast, respectively. Therefore, the suitable areas for oil palm plantations are quite limited by the climate conditions.

4.6 Summary

Thailand ranks third in world palm oil production, which will account for 4.30% of world production in 2021. In 2021, oil palm production in Thailand involved 0.4 million households, most of whom are smallholders, and 6.3 million rai (1 million hectares) of the total planted area. However, most smallholders are facing a lot of difficulties and challenges, including production, marketing, policy, and other problems. Nearly all are quite common throughout the oil palm production areas. Their levels may differ among the regions and specific production areas. For example, a lack of knowledge in overall oil palm management is more serious in the newly planted area in the northeastern region than in the south. In addition, low prices of FFB received by smallholders are more critical in new production areas where there are fewer ramps and mills. Furthermore, drought is more severe in the northeast. Therefore, productivity, cost of production, and net return are closely and adversely linked to those problems.

The planted area has gradually increased by 2 million rai during 2012-2021. 85.5% of the planted areas are in the southern region. In 2021, Thailand obtained roughly 16.8 million tons of FFB, or 2.768 tons per rai (17.3 tons/ha) on average. So far, CPO has mainly been used for domestic consumption, both as food and biofuel. In 2021, 75% of CPO was utilized domestically, of which 52% was used for the food industry and oleochemical products, and the rest (48%) was used for biofuel. However, in 2021, Thailand exported more palm oil, and in the near future, it is expected to increase due to increased supply.

The growing trend of the oil palm industry in Thailand has contributed to economic growth, created employment, and provided economic returns to stakeholders along the supply chain, especially for the southern economy, where the climate is suitable for oil palm trees and the industry is geographically concentrated. At the farm level, over 0.4 million smallholders can earn regular cash income from their plantations twice a month. This cash income can be enhanced if the smallholders improve their productivity and efficiency. Relating farm businesses to input businesses, particularly chemical fertilizer and planting materials, as well as the ramps, oil palm processing, midstream, and downstream industries, they show similar growth as a result of rising demand from oil palm expansion. The palm oil-based biofuel can reduce dependence on fossil fuel imports.

It seems that in Thailand, economic gains from oil palm production outweigh the negative environmental impacts. The negative impacts from the expansion of production areas are not as severe as those in Indonesia or other countries since the expansions took place on agricultural lands. However, mitigating the negative environmental impacts of oil palm production is imperative to sustain economic growth, smallholder welfare, and others along the supply chain.

CHAPTER 5

Costs, Benefits, and Challenges Faced by Thai Smallholders in Relation to RSPO Certification

This chapter discusses the costs, benefits, and challenges of RSPO certification for Thai oil palm smallholders, with a special emphasis on the implementation of the RSPO ISH requirements. The costs of RSPO certification for ISH in Thailand are based on data from the focus group meetings and in-depth interviews with key stakeholders, including RSPO group managers and committees, as described in Chapter 3.

It is divided into three sections. The first section provides an overview of the RSPO ISH groups' context. Second section presents the costs, benefits of RSPO standard certification for oil palm ISH. The third part discusses the difficulties Thai oil palm ISH encountered in meeting the RSPO standards criteria. The following information is provided in detail:

5.1 The context of ISH groups with RSPO certification and membership

Under the guidance of the GIZ project, the first four ISH groups in the world became RSPO-certified in Thailand in 2012. So far, CPO mills and downstream industries in the palm oil supply chain, GIZ, and certain Thai research initiatives have helped to build all ISH certified groups. None of them were initiated by the ISH on their own. Until recently, the certified groups have been structured and maintained into two categories. In the first category, regardless of the establishment, the ISH groups ran their groups toward RSPO certification independently from the CPO mills. However, only a few ISH groupings fall within this category.

The ISH groups are connected with the CPO mills in the second category. This category contains the majority of the certified groups. However, within this category, there are two sub-types of certified groups: 1) certified groups which operate their groups autonomously, and 2) certified groups that manage their groups with full mill aid, i.e. the mill initiated the groups' formation and provided all resources to cover the initial costs.

Only 8.6% of RSPO member groups that have not yet received certification are associated with mills. However, 21% of them (10 out of 58 groups) are negotiating with possible partner mills (RSPO, 2023, and personal communication with the groups).

5.2 RSPO certification costs and benefits for ISH in Thailand

This section summarizes the important findings on the costs and benefits of the RSPO standard certification for Thai ISH. It is divided into four sub-sections: RSPO-certified group characteristics; RSPO certification costs; RSPO certification benefits; and net benefits of RSPO certification for ISH in Thailand. These are the following:

5.2.1 Characteristics of RSPO-certified groups

Table 5.1 illustrates the basic characteristics of the seven RSPO-certified groups chosen for this study's in-depth interview. They are all ISH groups. The groups spent

around two years on average before the first certification, which was received in 2012, 2015 (3 groups), 2017, 2019, and 2020, accordingly.

The average number of members in the first certified year was 86, with 5 groups having fewer than 100 members and only two groups having more than 100 members. However, in 2022, the average number of members reached to 298 people, while the majority of groups have 200-300 members. Some ISH groups may attract more than 300 smallholders throughout the establishing process, but by the time of the first certification, less than 100 members were ready and certified.

In 2022, the average oil palm certified area per member from the sample groups ranges from 19.9 to 47.2 rai, with a 7-group average of 33.2 rai per person. The certified FFB for each group ranges from 8,366 to 124,064 ton, depending on the number of members, average oil palm area, and productivity. The average FFB yield per rai for all seven groups was 3.18 ton. Most groups sell certified FFB physically to their partner mills. Only one certified group sells certified FFB in the form of credit on the global market. One group essentially sells its FFB physically to the partner mill, but sells a portion of it in the form of credit (*Table 5.1*).

The income from selling credit is determined by the quantity of certified FFB and the prices of CSPO, CSPKO, and CSPKE. Normally, the group could sell CSPO, CSPKO, and CSPKE at the amounts of 20%, 2.25% ($5\% \times 0.45$), and 2.75% ($5\% \times 0.55$) of certified FFB, respectively (RSPO, 2019). The highest premium prices are for CSPKO, where prices have risen as high as \$100 US per ton. These prices fluctuate on the global market.

The income gained from selling credit will be distributed to the groups themselves for the purpose of running their operations. However, the partner mills will distribute income (premium prices) to the group and members in accordance with their agreements for the groups who physically sell certified FFB to them.

Table 5.1: Characteristics of the RSPO-certified groups

ITEM	G1	G2	G3	G4	G5	G6	G7	Aver.
Smallholder type	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	Ind.	
Pre. period for cert. (Yrs.)	2	2	2	2	2	2	2	2
Year start certified	2012	2020	2015	2015	2019	2015	2017	-
Member in year started certified (people)	158	91	53	58	58	85	101	86
Member in 2022	260	195	265	243	120	312	692	298
% increase in members since 1 st certified to 2022	65	114	400	319	107	267	585	265
Area in 2022 (ha)	1,233.0	1,202.8	845.3	1219.3	468.5	2,358.7	4,535.8	-
Area in 2022 (rai)	7,706.2	7,517.5	5,283.1	7,620.6	2,928.1	14,741.9	28,348.8	-
Area per member in 2022 (rai)	29.6	38.6	19.9	31.4	24.4	47.2	41.0	33.2
FFB (MT)	23,667	17,922	21,402	22,700	8,366	37,783	124,064	-
Average FFB (ton/rai)	3.07	2.38*	4.05	2.98	2.86	2.56	4.38	3.18
RSPO-certified FFB sell	Credit	Physical	Physical	Physical	Physical	Physical & credit	Physical	-
Financial support for upfront/initial cost	GIZ/ Mill	Mill	Shell/Mill	Shell/ Mill	Mill	Shell/ Mill	Research project/ Mill	-

Source: RSPO, 2023, and focus group meeting with the group manager and committee.

Remark: * Newly certified group, increasing members during Covid-19.

5.2.2 Costs of RSPO certification for ISH

Before discussing the costs of RSPO certification, it is important to note that there are at least five steps to certification: 1) Form a group and assign a manager, whether an individual or an entity; 2) develop an Internal Control System (ICS) for group management; 3) facilitate training to ensure compliance with RSPO standard for ISH; 4) join RSPO as a member; and 5) once ready, the Group Manager can approach a Certification Body for auditing. After the first year of certification, the certified group must undergo main audits every 5 years. And, to keep the certification, the group must go through Surveillance auditing every year between years 2-4.

The upfront costs and recurrent costs of RSPO certification for ISH are included in this section.

5.2.2.1 Upfront costs

As was previously noted, all certified groups were founded with the assistance of mills and third parties; nevertheless, the upfront costs for each group were not completely acknowledged at the group level. Because of the availability of data and the activities that the group must carry out to comply with the standards, the researchers in this study assessed and confirmed the upfront expenses. The upfront costs, which are exclusively at the group level, and tangible, are shown in *Table 5.2*. These expenses don't include the smallholders' travel expenses to participate in group events, their time opportunity costs, or additional expenses for implementing practices.

According to the nature of distribution of ISH in oil palm production areas, two scenarios, a starting member of 100 (Case 1) and 60 (Case 2) smallholders, were chosen in *Table 5.2*, which is supported by data in *Table 5.1*, where most certified groups have members of less than 100 people for the first year of certification. Initial certification costs were divided into categories such as staff, documents, training and organization, internal audit, certification procedure, materials and facilities, and other costs.

Total upfront costs for cases 1 and 2 were 1,280,000 and 1,204,000 THB, or 12,800 and 20,067 THB per member, respectively. The expenses for staff, the certification procedure, and training and organization accounted for the top three biggest upfront costs, with respective shares of 42.2% and 44.9%, 23.8% and 25.3%, and 14.5% and 12%.

The costs for full-time employees are essential for document preparation and coordination in order to obtain certification. These cover a group manager's and a farm advisor's (FA) costs. Due to outside assistance, this cost component is typically not documented or addressed when talking about upfront costs.

Regarding the certification process, the costs are composed of the RSPO registration fee and the main auditing expense (*Table 5.3*). Compared to the main audit cost, the RSPO registration fee is not that high. Since most RSPO ISH groups in Thailand are small, the RSPO registration fee is 250 EUR. The auditing costs in Thailand vary depending on not only the members of the group but also the CB chosen. So far, the rate has been about 25,000–30,000 THB per M-D. From *Table 5.3*, the main auditing costs for

60–100 members are around 295,000 THB. If the members go up to 260, the main audit costs will be roughly 421,000 THB.

Main audit costs include expenses relating to the following activities: public announcement, stakeholder consultation, field assessment (ISH), report writing, peer review, technical review, group manager (ICS), RSPO certification assessment, air ticket, and related hospitality costs such as accommodation and food.

For the first audit cost, the smallholder group could ask for financial support from the RSPO Smallholder Support Fund (RSSF). So far, some of the new certified groups have requested this fund.

Regarding the training and organization expenses, these include the costs of training, such as trainers and meals, as well as the committee training and meeting. Training is crucial since the group has to ensure the members and committee understand all aspects of the standards and criteria and all that has to be done to achieve the ultimate goals.

In sum, it is worth noting that if the ISH group has to be set up for RSPO certification, the starting certified members should be at least 100 people to lower unit costs.

Table 5.2: Total upfront cost of RSPO certification for ISH

Cost item	Case 1(100 members)*		Case 2 (60 members)*	
	Amount (THB)	%	Amount (THB)	%
Personnel				
Fulltime group manager @18 months@20,000THB/month	360,000	28.1	360,000	29.9
Fulltime farm advisor @12 months@15,000THB/month	180,000	14.1	180,000	15.0
Documents	60,000	4.7	40,000	3.3
- Farmers' document (training, farm record book)	40,000		25,000	
- Group certification document	20,000		15,000	
Training & organization	185,000	14.5	145,000	12.0
- Member (Trainer, meal)	150,000		110,000	
- Committee (training, meeting, trainer, meal)	35,000		35,000	
Internal audit	40,000	3.1	24,000	2.0
Certification process	305,000	23.8	305,000	25.3
- RSPO registration fee	10,000		10,000	
- Main audit**	295,000		295,000	
Materials & facilities i.e. computer, printer etc.	50,000	3.9	50,000	4.2
Others i.e. local travel ~ 10% of the total	100,000	7.8	100,000	8.3
Total	1,280,000		1,204,000	
Cost/member	12,800		20,067	

Note: * costs are estimated and verified by the researchers based on the availability of data from the groups.

** see the details of main audit costs in Table 5.3

Table 5.3: Annual audit cost for RSPO certification (THB)

Item	Group size (member in people)			
	260	260	60-100	60-100
	Y1	Y2-4	Y1	Y2-4
Public announcement	12,500	-	12,500	-
Stakeholder consultation	50,000	50,000	25,000	25,000
Field assessment (ISH)	75,000	75,000	75,000	75,000
Report writing	50,000	50,000	50,000	50,000
Peer review	25,000	-	25,000	-
Technical review	75,000	75,000	37,500	37,500
Group manager (ICS)	50,000	50,000	25,000	25,000
RSPO certification assessment	50,000	50,000	25,000	25,000
Air ticket	13,500	13,500	10,000	10,000
Food & accommodation	20,000	20,000	10,000	10,000
Total*	421,000	383,500	295,000	232,500

Remark: 1 M-D = 25,000 THB

* excluding tax 7%

5.2.2.2 Recurrent costs

Tables 5.4–5.5 summarize the recurrent costs obtained from the certified groups that were willing to provide data to the research team. Some groups were unwilling to provide detailed information.

Groups A and B in Table 5.4 are those attached to the mills, and the group administration is fully supported by the mills, while Groups C and D in Table 5.5 are those having partner mills, but their group administration is undertaken autonomously by the group committee. Groups C and D only offer the recurrent costs as a percentage of the total.

The recurrent costs presented in this section are only at the group level. The costs at the farm level are already integrated into the cost of production by the individual farmer.

In Table 5.4, for both of the groups, the costs of hiring the group manager and FA, documents, and travel costs of the group manager and FA were internalized in the operating costs of the mills, not the costs of the groups. Thus, the recurrent costs in Table 5.4 are not the real costs, which reflect the true value of resources necessary for the group to achieve certification.

Groups C and D provided rough information for the costs of personnel (manager, FA, committee), operating expenses, the certification process (RSPO fee and surveillance audit), and members' dividends. As for group C, income tax was also included.

Table 5.4: Recurrent costs of RSPO certification for two cases of certified groups, A and B

Cost items	Group A	Group B
	Amount (THB) in 2019	Amount (THB) in 2022
Fulltime group manager	*	*
Fulltime farm advisor	*	*
Documents	*	*
- Farmers' document (training, farm record book)	*	*
- Group certification document	*	*
Training & organization	232,843	18,833
- Member (Trainer, meal)	230,173	18,833 only cost of meal
- Committee (training, meeting) (Trainer, meal)	2,670	
Internal audit	27,781	23,000
Certification process	311,212	340,869
- RSPO membership fee	10,000	10,000
- Surveillance audit**	301,212	330,869
Materials & facilities	11,992	14,700
Member welfare	148,257	198,640
Contribution to community	10,000	-
Others	5,145	3,508
Local travel cost of group manager, FA	*	*
Total	737,230	589,510

Note: costs are merely based on data from the group records.

Group A has 142 members, Group B has 195 members

Table 5.5: Recurrent costs of RSPO certification in 2022 for two cases of certified groups, C and D

Cost items	Group C	Group D
	Amount (THB)	Amount (THB)
Personnel (manager, FA, committee)	500,000 (22.2%)	600,000 (17.1%)
Group operating expenses	500,000 (22.2%)	500,000 (14.3%)
Certification process (RSPO fee & surveillance audit)	500,000 (22.2%)	600,000 (17.1%)
Members dividends	500,000(22.2%)	1,800,000 (51.4%)
Others (Tax)	250,000 (11.2%)	-
Total	2,250,000	3,500,000
Average per member excluding dividends	5,769	5,449

Note: Group C has 260 members, Group D has 312 members

From the cost information in *Tables 5.2–5.5*, the recurrent costs were assessed and estimated (*Table 5.6*). The recurrent costs in this table are represented by four cases by group size: 100, 150, 200, and 250 members. Total recurrent costs were 972,500, 1,120,000, 1,410,000, and 1,603,500 THB, or 9,725, 7,467, 7,050, and 6,414 THB per

member, respectively. The recurrent costs per member decrease as the number of member increases, but in a non-linear pattern.

The expenses for staff, the certification procedure, and operating expenses accounted for the top three biggest recurrent costs, with corresponding shares of 37.42-43.19%, 24.94-27.68%, and 20.57-24.32%.

The costs for personnel are essential to managing all activities and coordination in order to obtain certification. These costs may be compensated by the group committees, full-time group managers, a farm advisor's (FA), or others depending on the characteristics of the individual group administration addressed above.

Certification costs are the second-biggest recurring cost. These were about a quarter of the total recurrent cost annually. These include the RSPO membership fee and surveillance audit. The annual membership fee is 250 EUR for smallholder groups smaller than 1,000 ha, 1,000 EUR for smallholder groups between 1,000 and 1,999 ha, and 2,000 EUR for smallholder groups larger than 1,999 ha. Annual surveillance audit costs are between 232,500 and 383,500 THB per group for groups between 100 and 250 members. These surveillance audit cost items are most similar to main audit costs, except public announcement and peer review are not included in surveillance audit costs. During the focus group meeting with the certified group manager and committee, most of them reflected that the certification costs are high, partly due to lump-sum payments, and the cost structure of the certified group is not fully assessed. It is worth noting that during the pandemic of COVID-19, RSPO waived the membership fee for the certified smallholder groups in Thailand to reduce the adverse impacts of the groups.

Group operating expenses, the third biggest recurrent cost and crucial, include the expenses for training the members and committee, documents, local travel costs for group personnel, and an internal audit.

Table 5.6: Recurrent costs of RSPO certification for ISH, classified by group size

Cost items	Group size (members)			
	100	150	200	250
	(THB)	(THB)	(THB)	(THB)
• Personnel (manager, FA, committee)	420,000 (43.19%)	420,000 (37.50%)	540,000 (38.30%)	600,000 (37.42%)
• Group operating expenses	200,000 (20.57%)	260,000 (23.21%)	330,000 (23.40%)	390,000 (24.32%)
- Training the members (trainer, meal)	100,000	120,000	150,000	170,000
- Training the committee (trainer, meal)				
- Documents (training & ICS& farm record book)	40,000	50,000	60,000	70,000
- Local travel cost for group personnel	20,000	30,000	40,000	50,000
- Internal audit	40,000	60,000	80,000	100,000

Table 5.6: Recurrent costs of RSPO certification for ISH, classified by group size, (cont.)

Cost items	Group size (members)			
	100	150	200	250
	(THB)	(THB)	(THB)	(THB)
• Certification process	242,500 (24.94%)	310,000 (27.68%)	380,000 (26.95%)	423,500 (26.41%)
- RSPO membership fee	10,000	10,000	40,000	40,000
- Surveillance audit	232,500	300,000	340,000	383,500
• Materials & facilities	20,000 (2.06%)	30,000 (2.68%)	40,000 (2.84%)	50,000 (3.12%)
• Others ~10%	90,000 (9.16%)	100,000 (8.93%)	120,000 (8.51%)	140,000 (8.44%)
Total	972,500	1,120,000	1,410,000	1,603,500
Per member	9,725	7,467	7,050	6,414

Note: the recurrent costs derived from *Table 5.2-5.5*.

5.2.3 Benefits of RSPO Standard Certification for ISH in Thailand

The benefits of RSPO Standard certification for ISH in Thailand are summarized in *Figure 5.1*. In this figure, it reveals how the real benefits are generated. In the first step, the smallholders become members of the RSPO group with the involvement and support of the mill in the supply chain. After joining the RSPO group, the smallholders accessed intensive training in various GAPs and OPSP. As a result, they improve their knowledge and understanding of sustainable oil palm production. They also realize the linkage between production and the market. The groups and mills also help them access important inputs such as fertilizer and seedlings. Consequently, they adopted and have improved their oil palm management practices. The changes in their practices will result in improving productivity (yield/rai) and FFB quality, reducing cost per unit of FFB, and obtaining premium FFB prices. Thus, these generate economic, environmental, and social benefits. Details are presented as follows:

The economic benefits from the certification described in this section are limited to the benefit to group members, namely the certified smallholders. The change in net benefits with and without certification is used in this assessment. To calculate the benefits, the following variables are employed:

An average oil palm harvested area and the average FFB yields of the certified smallholders in 2022 of 33.2 rai per member and 3,180 kg per rai, respectively (*Table 5.1*) are used. Regarding the incremental yields due to certification, 518 kg per rai are used. This amount is the difference between the average FFB yield of certified and non-certified smallholders in 2022. The average FFB yield of the non-certified smallholders is 2,662 kg per rai (*Table 6.17* in Chapter 6). The average FFB price of 8.1 THB per kg in 2022 is used to calculate the benefit, and the 10-year average price, during 2013–2022, of 4.57 THB per kg is also used for sensitivity analysis. The cost of oil palm production, which was about 5,978 THB per rai or 1.88 THB per kg (*Table 6.17* in Chapter 6), is employed. Therefore, the benefits are calculated per group of 260, 100, and 60 members (*Table 5.7*). The total

annual benefits of the RSPO certification for the smallholders are equal to 12.02, 4.63, and 2.78 M.THB per group, respectively.

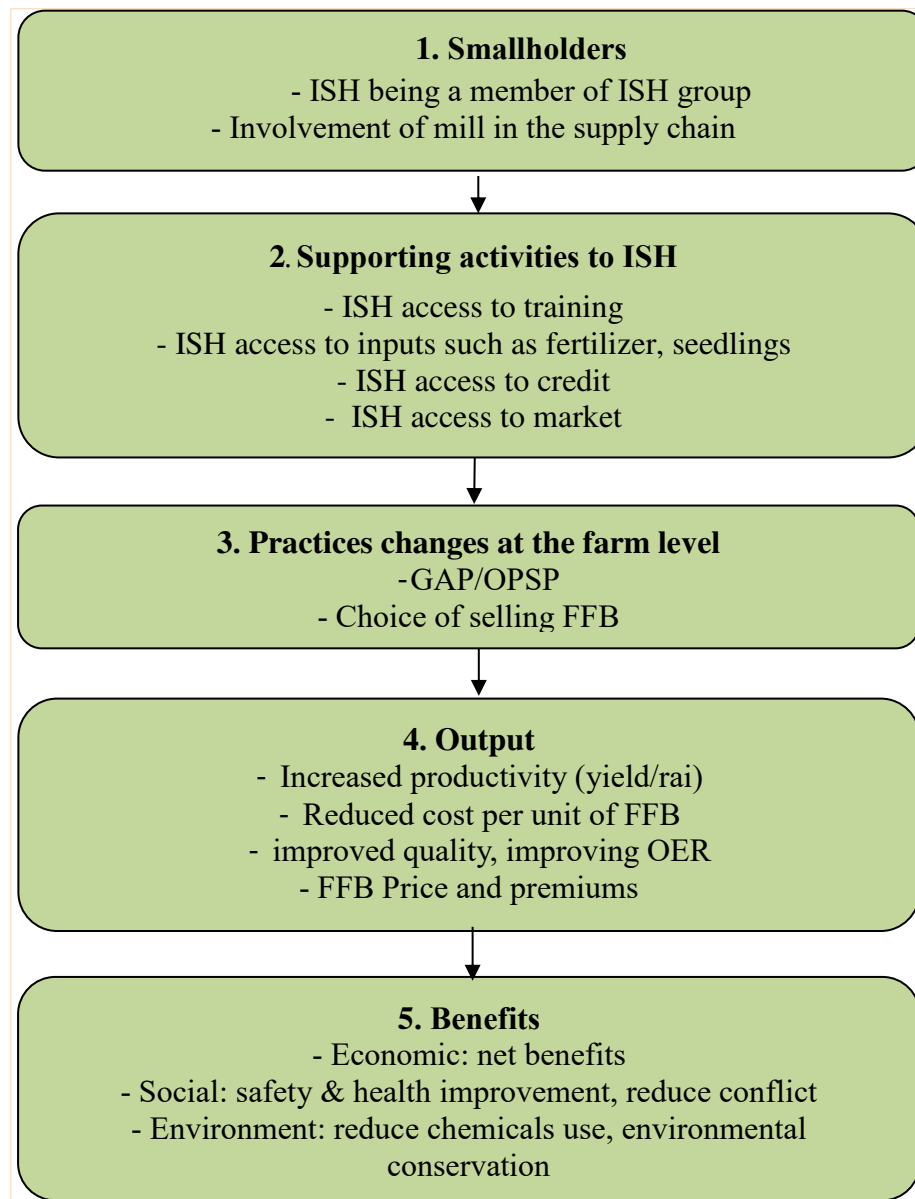


Figure 5.1: Summary of the benefits of RSPO standard certification for ISH in Thailand

Table 5.7: Average annual benefits of RSPO certification for smallholders (THB)

Item	Group Size (members)		
	260	100	60
Average oil palm harvested area (rai/member)	33.2		
Average FFB yields of the certified smallholders, 2022 (kg/rai)	3,180		
Average FFB yields of the non-certified smallholders, 2022 (kg/rai)	2,662		
Incremental yield due to certification (kg/rai)	518		
Average FFB prices, 2013-2022 (THB/kg)	4.57		
Average FFB prices, 2022 (THB/kg)	7.70		
Cost of production (THB/rai)	5,978		
Cost of production (THB/kg of FFB)	1.88		
Total certified area (rai)	8,632	3,320	1,992
Incremental benefits (M.THb/group)	20.43	7.86	4.72
Incremental cost of production (M.THb/group)	8.41	3.23	1.94
Total annual benefits of the RSPO certification for the smallholders (M.THb/group)	12.02	4.63	2.78

5.2.4 Net benefits of the RSPO certification

Table 5.8 shows the net economic benefits of RSPO certification for smallholders by group size. The results reveal that even for the group with the smallest size of 60 members, the RSPO certification still generates net economic benefits. The net economic benefits increase as the smallholder group grows. For example, a group with 260 members could generate net economic benefits of as much as 10.416 million THB per year.

In addition, during the focus group meeting with the group managers and committee, they reflected that being members of RSPO groups, participating, and receiving certification contribute to positive social and environmental benefits. The certification helps raise their awareness regarding health risks and social and environmental impacts and creates immunity among the farmers in the long run (see more in Sections 6.4 and 6.5, Chapter 6).

This implies that investment in the RSPO certification for ISH is efficient.

Table 5.8: Net economic benefits of RSPO certification for the smallholders (M.THb/group)

Item	Group Size (members)		
	260	100	60
Upfront costs	-	1.280	1.204
Recurrent costs	1.604	0.973	0.973*
Benefits of the RSPO certification for the smallholders	12.020	4.630	2.780
Net benefits of the RSPO certification for the smallholders	10.416	3.657	1.807

Note: Derived from Table 5.2, 5.6 and 5.7

* assumed at most equal to the group with the members of 100 smallholders

5.3 Challenges faced by Thai ISH in complying with the RSPO Standard requirements

This section presents comprehensive results of the problems and challenges towards the RSPO standard certification for ISH from the in-depth interview with the stakeholders in the oil palm supply chain, which was addressed in Chapter 3.

The results reveal that there are several problems and challenges. These are summarized as follows:

1) Market: The market for CSPO is still limited, since a large proportion of Thai palm oil is consumed domestically. For an international market, if there is a surplus, Thailand cannot compete with the major producing countries. As a result, there are lower premium prices for CSPO (i.e., 2 THB for a kg of CSPO). CSPO prices are still unfavorable. Thus, most Thai CPO mills and supply chain do not have enough incentives to promote RSPO certification, especially for ISH. So far, most of the CPO mills have supported the RSPO-certified groups under CSR policy.

Moreover, most CPO mills, which are the market for FFB, do not physically purchase CFFB.

2) Policy: The government policy towards RSPO certification is ambiguous. Although the Thai government has promoted sustainability practices in agricultural production, it is not specific to oil palm in the government plan (See more details in Chapter 7 for policy implications). Thus, the shortage of support and promotion from the government sector. However, some government agencies in the Ministry of Agriculture and Cooperatives (MOAC), such as the DOAE, are working closely with the smallholders for RSPO certification in the top oil palm producing provinces under the cooperation with GIZ project, namely “Sustainable and Climate-Friendly Palm Oil Production and Procurement (SCPOPP) Project (2018-2022)” (GIZ, 2022). Those efforts seem not sufficient.

The policy implementation is vague, especially with regard to the budget and the officials. Promoting RSPO certification for ISH cannot mainly depend on the DOAE. The DOAE has an organizational structure that is unfavorable to support the RSPO certification, such as the practical officials have multi-tasks, they lack knowledge in RSPO standards, and are often transferred to other areas to get promotions. Thus, it limits the support towards certification.

3) Awareness: Awareness concerning the RSPO standards and certification is still limited among the stakeholders and at every level. Even though it has been undertaken in Thailand as a pioneer for ISH certification for over a decade, it is not known among most oil palm smallholders, the concerned officials at all levels, and many others in the supply chain. Hence, overall understanding about the RSPO standards, certification process, benefits, and costs, is insufficient to move forward on RSPO certification.

Most of the smallholders do not (1) have adequate access to the required knowledge and information, (2) understand the mechanism of RSPO certification, and (3) realize the benefits and actual costs of the RSPO certification. Thus, they are not convinced why they have to participate and adopt the RSPO standards.

4) RSPO standard is complex and quite hard for most smallholders. It has a lot of details regarding sustainability principles, criteria, and indicators. In addition, the interpretation of the Thai context is ambiguous for some indicators.

As a result, to comply with the standard, it requires a lot of effort. The smallholders are facing several challenges as follows.

4.1) Most oil palm smallholders are not members of the farmer's groups or if they are members, for example, Plang Yai, the groups are loosely organized and they do not link to the mills.

4.2) The smallholders and the smallholder groups lack of budget, especially for the upfront costs in the first few years to form the farmer's groups and prepare for the RSPO certification. So far, in Thailand, none of the RSPO-certified groups was set up and supported by itself through the process of certification (as explained in section 5.1).

4.3) The smallholders lack the technical support to meet the RSPO requirements. These also include the group managers, who have to perform multi-tasks. They lack skills in management, business, communication, and IT.

5) The RSPO standards and the certification process are the challenges.

5.1) RSPO standards

- Land titles: The majority of smallholders in our sample possess adequate land titles. However, for the smallholders who do not have legal land titles, this constitutes a main stumbling stone for achieving certification.

- Documentation: In contrast to the RSPO requirements, even though all smallholders keep their farm records, most of them do not fully record their farming activities.

- Internal audit: RSPO standard requires 100 percent of the members to have an internal audit. This requirement is too costly for the smallholder groups to comply with it since some members and their plantations are not in the same sub-district or same district.

5.2) Certification process

- The lack of auditor options causes high annual audit costs. Normally, the audit charge in Thailand is 20-30% higher than that in Malaysia and Indonesia.

- It is time-consuming in the certification process, such as audit until receiving the certificate. RSPO has a guideline, but it is hard to keep the time frame.

- Interpretations of the auditors and the smallholder groups for some environmental and social indicators are not the same. These are, for example, buffer zone, groundwater, burning (Criteria 4.6), temporary vs permanent labor, GAP vs BMP, etc.

5.3) RSPO

- A lack of RSPO staff both locally and nationally who can facilitate the smallholders understanding of the standards and certification process. This includes Q&A regarding the standards and certification.

- The application for HCV assessment is not stable. It is not smallholder-friendly.

- RSPO spends too much time on some of the certification processes, such as LUCA, adding new group members, and areas of oil palm production.

- A lack of a system of communication between RSPO and RSPO Thailand and the farmer's groups. In addition, the lack of updating with regards to the standards and certification process

6) Smallholders: The constraints of the smallholders regarding their demographics, such as their education and age, and participation are crucial barriers. These inhibit a genuine understanding of the standard and thus limit the adoption of OPSP practices.

7) Personnel: A lack of key personnel who can provide technical support to the smallholder groups, such as trainers and experts about the RSPO standards and certification process, is a big challenge.

Some of the above problems and challenges are similar to those discussed in several studies. For example, for the financial and budget challenges, they were raised by Brandi et al. (2013), Wangrakdiskul and Yodpojit (2015), Rietgerg et al. (2016), Bakhtary et al. (2021), Npueng et al. (2022), and Chaivijitmalakoon et al. (2022). Regarding land title constraint, it has been referred to by many, such as Blandi et al. (2015). In addition, the market for CSPO challenges has been stated by Kunsangkaew et al. (2019) and Npueng et al. (2022).

5.4 Summary

So far, in Thailand, all RSPO-certified groups were initiated and supported by the mills and third parties in the certification process. Most certified groups are connected with the CPO mills and manage their groups with full mill aid. Partly, this is due to the fact that it is difficult and costly for smallholders to achieve it. The upfront costs for a starting member of 100 and 60 smallholders were about 1,280 M.THb and 1.204 M.THb, respectively. The main audit costs for 60–100 members are around 295,000 THb. The expenses for the certification procedure are about one-fourth of the upfront costs.

The recurrent costs for the group sizes of 100, 150, 200, and 250 members were 972,500, 1.120, 1.410, and 1.604 M.THb per year, respectively. The recurrent costs are not a big concern since, after the first certification, the groups can sell CSPO and generate some of the group's income.

The benefits of RSPO Standard certification for ISH in Thailand were realized when the smallholders adopted and improved their OPSP. The benefits are achieved in the form of improving productivity (yield/rai) and FFB quality, reducing cost per unit of FFB, obtaining premium FFB prices, and adopting environmental and social practices. The real economic benefits from the certification for the certified smallholders are the changes in net benefits with and without certification. The results show that even for the group with the smallest size of 60 members, the RSPO certification still generates net economic benefits, and net economic benefits increase as the smallholder group grows. A group with 260 members could generate net economic benefits of as much as 10.416 M.THb per year. Also, adopting OPSP to comply with the standards generates social and environmental benefits. Thus, an investment in the RSPO certification for ISH is efficient.

However, the smallholders are still facing challenges in complying with the RSPO Standard requirements. These are the markets for CSPO, government policy, public awareness, the RSPO standard and certification process, RSPO, smallholders, personnel, and experts to support technical services, and the RSPO standard certification process. To tackle and overcome those challenges and move towards the RSPO certification of ISH, a lot of interventions need to be made.

Chapter 6

Impact of RSPO Certification on the Livelihoods of Smallholders

This chapter presents the impact of RSPO on the livelihoods of smallholders, drawn from the primary data collected from 302 smallholders, including 158 certified and 144 non-certified RSPO smallholders in the study areas. The results are in 8 sub-sections: 1) demographic profile of smallholders; 2) farm characteristics and oil palm practices; 3) opinion on RSPO certification; 4) social impacts; 5) environmental impacts; 6) economic impacts; 7) problems faced by smallholders, support and training needs and suggestions; and 8) a summary.

6.1 Demographic profile of smallholders

Selected profiles of the smallholders are summarized in *Table 6.1*. The survey showed that around 90% of the smallholders are over 40 years of age, one-third are over sixty years old, and the average is 55.62 years. About 75% obtained, at most, only secondary education. Only 17.2% received a bachelor's degree or higher. According to the smallholders' age and education, it is likely that they would have limited knowledge and constraints when adopting sustainable oil palm management practices.

Overall, more than half (55.6%) of the smallholders are male. However, for the certified smallholders, the proportion of males is higher (63.3%), and for the non-certified, the proportion of females is over half (52.8%) of them. Approximately 80% of the smallholders are married, and a single smallholder accounts for 8.9%. Normally, for male farmers who are married, housewives assist their husbands in some activities in the production of oil palm. There is a tendency that female smallholders will play a significant role in oil palm production, as well as an increase in demand for hiring labor.

More than half of the smallholders have at most 3 household members, and 35.4% have 4-5 household members. On average, they have 3.5 people per household, and two members are working.

Most of the smallholders (85.1%) grow oil palms as their primary source of income, while 9.3% and 5.6% of them depend on other agricultural and non-agricultural income, respectively. It is interesting to note here that 83.1% of the smallholders obtained income from more than one source. Examples of a secondary source of income were rubber plantations (45.4%) and fruit tree production (35.5%). It is clear that most of the oil palm smallholders, especially in the south, depend for their income not only on oil palm but also on rubber, fruit trees, and other non-farm activities. Their diversification helps improve households' economic livelihoods (see Section 6.6).

As for experience in oil palm production, it varies a lot among the smallholders, from at most 5 years to more than 20 years. More than half (54.7%) of the smallholders have more than 15 years of experience in oil palm production, while 7.3% of the smallholders have at most 5 years of experience. On average, they have 18.2 years of experience. The certified smallholders

have more experience than the non-certified ($t = 4.252$, $p\text{-value} = 0.000$), with 20.13 and 16.06 years of experience on average, respectively.

The certified smallholders have joined the groups for 6.1 years on average. More than half (51.9%) of them have been members for 3-5 years. However, for the non-certified groups, only a few non-certified smallholders (1.4%) are members of the oil palm production groups. This would be a key reason for them not to have access to training. Normally, in Thailand, the MOAC is responsible for promoting farmer's groups, which are mainly implemented by the Department of Agricultural Extension (DOAE) and the Cooperative Promotion Department (CPD). So far, most of the RSPO-certified ISH groups have been registered by the DOAE, namely the community enterprises.

Table 6.1: Demographic profile of the smallholders

Variable	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Average age (Years) (S.D.)	56.4 (10.8)	54.8 (11.4)	55.62 (11.1)
Education: Primary school or under	72 (45.6)	60 (41.7)	132 (43.7)
Gender			
- Male	100 (63.3)	68 (47.2)	168 (55.6)
- Female	58 (36.7)	76 (52.8)	134 (44.4)
Marital status: Married	135 (85.4)	105 (72.9)	240 (79.5)
Average householder member (people) (S.D.)	3.7 (1.8)	3.3 (1.3)	3.5 (1.6)
Average number of household labors (people) (S.D.)	1.9 (0.8)	1.8 (0.8)	1.8 (0.8)
Main occupation: Oil palm grower	139 (88.0)	118 (81.9)	257 (85.1)
Secondary occupation (Yes)	132 (83.5)	119 (82.6)	251 (83.1)
Type of secondary occupation: Oil palm production	19 (14.4)	26 (21.8)	45 (17.9)
Average experience in oil palm production (Year) (S.D.)	20.13 (8.8)	16.06 (7.7)	18.2 (8.5)
	$t = 4.252$, $p\text{-value} = 0.000$		
Average period of membership in oil palm production group (Year) S.D.)	6.1 (2.3)	-	-

Remark: * An oil palm smallholder can give more than one answer

6.2 Farm characteristics and oil palm practices

6.2.1 Farm characteristics

This part describes the key variables about the farm characteristics of the smallholders. These include area of land holding, average land use by key activity per household, oil palm production area, number of oil palm plots, land ownership, land title, land use prior to oil palm production, topography, and high-value assets (*Table 6.2*).

On a per-household basis, smallholders owned on average about 37.1 rai (5.94 ha), while some 79.8% of them owned at most 50 rai. Only 3.6% owned more than 100 rai. The certified smallholders have larger land holdings than the non-certified ($t = 3.098$, $p\text{-value} = 0.002$), 42.8 and 30.7 rai on average, respectively. Overall, the smallholder owns more land

than the country's average, which is 24.92 rai per agricultural household (OAE, 2023). For oil palm production, the average area is 26.8 rai (4.29 ha). 64.2% of them own up to 25 rai of oil palm areas, and 25.8% own 26–50 rai per household. Overall, the smallholders allocate around 70% of their land to oil palm production. The certified smallholders have larger oil palm production areas than the non-certified ($t = 2.840$, $P\text{-value} = 0.005$), 31.6 and 21.5 rai on average, respectively (*Table 6.2*).

Apart from oil palm production, other land uses of the smallholders are rubber production and fruit tree crops such as durian and mangosteen, with average areas of 14.8 and 5.6 rai, respectively.

Smallholders own, on average, 1.7 oil palm plots, while 57.0% of them have only one plot, 28.1% have two plots, and only 5.3% have more than three plots.

The majority of oil palm plots (477 plots) had land titles. The most popular land titles were Nor Sor 4 (63.2%) and Sor Por Kor (16.8%). However, some Por Bor Tor 5 (8.6%) of the plots were not eligible for the RSPO Standard.

Land usage before oil palm was various. Some 42.1% of oil palm plots were used for rubber production, while some 25.6% were used for rice paddies, 19.5% were un-used land, and 10.5% were used for other agricultural activities (*Figure 6.1*). It is clear from the above information that many agricultural plots, i.e., rubber and paddy fields, were replaced by oil palm. Some of the reasons the smallholders chose rubber for oil palm were that rubber requires intensive labor, rubber may have disease in some areas, and rubber prices are low. As to rice, the low net return is the main reason for the replacement. Since the physical supply of land is fixed, competition among alternative uses cannot be avoided. Up to 80.7% of the oil palm plots are in plain areas, while 8.8 % and 7.1% of the plots are on lowland, and hilly and mountainous areas, respectively.

As to farm high-value assets, the survey showed that the most popular assets are motorcycles (96.7%), cars (82.8%), 4 and 6-10 wheel trucks (25.5%), and tractors (9.9%)

Table 6.2: Farm characteristics

Variable	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Land holding (rai/household)			
- ≤ 25	44 (27.8)	77 (53.5)	121 (40.1)
- 26-50	70 (44.3)	50 (34.7)	120 (39.7)
- > 50	44 (27.9)	17 (11.8)	61 (20.2)
Mean (S.D.)	42.8 (35.4)	30.7 (32.4)	37.1 (34.5)
	$t = 3.098$, $P\text{-value} = 0.002$		
Average land use by activity per household			
- Oil palm	31.6 rai	21.5 rai	26.8 rai
- Rubber	15.3 rai (n=72)	14.2 rai (n=67)	14.8 rai (n=139)
- Other crops i.e. fruit tree crops	6.0 rai (n=58)	5.1 rai (n=43)	5.6 rai (n=101)

Table 6.2: Farm characteristics (cont.)

Variable	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Area of oil palm production (rai/household)			
- ≤ 25	86 (54.4)	108 (75.0)	194 (64.2)
- 26-50	49 (31.0)	29 (20.1)	78 (25.8)
- >50	23 (14.6)	7 (4.9)	30 (10.0)
Mean (S.D.)	31.6 (31.2)	21.5 (30.3)	26.8 (31.2)
	$t = 2.840, p\text{-value} = 0.005$		
Average number of oil palm plot (S.D.)	1.7 (1.1)	1.7 (1.2)	1.7 (1.2)
Land ownership for oil palm plot	(n=251 plots)	(n=226 plots)	(n=477 plots)
- Owned land	100.0%	100.0%	100.0%
Land title for each plot			
- Nor Sor 4	177 (70.5)	125 (55.3)	302 (63.2)
- Nor Sor 3	15 (6.0)	23 (10.2)	38 (8.0)
- Sor Por Kor	33 (13.1)	47 (20.8)	80 (16.8)
- Nor Sor 5, Nor Kor 3/ Nor Sor 2	6 (2.4)	10 (4.4)	16 (3.4)
- Por Bor Tor 5	20 (8.0)	21 (9.3)	41 (8.6)
Land use prior to oil palm production	(n=251 plots)	(n=226 plots)	(n=477 plots)
- Rubber Plantation	95 (37.8)	106 (47.0)	201 (42.1)
- Paddy field	74 (29.5)	48 (21.2)	122 (25.6)
- Un-used land	52 (20.7)	41 (18.1)	93 (19.5)
- Other agricultural activity	24 (9.6)	26 (11.5)	50 (10.5)
- Not available	6 (2.4)	5 (2.2)	11 (2.3)
Topography	(n=251 plots)	(n=226 plots)	(n=477 plots)
- Plain	202 (80.5)	183 (81.0)	385 (80.7)
- Lowland	24 (9.6)	18 (8.0)	42 (8.8)
- Hilly and mountainous	10 (4.0)	24 (10.6)	34 (7.1)
- Others	15 (5.9)	1 (0.4)	16 (3.4)
High value assets*			
- Car	144 (91.1)	106 (73.6)	250 (82.8)
- 4, and 6-10 wheel truck	48 (30.4)	29 (20.2)	77 (25.5)
- Motorcycle	152 (96.2)	140 (97.2)	292 (96.7)
- Tractor	19 (12.1)	11 (7.7)	30 (9.9)

Remark: * An oil palm smallholder can give more than one answer

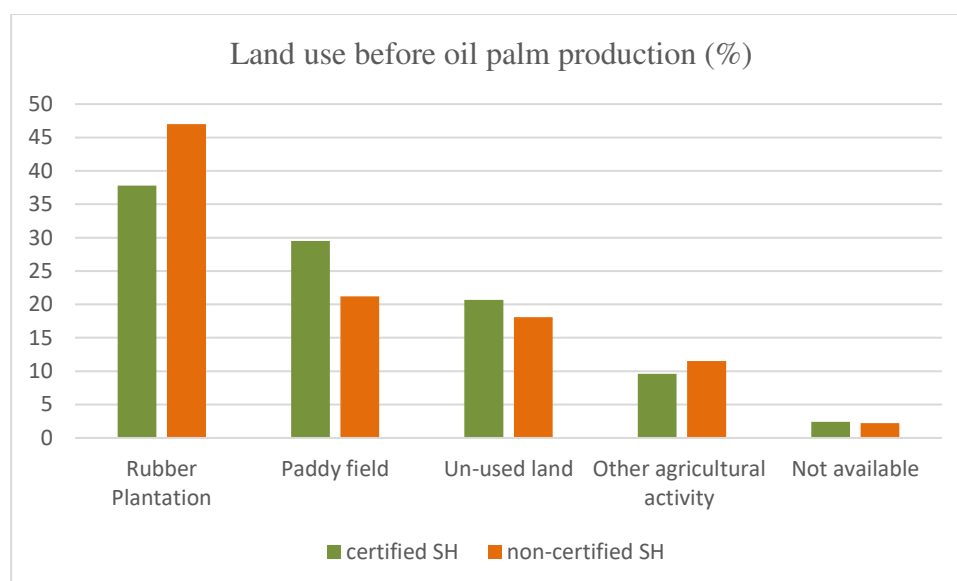


Figure 6.1: Land use before oil palm production

6.2.2 Oil palm practices

This sub-section highlights the key oil palm practices of the smallholders, including the age of the oil palm, the management of fronds and leaves, pests and labor, the application of fertilizer, farm records, FFB selling, OPSP training, and the adoption of sustainable practices. These are presented as follows:

Table 6.3 summarizes the age of the oil palm by plot. Overall, oil palm are 15.8 years old on average. 57.5% of the oil palm plots have at least 15-year-old palm. The findings also show that some smallholders (11.1%) still maintained their old oil palms (25+ years old). Generally, old oil palms are not optimally productive and will also increase the cost of FFB production. However, proper management could help prolong their productive period (see production by age of palm in Section 6.6). The results also reveal that the oil palm owned by the certified smallholders are older than those owned by the non-certified, with 17.6 and 13.7 years old on average, respectively ($t = 5.371$, $p\text{-value} = 0.000$).

Table 6.3: Age of oil palm

Age of oil palm	Oil palm plot (%)		
	Certified (n=251 plots)	Non-certified (n=226 plots)	Total (n=477 plots)
- ≤ 3	9 (3.6)	16 (7.1)	25 (5.2)
- 4-8	21 (8.4)	54 (23.9)	75 (15.7)
- 9-14	54 (21.5)	49 (21.7)	103 (21.6)
- 15-20	96 (38.2)	67 (29.6)	163 (34.2)
- > 20	71 (25.3)	40 (17.7)	111 (23.3)
Mean (S.D.)	17.6 (7.9)	13.7 (7.7)	15.8 (8.0)
	$t = 5.371, p\text{-value} = 0.000$		

FronD & leaf management

In oil palm production, normally during the harvest of FFB and on a yearly basis, the harvesting team has to cut the oil palm fronds. After cutting, it will be collected and accumulated in bulk between the rows of the oil palm. However, this is not considered a good practice. As an alternative, placing it in a spread covering the entire plantation brings several benefits and is a sustainable practice. The benefits include helping preserve soil moisture, controlling weeds, protecting soil erosion, decomposing fast, improving soil structure, etc.

During the past decade, it has been widely recommended to smallholders, especially the certified smallholders and the members of the oil palm group. However, overall, only 27.8% of the smallholders adopted this practice, and the proportion of adopting is higher among the certified smallholders (38.6%), while only 16% of the non-certified have adopted it (*Table 6.4*).

Pest management practices

Data on pest management in oil palms are summarized in *Table 6.4*. The survey shows that to cope with the pest, the smallholders used different measures, for example, mechanical control (87.7%), applying chemicals (30.5%), and using IPM (5.0%). Normally, to get rid of weeds, smallholders use both non-chemical and chemical methods. To control rats, the use of non-chemical measures, such as traps or nets, is popular. These results also reveal that the proportion of smallholders who still apply chemicals decreases. Thongrak and Kiatpathomchai (2012) reported that, overall, 55% of the smallholders used chemicals in pest management. In addition, this survey shows that the proportion of certified smallholders that still apply chemicals is less than that utilized by the non-certified, at 26.5% and 34.7%, respectively. While the proportion of the certified that applies IPM is greater than that utilized by the non-certified, 12.0% and 0.0%, respectively, Nevertheless, this proportion is still very low for the certified smallholders.

Table 6.4: FronD & leaf and pest management

Practice	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
FronD & leaf management			
- Collecting and accumulating those between the row of oil palm	97 (61.4)	121 (84.0)	218 (72.2)
- Placing those spread cover the entire plantation	61 (38.6)	23 (16.0)	84 (27.8)
Pest management			
- Mechanical control	147 (93.0)	118 (81.9)	265 (87.7)
- Applying Chemicals	42 (26.5)	50 (34.7)	92 (30.5)
- IPM	19 (12.0)	0.0 (0.0)	19 (5.0)

Remark: * An oil palm smallholder can give more than one answer

Labor management

Table 6.5 summarizes the information on labor management in oil palm production. The results revealed that more than 80% of the smallholders use both family and hired laborers. Some 15.2% of them use only household labor. These results also show that around 85% of the smallholders have to rely on hired laborers. The most popular activities utilizing family labor were general management (99.0%), applying fertilizer (76.8%), and weeding (62.8%). In contrast, the top 3 activities utilizing hired labor were harvesting (96.5%), transportation of FFB (83.6%), and frond cutting (81.3%).

For the smallholders using only household labor, more than 80% of them depend on oil palm as the main source of income (or occupation), and they have a small oil palm production area, only 14.5 rai per household on average. The survey also indicates that oil palm smallholders who hired labor mostly (97.7%) hired them from their provinces.

Table 6.5: Labor management

Labor management	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Source of labor			
- Household labor (only)	21 (13.3)	25 (17.4)	46 (15.2)
- Hired labor (only)	2 (1.3)	7 (4.9)	9 (3.0)
- Both household and hired labor	135 (85.4)	112 (77.8)	247 (81.8)
Top three practices used household labor	(n=156)	(n=137)	(n=293)
- General management	151 (96.8)	137 (100.0)	290 (99.0)
- Applying fertilizer	119 (76.3)	106 (76.3)	225 (76.8)
- Weeding	95 (60.9)	89 (64.0)	184 (62.8)
Top three practices used hired labor	(n=137)	(n=119)	(n=256)
- Harvesting	135 (98.5)	112 (94.1)	247 (96.5)
- Transportation of FFB	116 (84.7)	98 (82.4)	214 (83.6)
- Frond cutting	117 (85.4)	91 (76.5)	208 (81.3)

Remark: * An oil palm smallholder can give more than one answer

Application of fertilizer

Table 6.6 summarizes the survey results regarding the application of fertilizer by the smallholders. The results revealed that all smallholders applied fertilizer. Of this figure, 58.9% applied both organic and chemical fertilizers, 40.4% applied only chemical fertilizer, and 0.7% used only organic fertilizer.

Overall, 80.3% applied chemical fertilizers 2-3 times a year. 12% applied chemical fertilizers once a year. About 7.7% of them applied chemical fertilizer three times or more a year. Only 19.5% and 12.9% of them applied fertilizers based on soil and leaf analysis, respectively. 37.1% of them applied fertilizers based on observing leaf symptoms.

The percentage of the certified smallholders that applied fertilizers based on soil and leaf analysis is much higher than that of the non-certified smallholders, 35.4% and 22.8% versus 2.1% and 2.1%, respectively. This evidence clearly indicates that there are inappropriate

practices undertaken by the non-certified smallholders. The main reasons are that they have no access to soil and leaf analysis facilities, which are not available throughout the oil palm production areas, as well as a lack of knowledge about good practices. Therefore, helping solve this problem should be a priority for the oil palm smallholders' intervention.

Table 6.6: Application of fertilizer

Application of fertilizer	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Type of fertilizer applied			
- Chemical fertilizer (only)	59 (37.3)	63 (43.8)	122 (40.4)
- Organic fertilizer (only)	1 (0.7)	1 (0.7)	2 (0.7)
- Both chemical and organic fertilizer	98 (62.0)	80 (55.5)	178 (58.9)
Frequency of applying chemical fertilizer (Time/year)	(n=157)	(n=143)	(n=300)
- 1	8 (5.1)	28 (19.6)	36 (12.0)
- 2-3	138 (87.9)	103 (72.0)	241 (80.3)
- > 3	11 (7.0)	12 (8.4)	23 (7.7)
Mean (S.D.)	2.6 (0.7)	2.3 (0.9)	2.4 (0.8)
Criteria for applying fertilizer*			
- Observing leaf symptom	83 (52.5)	29 (20.1)	112 (37.1)
- Leaf analysis	36 (22.8)	3 (2.1)	39 (12.9)
- Soil analysis	56 (35.4)	3 (2.1)	59 (19.5)

Remark: * An oil palm smallholder can give more than one answer

Farm records

Table 6.7 illustrates farm records and their uses. Overall, 59.9% of the smallholders keep their farm records; 23.8% do not keep records but keep bills; and 16.3% do not keep records and bills. However, all certified smallholders keep their farm records, while only 16.0% of non-certified smallholders do. The results indicate clearly that the certified smallholders have already adopted the farm record practice because they have incentives or are motivated to implement it. In contrast, the non-certified smallholders, who keep farm records, are those who realize the benefits.

For those who kept records, 73.5% of them used them to improve farm management. Since farm record keeping is an important means to obtain basic information for farm self-assessment and use it to improve the smallholder's decision regarding oil palm production management, a high priority should be given to fully keeping records and learning to properly use the farm records.

Thus, being a member of the certified group is a proper measure to promote the adoption of farm records.

Table 6.7: Farm records

Variable of farm records	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Farm records			
- Yes	158 (100.0)	23 (16.0)	181 (59.9)
- No records & not keeping bills	0.0 (0.0)	49 (34.0)	49 (16.3)
- No records but keeping bills	0.0 (0.0)	72 (50.0)	72 (23.8)
Use of farm records	(n=158)	(n=23)	(n=181)
- Yes	118 (74.7)	15 (65.2)	133 (73.5)

FFB selling

The information on the sale of FFB is summarized in *Table 6.8*. The results revealed that each individual smallholder sold the FFB to more than one buyer. Most of the certified smallholders (81.6%) sold their FFB to the partner mill; 15.8% of them sold to the partner mill ramp; and 8.2% sold to the independent ramp. In general, the certified smallholders do not have to sell FFB to the partner mill or the partner mill ramp. However, those are the favorites because the certified smallholders will have premium prices (see the premium prices in *Table 6.15*).

For the non-certified smallholders, the highest proportion (69.4%) of the smallholders sold their FFB to the local ramp. About 29.9% and 7.6% of them sold their FFB to the same mill and mill ramp as the certified smallholders, respectively.

The result also revealed that the distance between the plantation and the independent ramp was 3.6 km on average. It was the shortest distance among them. The average distance between the plantation and the partner mill was 5.5 kilometers. This indicates that this distance will not be a constraint for the certified smallholders to sell FFB to the partner mill, as well as for the non-certified smallholders.

Normally, each individual smallholder's decision to sell FFB depends on a combination of several factors, such as purchasing prices from each buyer, the location of oil palm plantations (distance to buyer), the grading system, harvesting and transportation conditions, payments, etc.

Table 6.8: Selling the FFB

Variable	Oil palm smallholders (%)	
	Certified (n=158)	Non-certified (n=144)
FFB buyer*		
- Partner mills	129 (81.6)	43 (29.9) **
- Mill	3 (1.9)	0 (0.0)
- Mill ramps	25 (15.8)	11 (7.6) **
- Independent ramps	13 (8.2)	100 (69.4)
Distances to buyers (km)		
- Partner mills	Min=0.3, max=25, mean=5.5	Min=0.5, max=15, mean=4.1
- Mill	min = 1, max = 19, mean = 9.3	0.0
- Mill ramps	min=0.5, max=20, mean= 6.2	min = 2, max=10, mean = 5.6
- Independent ramps	min = 1, max = 10 , mean = 3.6	min=0.1, max=25, mean = 3.6

Remark: * An oil palm smallholder can give more than one answer

** Non-certified smallholder sold FFB to the same mills and mill ramps as certified smallholders

Attending oil palm and sustainable practice training (OPSP)

Table 6.9 presents the information with regards to the smallholders' attendance in the OPSP training in percentage. For the certified smallholders, the results reveal two periods: since joining the certified group and during 2020–2022. But, for the non-certified smallholders, the information was requested only during 2020–2022. The results showed clearly that being a certified smallholder helps access OPSP enormously.

However, when asked about additional training needs, the certified smallholders reflected that they still require more training on *Garnoderma spp.* (19.6%), soil and fertilizer management (9.4%), such as in-depth topics such as the selection of organic matter for soil amendment, taking soil and leaf samples, and others (3.1%) such as seedling selection and innovation or new technology in plantation management. But, for non-certified smallholders, they require training on soil and fertilizer management (23.6%), overall plantation management (20.8%), *Garnoderma spp.* (11.8%), and others (3.5%) such as OHS, seedling selection, farm records, and marketing.

The responses on training needs indicate that the certified smallholders demand more in-depth knowledge for improving their production, while the non-certified smallholders still need basic knowledge of oil palm practices.

Table 6.9: Percentage of smallholders attended OPSP training

Variable	Certified smallholders since joining RSPO group (n=158)	Training during 2020-2022**	
		Certified (n=158)	Non-certified (n=144)
Attended training	100.0	98.1	20.1
Training topic attended *			
- Farm records	95.6	31.0	0.0
- Plantation management	94.3	67.7	16.0
- OHS	93.7	34.8	2.1
- Fertilizer & management	91.1	63.3	15.3
- IPM	88.6	29.1	2.8
- RSPO practices	88.0	67.7	0.0
- Soil, water, and natural resource conservation	82.9	32.9	4.2
- HCV	79.7	27.8	0.0
- Sustainability manual	65.8	15.8	0.0
- ICS	60.1	19.6	0.0
- GAP	0.0	0.0	2.1

Remark: * An oil palm smallholder can give more than one answer

Adoption of good and sustainable management practice

Table 6.10 summarizes the adoption of OPSP by the smallholders. The results reveal that the certified smallholders have adopted the OPSP more than the non-certified in all practices (Figure 6.2). The most adopted practices are: keeping farm records (100.0%);

harvesting ripe FFB (100.0 %), do not hire child labor (100.0%), selling FFB directly to partner mill or mill ramp (97.5%), improving soil & fertilizer management such as increasing the frequency of applying fertilizer, applying fertilizer based on soil leaf analysis, using strength fertilizer to reduce loss, applying organic matter such as empty bunch, and manure (81.6%); proper pest management namely stops or reducing chemicals use, or apply IPM (79.7%); soil, water, natural resource conservation such as no fire and burning in plantation, no trash, do not plant oil palm close to the waterway (64.6%); implementing OHS (59.5%); arranging oil palm frond cover the entire plantation area to control weed, keep moisture, and prevent soil erosion (38.6%); etc. However, the level of adoption of farm records may vary among the certified smallholders.

When comparing the adoption of OPSP between the well-established and newly certified smallholders, the results showed that for most practices, the adoption does not differ. But, for IPM pest management, arranging oil palm fronds to cover the entire plantation area, OSH, and improving soil and fertilizer, the well-established certified smallholders adopted at a higher rate than the newly certified smallholders (*Figure 6.3*). It seems that for practices that do not directly need to comply with the standard, it takes longer to adopt.

The adoption of these practices will directly affect the smallholders' livelihood, including social, environmental, and economic variables (see sections 6.4-6.6).

Table 6.10: Adoption of good and sustainable management practice

Variable	Oil palm smallholders (%)	
	Certified (n=158)*	Non-certified (n=144)**
- Farm records	158 (100.0)	23 (16.0)
- Improve soil & fertilizer management i.e. increase frequency of applying fertilizer, applying fertilizer based on soil leaf analysis, use strength fertilizer to reduce loss, apply organic matter such as empty bunch, manure)	129 (81.6)	53 (36.8)
- Proper pest management i.e. stop or reducing chemicals use, or apply IPM	126 (79.7)	50 (34.7)
- Selling FFB directly to partner mill or mill ramp	154 (97.5)	0 (0.0)
- Conduct soil, water, natural resource conservation i.e. no fire and burning in plantation, no trash, do not plant oil palm close to the waterway	102 (64.6)	27(18.8)
- Implement OHS	94 (59.5)	27 (18.8)
- Arranging oil palm frond cover the entire plantation area to control weed, keep moisture, and prevent soil erosion	61 (38.6)	23 (16.0)
- Harvesting ripe FFB	158 (100.0)	70 (48.6)
- Do not hire labor <15 years old	158 (100.0)	144 (100.0)

Remark: * practice change after joining RSPO group

** practice change during the past 3 years

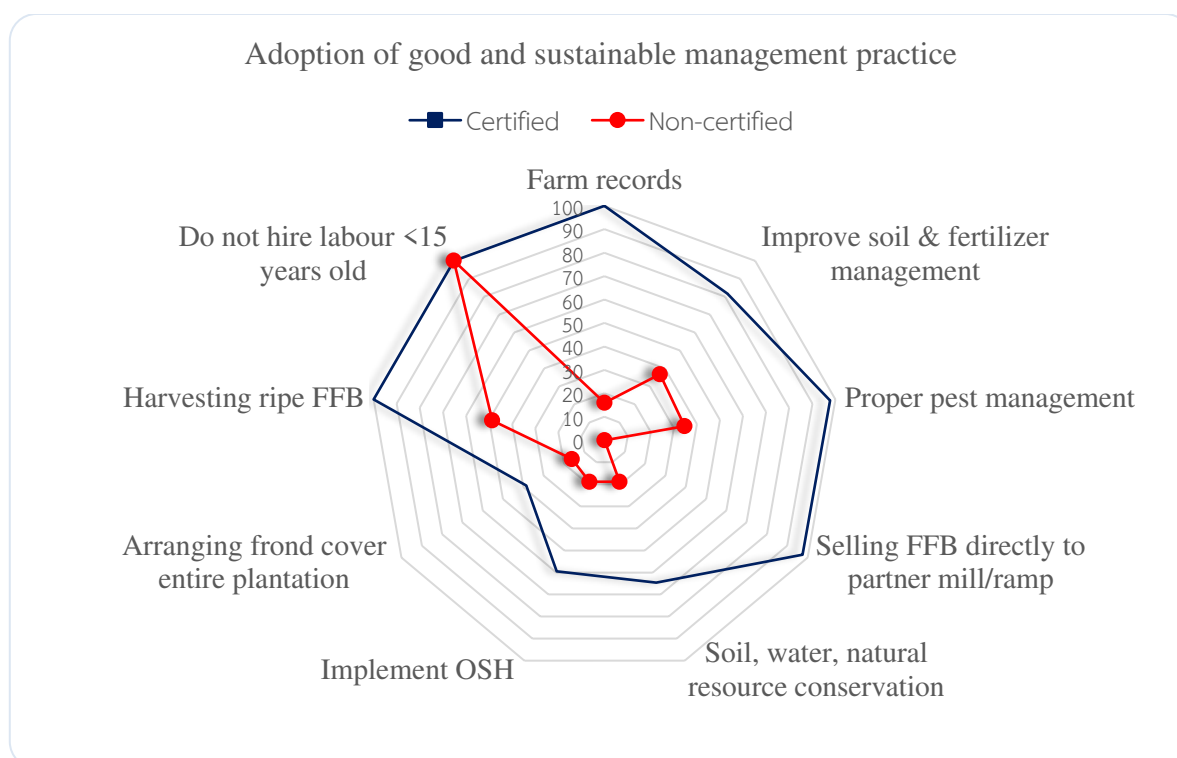


Figure 6.2: Adoption of good and sustainable management practices, comparing certified and non-certified smallholders

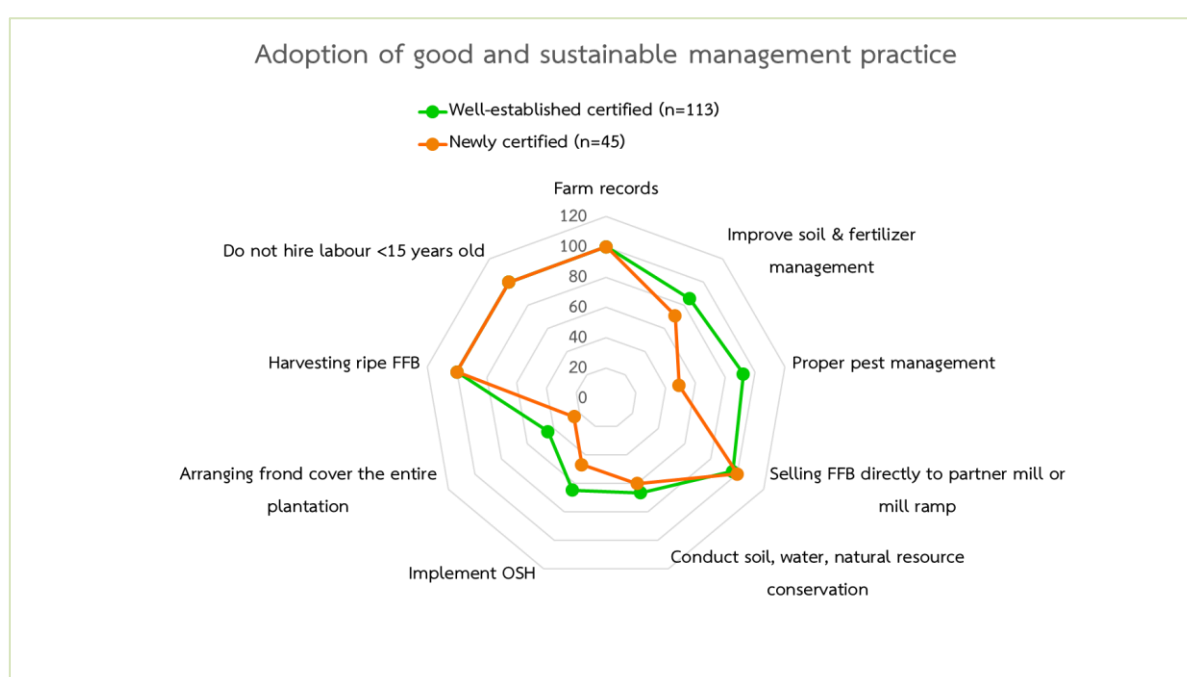


Figure 6.3: Adoption of good and sustainable management practices, comparing well-established and newly certified smallholders

6.3 Opinion on RSPO certification

Regarding the opinion of the smallholders on RSPO certification and their participation, the results in *Table 6.11* reveal that most certified smallholders (74.1%) participated in the RSPO group activities at a high level, while 24.7% contributed at a moderate level. Only 1.2% participated at a low level. The proportion of them chosen by the auditors to visit the farm during the auditing process was only 31.6%. However, all of them reflected that the feedback was beneficial for improving their practices. All of them agree (97.5% and 2.5% highly agree and moderately agree) with the status of being a member of the RSPO-certified group and feel satisfied.

However, only 32.6% of the non-certified smallholder samples perceived the RSPO standard. They all realize the benefits of joining the RSPO-certified group, such as knowledge-gaining and the premium prices of FFB. All of them agree (85.1% and 14.9% highly agree and moderately agree), with the status of being a member of the RSPO-certified group. When asked about joining the RSPO group, they were all invited. The main reasons for not joining the RSPO group are time availability for training (59.6%); having a small oil palm area (21.3%); the problem with land titles; and others (14.9%) such as old age, health problems, and living far from the group (*Table 6.11*).

When comparing opinions on RSPO certification and participation between the well-established and newly certified smallholders, the results revealed that only opinions on level of participation were different. The newly certified smallholders reflected a higher percentage of high participation in the RSPO group.

Table 6.11: Opinion on RSPO certification, and participation

Variable	No.	%
Certified RSPO	(n=158)	
Level of participation in RSPO group: High	117	74.1
Chosen by auditor to visit farm during auditing process: Yes	50	31.6
Benefit from being chosen: Yes (feedback for improving practice)	50 (n=50)	100.0
Opinion about being a member of RSPO-certified group: Highly agree	154	97.5
Satisfaction on being a member of RSPO-certified group: Satisfy	158	100.0
Non-certified RSPO	(n=144)	
Perception about RSPO standards: Yes	47	32.6
Perception about benefit from RSPO standards: Yes	47 (n=47)	100.0
Benefit perceived*		
- Knowledge	47	100.0
- Premium prices of FFB	47	100.0
Opinion regarding to RSPO-certified: Highly agree	40	85.1
Been invited to join RSPO group: Yes	47 (n=47)	100.0
Reason for not joining RSPO group*	(n=47)	
- Constraint of time availability for training	28	59.6
- Small size of oil palm area	10	21.3
- Constraint of land title	5	10.6
- Others i.e. old age, health problem, living far from the group	7	14.9

Remark: * An oil palm smallholder can give more than one answer

6.4 Social impacts

As for the social benefits of RSPO certification for ISH, the results in *Table 6.12* reveal that the most social gains are the improvement of knowledge in oil palm production and related aspects (100.0%); the better relationship among the smallholders and between the smallholders and the CPO mills (99.4%); the health risk of the smallholder, family member, and labor decreases (98.6%); safety from accidents of farm household and hired laborers improves (99.4%); and increasing awareness of the non-certified smallholders about sustainability in oil palm production (52.5%).

The social benefits with regards to knowledge improvement among the smallholders are apparent, not only bringing direct benefits to the certified smallholders but also creating spillovers to the non-certified smallholders, where 91.4% of the certified reflected that their knowledge is available for others as well as the non-certified (*Table 6.12*). *Through the process of certification, RSPO's groups acted as a center for sharing knowledge and experiences.* Therefore, the smallholders themselves can solve most of their problems in oil palm production, which will improve their economic livelihoods (see more in Section 6.6).

Regarding the relationship amongst the smallholders and the relationship between the smallholders and the CPO mills, this aspect is getting much better since all RSPO sample groups are attached to the mills. Participation in group activities helps assimilate the information flow from the mills and supply chain. This association, thus, improves their understanding and leads to a better relationship. As for the relationship amongst the smallholders, it is obvious that their participation and interaction in group activities with common goals improves their relationship inevitably. In addition, during the in-depth interview with the certified groups, it was evident that most of the certified groups have allocated their budgets to support community activities. This helps improve the relationship between the group organization and the community.

The adoption of OPSP presented in *Table 6.10*, especially chemical use and OHS, helps reduce health risk and safety.

Moreover, the results from the in-depth interview reveal that the certified smallholders have learned and realized the power of working as a group. Thus, overall, based on the social benefits discussed above, it is worth noting that the RSPO certification for ISH significantly creates positive social impacts.

Table 6.12: Social benefits from RSPO certification

Variable*	Oil palm smallholders (%)	
	Certified (n=158)	Non-certified (n=144)
Smallholder's knowledge on oil palm management improves	158 (100.0)	20 (13.8)
Relationship amongst the smallholders, and between smallholder and mill improves	157 (99.4)	2 (1.4)
Health risk of smallholder, family member, and labor decreases	156 (98.6)	27 (18.8)
Safety of from accident of farm household & hired laborers improve	157 (99.4)	26 (18.1)
Benefits for non-certified smallholders		(n=47) **
- More knowledgeable farmers in the community who can help others.	127 (91.4)	46 (97.9)
- Availability of best management practice plantation in the community	104 (74.8)	32 (68.0)
- Raising awareness of the non-certified smallholders	73 (52.5)	18 (38.3)

Remark: * An oil palm smallholder can give more than one answer

** Percentage was calculated from the respondents that perceived about RSPO

6.5 Environmental impacts

The results of the environmental impacts of RSPO certification in this section are based on the data from the survey and the in-depth interview with the certified groups. The survey results reveal different aspects of oil palm management and natural resource and environmental practices (*Table 6.13*). These indicate that the certified smallholders have a higher percentage of adopting environmentally friendly practices compared to the non-certified. Thus, the adoption implies the positive environmental impact of the RSPO certification.

In Thailand, the negative environmental impacts of deforestation from oil palm production should not cause too much concern. Since most of the land used before oil palm production was agricultural, the rest is unused land (*Tables 6.2 and 6.13*). Other practices that create environmental benefits include stopping the application of chemicals (73.5% and 65.3% for the certified and non-certified smallholders, respectively), reducing chemical use (26.5% and 16.0%), adopting soil, water, and natural resource conservation (64.6% and 18.8%), OHS adoption (59.5% and 18.8%), placing fronds and leaf spread over the entire plantation to control weeds and soil erosion (38.6% and 16.0%), and applying IPM (12% and 0.0%).

Regarding the chemicals used, the results from the in-depth interview also indicate that before joining the RSPO group, the smallholders were used to choosing chemicals to control weeds or some other pests, but after participating in the RSPO group, using chemicals was given low priority.

As for the soil, water, and natural resource conservation that must be adopted to comply with the RSPO standard, the certified smallholders have a higher percentage of adoption

compared to the non-certified ones. In addition, the adoption of OHS is higher among certified smallholders. However, when comparing the well-established and newly certified smallholders, the adoption of OHS is higher among the well-established certified. The main reason was their awareness of the negative impacts of not implementing OHS practices.

The positive environmental impacts of RSPO certification are consistent with the results from previous studies such as Thongrak and Kiatpathomchai (2012), and Thongrak, et.al (2016).

Table 6.13: Selected practices that create environmental benefits in percentage

Variable*	Oil palm smallholders (%)	
	Certified (n=158)	Non-certified (n=144)
Land use prior to oil palm production	76.9% of plots	79.7% of plots
Placing frond and leaf spread cover the entire plantation to control weed and soil erosion	38.6	16.0
Stop applying chemicals	73.5	65.3
Reducing chemicals use	26.5	16.0
Applying IPM	12.0	0.0
Adopting soil, water, and natural resources conservation	64.6	18.8
OHS adoption	59.5	18.8

Remark: * An oil palm smallholder can give more than one answer

6.6 Economic impacts

The results relating to economic variables and economic impacts in this section are summarized in *Tables 6.14–6.17*. These include the smallholder's access to inputs and services (*Table 6.14*); access to the market and obtaining a premium price for FFB (*Table 6.15*); FFB yield in 2021 and 2022 (*Table 6.16*); average FFB yield classified by oil palm age in 2021 and 2022 (*Figure 6.4–6.5*); and cost, revenue, and net return from oil palm production in 2021 and 2022 (*Table 6.17*).

Access to inputs and services

Apart from their access to training, as explained earlier, the results also show that certified smallholders get better access to inputs and services. For example, they get access to harvesting teams with reasonable wages (88.6%), access to soil or leaf analysis (60.8%), purchase chemical fertilizer at a lower price than the market prices due to collective buying (24.7%), obtain free empty bunches from a mill or purchase at a lower price (7.6%), and could purchase oil palm seedlings at a lower price than the market prices (6.3%). The certified smallholders get better access to inputs and services because of the power of the group and the contribution of the partner mill. Nevertheless, there are some gaps for improvement, not only for the non-certified but also for the certified smallholders.

When comparing their access to inputs and services between the old and new-certified smallholders, the results showed that only their access to harvesting teams with reasonable wages and soil or leaf analysis were similar. The rest were different; the rate of access to inputs and services for the newly certified smallholders was similar to that for the non-certified smallholders. The newly certified groups need time to arrange those inputs and services.

Table 6.14: Smallholders' access to inputs and services

Variable*	Oil palm smallholders (%)	
	Certified (n=158)	Non-certified (n=144)
Access to harvesting teams with reasonable wages	140 (88.6)	7 (4.9)
Access to soil or leaf analysis	96 (60.8)	7 (4.9)
Purchasing chemical fertilizer at a lower price than the market price due to collective buying	39 (24.7)	6 (4.2)
Obtained empty bunches from the mill or at lower prices	12 (7.6)	1 (0.7)
Purchasing oil palm seedlings at a lower price than market prices	10 (6.3)	1(0.7)
Credit from the mill for purchasing chemical fertilizer	3 (1.9)	3 (2.1)
Access to credit	0 (0.0)	2 (1.4)

Remark: * An oil palm smallholder can give more than one answer

Access to the market and obtaining premium prices

As mentioned in Chapter 5, most of the certified smallholder groups in Thailand are connected to or supported by the mills. This association helps improve their FFB marketing management, such as improving marketing information, FFB quality, transportation, and thus obtaining premium prices. The results show that during the production peak, 48.7% of the certified smallholders obtain the privilege of transporting their FFB to the mill through a special lane (*Table 6.15*), which can save time and reduce the loss of FFB weight due to the long queue of FFB's trucks. But the non-certified do not obtain this special service.

As for the premium prices of FFB, all certified smallholders received it at an average of 0.22 THB per kg. However, it varies from 0.10 to >0.30 THB per kg. 72.7% of them obtained premium prices of 0.20 THB per kg. However, most non-certified smallholders (79.9%) do not receive premium prices. Some 12.5% received 0.10-0.15 THB per kg due to FFB quality improvement. However, it is worth noting that the newly certified smallholders only obtained one premium price at a rate of 0.20 THB per kg.

The amount of premium price obtained by the certified smallholders depends on the quantity of CSPO produced by each group, the individual partner mill supply chain, and the mill's policy towards sustainability.

Table 6.15: Smallholders' access to the market and the premium price of FFB

Variable	Oil palm smallholders (%)	
	Certified (n=158)	Non-certified (n=144)
Distribution of FFB through a special lane during production peak	77 (48.7)	0 (0.0)
Achieve the premium price of FFB (THB)		
- 0.00 (do not obtain)	-	115 (79.9)
- 0.10-0.15	18 (11.5)	18 (12.5)
- 0.20	115 (72.7)	4 (2.8)
- 0.25-0.30	18 (11.5)	2 (1.4)
- > 0.30	7 (4.3)	5 (3.5)
Mean (S.D.)	0.22 (0.1)	-

FFB yield

Table 6.16 summarizes the FFB yield in 2021 and 2022. The survey results showed that the average FFB yield of the certified smallholders was 3,454.7 and 3,569.8 kg per rai in 2021 and 2022, while those of the non-certified were 2,578.2 and 2,662.4 kg per rai, respectively. Regarding the average FFB yield classified by oil palm age, the results show that the highest average yields of 3,862.3 and 2,832.6 kg per rai of the certified and non-certified smallholders in 2022 are from the oil palm age of 15–20 years (Figure 6.4).

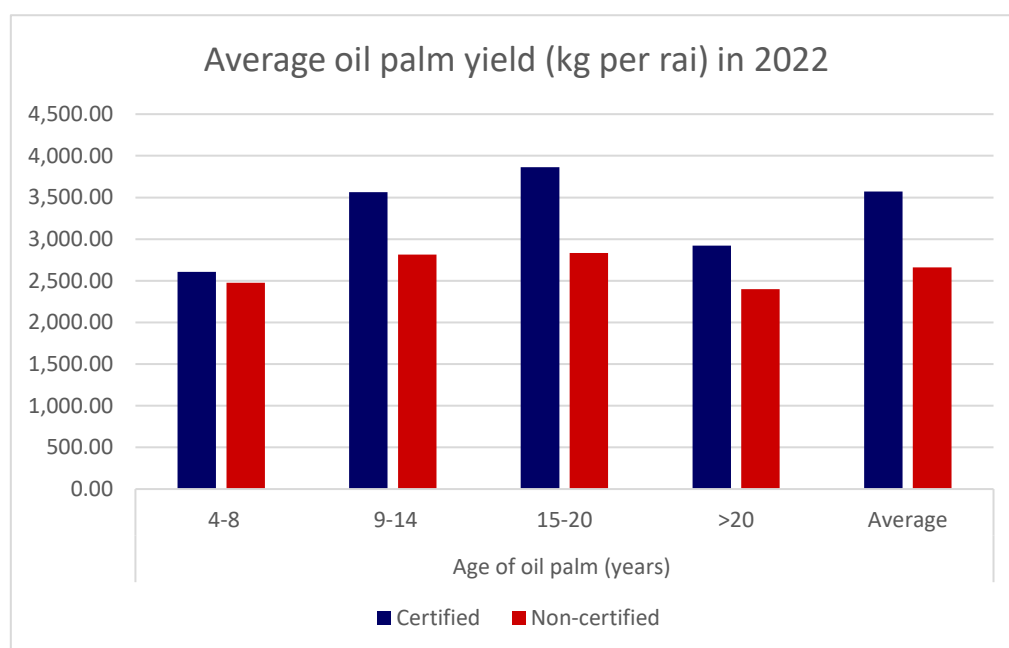
The results indicate that the average FFB yield of the certified smallholders is significantly higher than that of the non-certified in 2021 and 2022 ($t = 7.678$, $p\text{-value} = 0.000$; $t = 7.605$, $p\text{-value} = 0.000$). Moreover, the average yields from the certified smallholders are much higher than the country's average of 2,802 and 3,099 kg per rai in 2021 and 2022, respectively (OAE, 2023). Thus, it is clear that being a member of the RSPO-certified group helps improve knowledge, encourage high adoption of good practices, and thus improve productivity.

When comparing the FFB yield between the well-established and newly certified smallholders, the results revealed that the average FFB yield of the well-established certified smallholders is significantly higher than that of the newly certified in 2021 and 2022. There were 3,605.6 and 3,075.7 kg per rai in 2021 and 3,762.3 and 3,086.2 kg per rai in 2022 ($t = 3.328$, $p\text{-value} = 0.001$ and $t = 4.000$, $p\text{-value} = 0.000$), respectively (Table 6.16 and Figure 6.5). This was basically due to the higher rate of adoption of OPSP, which always takes longer to adopt.

Table 6.16: FFB yield in 2021 and 2022

Yield	Oil palm smallholders (%)		Oil palm smallholders (%)*	
	Certified (n=158)	Non-certified (n=144)	Well - established certified (n =113)	Newly certified (n=45)
2021				
- ≤ 2,000	9 (5.7)	16 (11.1)	9 (8.0)	0 (0.0)
- 2,001-3,000	52 (32.9)	99 (68.8)	31 (27.4)	21 (46.7)
- 3,001-4,000	63 (39.9)	28 (19.4)	42 (37.2)	21 (46.7)
- 4,001-5,000	19 (12.0)	1 (0.7)	16 (14.1)	3 (6.6)
- > 5,000	15 (9.5)	0 (0.0)	15 (13.3)	0 (0.0)
Mean (S.D.)	3,454.7 (1,313.1)	2,578.2 (552.3)	3,605.6 (1,496.2)	3,075.7 (499.2)
	t = 7.678, p-value=0.000		t = 3.328, p-value=0.001	
2022				
- ≤ 2,000	7 (4.4)	13 (9.0)	6 (5.3)	1 (2.2)
- 2,001-3,000	45 (28.5)	98 (68.1)	28 (24.8)	17 (37.8)
- 3,001-4,000	66 (41.8)	32 (22.2)	43 (38.1)	23 (51.1)
- 4,001-5,000	24 (15.2)	1 (0.7)	20 (17.7)	4 (8.9)
- > 5,000	16 (10.1)	0 (0.0)	16 (14.1)	0 (0.0)
Mean (S.D.)	3,569.8 (1,398.1)	2,662.4 (518.6)	3,762.3 (1,579.1)	3,086.2 (541.0)
	t = 7.605, p-value=0.000		t = 4.000, p-value=0.000	

Remark: * well-established and newly certified smallholders are those from well-established and newly certified farmers groups.

**Figure 6.4:** Average oil palm yield: certified and non-certified smallholders

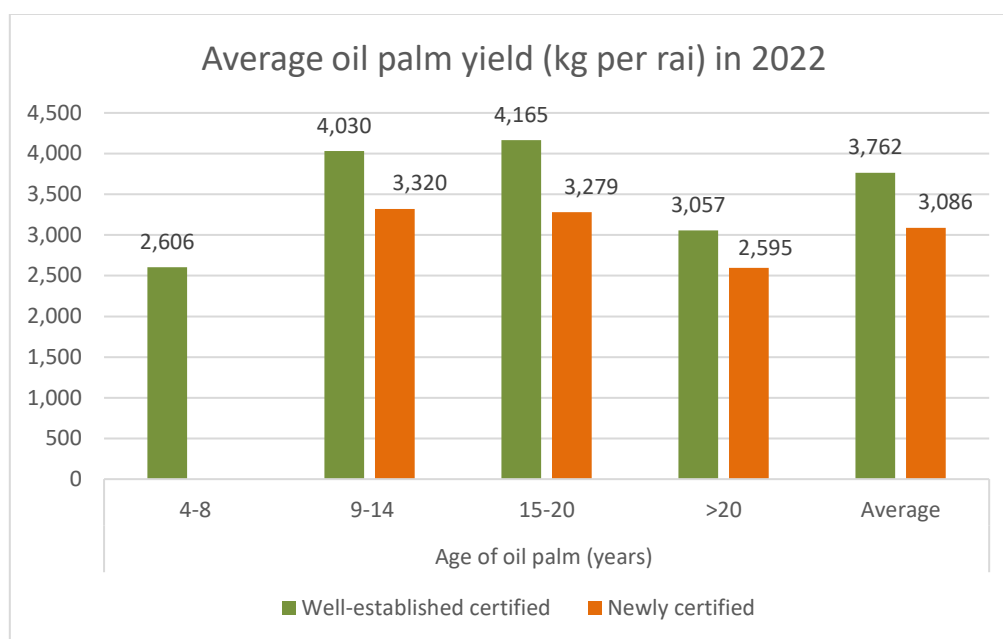


Figure 6.5: Average oil palm yield: well-established and newly certified smallholders

Cost and return

The results of a cost-return analysis use the data collected from the smallholders in the study areas. For each smallholder, a corresponding harvested plot was chosen for calculating the costs and returns. In general, the total economic costs of production are composed of fixed and variable costs. Both the fixed and variable costs can be divided into cash and non-cash costs. However, in this analysis, since it is not a pure or in-depth economic study, the costs of production cover only key variables and cash costs. The results can be used for economic impact assessments.

The variable cash costs in this analysis include the costs of fertilizer, hired labor, chemicals, transportation, and fuel. The main components of hired labor costs are the costs for harvesting, applying fertilizer, pruning and collecting fronds, and spraying. For the total or gross return, the average yield and price were used for the calculation. From this data, the net return was obtained by dividing the gross return by the variable cash cost. The net return was calculated per rai, per kg of FFB, and per household to reflect economic livelihood.

Table 6.17 summarizes the cost, return, and net return from oil palm production in 2021 and 2022. The results in 2022 revealed that the costs of FFB production per rai of the certified smallholders were higher than those of the non-certified, at about 6,710 and 5,760 THB per rai, respectively. However, the costs per kg of FFB are lower, at 1.88 and 2.16 THB, respectively.

As for the FFB yield, the results showed that the average FFB yield of the certified and non-certified smallholders was about 3,570 and 2,662 kg per rai in 2022, respectively. Regarding the prices of FFB received, they were 7.7 and 7.3 THB per kg for the certified and non-certified, respectively. Given those prices and FFB yields, gross returns of 27,495 and 19,533 THB per rai were achieved for the certified and non-certified smallholders, respectively.

In addition, with these costs and gross returns, a net return of 20,776 and 13,773 THB per rai was attained, respectively.

Given those results (higher yield, higher prices, and lower unit cost of FFB), it is clear that the net return of the certified smallholders is significantly higher than that of the non-certified ($t=10.198$, $p\text{-value} = 0.000$). These positive results were due to the participation of the RSPO group and the adoption of the OPSP.

Therefore, given the average oil palm harvested area of 30.7 and 20.4 rai, the net oil palm income of the certified smallholders is higher than that of the non-certified. These are 637,826 and 279,943 THB in 2022, respectively. The net oil palm income of the smallholders in 2022 is fairly high, partly because non-cash costs, such as the costs of household labor, are not included in the analysis while the return in cash is fully calculated.

When comparing the net return between the well-established and newly certified smallholders, the results showed that the net return of the well-established certified smallholders is significantly higher than that of the newly certified in 2021 and 2022. There were 19,417 and 13,982 THB per rai in 2021 and 22,624 and 16,264 THB per rai in 2022 ($t = 5.938$, $p\text{-value} = 0.000$ and $t = 3.414$, $p\text{-value} = 0.000$), respectively (*Table 6.18*). This was basically due to the higher yield and prices of FFB received.

To sum up, the RSPO standard certification creates positive economic impacts for smallholders.

Table 6.17: Average cost, return, and net return from oil palm production in 2021 and 2022, comparing certified and non-certified smallholders

Variable	Certified	Non-certified	t	p-value
2021				
- Production cost* (THB/rai)	5,346.2	4,601.6	3.088	0.002
- Yield (kg/rai)	3,454.7	2,578.2	7.678	0.000
- Prices (THB/kg)	6.72	6.18		
- Return (THB/rai)	23,217.2	15,945.1	8.618	0.000
- Production cost/kg of FFB (THB)	1.51	1.78		
- Net return (THB/rai)	17,871.0	11,343.50	11.459	0.000
- Oil palm net return (THB/household)**	548,640.0	231,407.0		
2022				
- Production cost (THB/rai)	6,710.4	5,759.9	3.138	0.002
- Yield (kg/rai)	3,569.8	2,662.4	7.605	0.000
- Prices (THB/kg)	7.70	7.34		
- Return (THB/rai)	27,494.8	19,532.6	7.255	0.000
- Production cost/kg of FFB (THB)	1.88	2.16		
- Net return (THB/rai)	20,776.1	13,772.70	10.198	0.000
- Oil palm net return (THB/household)**	637,826.3	279,943.0		

Remark: * production cost includes only variable cash-cost

** obtain from net return per rai X average harvested area

Table 6.18: Average cost, return, and net return from oil palm production in 2021 and 2022, comparing the well-established and newly certified smallholders

Variable	Well-established certified	Newly certified	t	p-value
2021				
- production cost* (THB/rai)	5,444.3	5,099.9	0.841	0.402
- Yield (kg/rai)	3,605.6	3,075.7	3.328	0.001
- Prices (THB/kg)	6.89	6.20		
- Return (THB/rai)	24,861.6	19,087.9	5.057	0.000
- Production cost/kg of FFB (THB)	1.51	1.66		
- Net return (THB/rai)	19,417.1	13,982.2	5.938	0.000
- Oil palm net return (THB/household)**	436,884.8	339,767.5		
2022				
- production cost* (THB/rai)	6,920.7	6,182.1	1.815	0.071
- Yield (kg/rai)	3,762.3	3,086.2	4.000	0.000
- Prices (THB/kg)	7.84	7.24		
- Return (THB/rai)	29,509.3	22,436.4	4.472	0.000
- Production cost/kg of FFB (THB)	1.83	2.00		
- Net return (THB/rai)	22,624.2	16,263.9	3.414	0.000
- Oil palm net return (THB/household)**	509,044.5	395,212.8		

Remark: * production cost includes only variable cash-cost

** obtain from net return per rai X average harvested area

6.7 Problems faced by smallholders, support and training needs, and suggestions

6.7.1 Problems faced by smallholders

The problems facing smallholders are presented in *Table 6.19*. These include the problems in oil palm production and those relating to the RSPO group and participation. The problems in oil palm production consist of the high cost of production, fluctuation of FFB prices, disease, especially *Garnoderma spp.*, and a lack of knowledge in oil palm production and fertilizer management, respectively. However, only the non-certified smallholders addressed the problem of lack of knowledge. Being a member of the RSPO-certified group could help solve the knowledge problem for the smallholders.

Nevertheless, there are some bottlenecks relating to the RSPO group and participation. Being members of the RSPO group, the smallholders have to keep too many farm records (16.5%). In addition, to participate in group activities, the smallholders (13.9%) are facing the problem of time availability. Moreover, some 10.1% of the smallholders reflected that the members of the group still lack understanding of the RSPO Standards.

It is evident that certain problems facing smallholder farmers could be solved by specific interventions at the micro level, but others have to be solved by a proper macro policy.

Table 6.19: Problems faced by smallholders in oil palm production and group participation

Variable	Oil palm smallholders (%)		
	Certified (n=158)	Non-certified (n=144)	Total (n=302)
Problems faced by smallholders in oil palm production			
- High cost of production i.e. fertilizer and wage	114 (72.2)	103 (71.5)	217 (71.9)
- Fluctuation of FFB prices	97 (61.4)	99 (62.7)	196 (64.9)
- Disease i.e. <i>Garnoderma spp.</i>	45 (28.5)	17 (11.8)	62 (20.5)
- Lack of knowledge in oil palm, soil, and fertilizer management	0 (0.0)	43 (29.9)	43 (14.2)
- Lack of water in dry season	14 (8.9)	8 (5.1)	22 (7.3)
- Flooding in rainy season	11 (7.0)	6 (4.2)	17 (5.6)
- Shortage of labor	7 (4.4)	1 (0.7)	8 (2.6)
- FFB's thief	7 (4.4)	0 (0.0)	7 (2.3)
- Harvester harvest unripe FFB and/or lack of ethics	4 (2.5)	4 (2.7)	8 (2.6)
- Yield decline	4 (2.5)	3 (2.1)	7 (2.3)
- Low soil fertility	3 (1.9)	3 (2.1)	6 (2.0)
- CPO mill purchases low quality FFB	4 (2.5)	0 (0.0)	4 (1.3)
- Low quality of seedlings	0.0	2 (1.4)	2(0.7)
Problem about RSPO group and participation			
- Keeping too much farm records	26 (16.5)	-	-
- Time availability	22 (13.9)	-	-
- Lack of understanding about RSPO Standard	16 (10.1)	-	-

Remark: * An oil palm smallholder can give more than one answer

6.7.2 Support needs

Table 6.20 reveals the support needed by the certified smallholders. The support from the group, the partner mill, and the government is independently presented. The main supports needed from the RSPO group include those that directly help reduce their production costs and raise revenue, such as purchasing fertilizer collectively, bargaining the prices of FFB, and supporting the prices and credit for fertilizer, respectively. As for the supports from the partner mill, the smallholders expect the supports about the prices and a credit for fertilizer, empty bunch and cake, marking up FFB's prices, and some others, i.e., a fast lane for FFB selling, and supporting oil palm seedlings. Most of the smallholders expected more from the government; besides boosting FFB prices and reducing or controlling fertilizer prices, they also needed credit and technical support, respectively.

The supports needed by non-certified smallholders are shown in Table 6.21. The supports are similar to those needed by the certified smallholders, especially those from the government. These include reducing or controlling the prices of fertilizer, technical, FFB price, and credit supports, respectively.

Table 6.20: Support needed by the RSPO-certified smallholders

Type of supports	Certified smallholders	
	No. (n=158)	%
Key supports needed from RSPO group		
- Purchase fertilizer collectively	36	22.8
- Bargain the prices of FFB	11	7.0
- Support the prices & credit for fertilizer	20	12.6
- Support soil and leaf analysis	7	4.4
- Others i.e. arrange additional training, publicize information through the members	15	9.5
Key supports needed from the partner mill		
- Support the prices & credit for fertilizer	50	31.7
- Support empty bunch & cake to the members	16	10.1
- Mark up the prices of FFB	13	8.2
- Others i.e. fast lane for FFB selling, support oil palm seedlings	13	8.2
Key supports needed from the government		
- Boost FFB price	108	68.4
- Reducing or controlling fertilizer price	100	63.3
- Credit	14	8.9
- Technical	11	7.0
- Others i.e. quality of oil palm seedlings, soil amendment, water supply	16	11.7

Remark: * An oil palm smallholder can give more than one answer

Table 6.21: Support needed by the non-certified smallholders

Type of supports	No. (n=144)	%
Key supports needed from mill		
- Raise the purchasing FFB prices	7	4.9
- Support cheap fertilizer prices for the smallholders who supply FFB to mill	3	2.1
- Support empty bunch & cake to the members	3	2.1
Key supports needed from the government		
- Reducing or controlling the prices of fertilizer	104	72.2
- Technical	21	74.6
- Support FFB price	16	11.1
- Credit	10	6.9

Remark: * An oil palm smallholder can give more than one answer

6.7.3 Suggestion by the smallholders

Based on the suggestions of the smallholders, both certified and non-certified, for the development of oil palm production and sustainability, the key issues are summarized separately in *Table 6.22*. The suggestions of certified smallholders to the key stakeholders are various such as 1) non- certified smallholders should be a member of RSPO group to stimulate the adoption of the GAP & OPSP, 2) the government should stabilize FFB prices, 3) the RSPO-certified members should seriously participate in group activity, and adopt OPSP, 4) the government should play more role to promote oil palm sustainability, 5) the RSPO group should purchase fertilizer collectively to reducing the cost of production for the members, 6) the non- certified smallholders should look for proper knowledge in oil palm practices, 7) the government should support oil palm training to group members, 8) the partner mill should develop system that helps purchase FFB according to its quality, 9) RSPO should review some criteria in the standard that do not fit the Thai context, i.e., land title, permanent labor, trash burning in the plantation, 10) The partner mill should provide empty bunches and cakes to the members or sell them at a low price, and 11) RSPO should help reduce auditing costs, respectively.

The suggestions from the non-certified smallholders—all of those are only for the government and mills. Among those, some are similar to those suggested by the RSPO smallholders. The key suggestions are: 1) the government should control fertilizer prices; 2) the government should stabilize FFB prices; 3) the government should control mills and ramps to conduct standard purchasing of FFB; 4) the government should support oil palm training regularly; 5) the mill should help stabilize FFB prices; 6) the government should provide and support soil and leaf analysis; 7) the mill should provide cheap fertilizer to FFB suppliers (smallholders); and 8) the mill should purchase FFB according to its quality, respectively.

Table 6.22: Key suggestions to the development of oil palm production and sustainability

Suggestions*	No.	%
Suggestions by the certified smallholders	(n=158)	
- Non- certified smallholders should be a member of RSPO group for adopting GAP & OPSP	133	84.1
- Government should stabilize FFB prices	87	55.1
- Certified members should seriously participate in group activity and adopt OPSP	86	54.5
- Government should play more role to promote oil palm sustainability	79	50.0
- RSPO group should purchase fertilizer collectively to reducing cost of production for the members	36	22.8
- Non- certified smallholders should look for proper knowledge in oil palm practices	30	18.9

Table 6.22: Key suggestions to the development of oil palm production and sustainability (cont.)

Suggestions*	No.	%
- Mill & group should provide credit for fertilizer to group's members	22	14.0
- Government should support oil palm training to group members	16	10.1
- Mill should develop system that helps purchase FFB according to its quality	15	9.5
- RSPO should review some criteria in the Standard that do not fit to Thai context i.e. land title, permanent labor, trash burning in the plantation	12	7.6
- Mill should provide empty bunch & cake to the members or sell at a low price	9	6.0
- RSPO should help reducing auditing cost	9	6.0
Suggestions by the non- certified smallholders	(n=144)	
- Government should control fertilizer price	91	63.2
- Government should stabilize FFB prices	89	61.8
- Government should control mill & ramp to conduct standard purchasing of FFB	39	27.1
- Government should support oil palm training regularly	21	14.6
- Mill should help stabilize FFB prices	21	14.6
- Government should provide & support soil and leaf analysis	12	8.3
- Mill should provide cheap fertilizer to FFB supplier	10	6.9
- Mill should purchase FFB according to its quality	7	4.9

Remark: * An oil palm smallholder can give more than one answer

6.8 Summary

The majority of the smallholders are mid-aged and over, and most of them obtained at most secondary education. More than half of them are male, and male is higher among the certified smallholders. For married male farmers, housewives assist them in some activities on the farm. However, most smallholders still depend on hired laborers on their farms, and the trend of hiring labor is increasing. Most of the smallholders grow oil palms as their primary source of income, and they have diversified their family income. They have on average 18.2 years of experience in oil palm production and own, on average, about 37.1 rai, or 5.94 hectares. The certified smallholders have larger land holdings and oil palm production areas than the non-certified, at 42.8 and 30.7 rai on average and 31.6 and 21.5 rai, respectively. Most land usage before oil palm was agriculture, especially for rubber and rice.

The certified smallholders have adopted the SMP more than the non-certified in all practices. Three of every four certified smallholders participated in the group activities at a high level. All of them are satisfied with their groups. Only one-third of non-certified

smallholders perceive the RSPO standard. They all realize the benefits of joining the certified groups. There are spillover effects, with regards to the GAPs, for non-certified smallholders.

The social benefits of RSPO certification for ISH are the improvement of knowledge in oil palm production and related aspects; a better relationship among the smallholders and between them and CPO mills; a decrease in the health risk of the smallholder, family members, and labor; improved safety from household accidents and hired laborers; and increased awareness among the non-certified smallholders about sustainability in oil palm production.

The certified smallholders have a higher percentage of adopting environmentally friendly practices compared to the non-certified. In Thailand, the negative environmental impacts of deforestation from oil palm production should not cause too much concern. Since most of the land used before oil palm was agricultural. Other practices that create environmental benefits include stopping the application of chemicals, reducing chemical use, adopting soil, water, and natural resource conservation, OSH adoption, placing fronds and leaf spread over the entire plantation to control weeds and soil erosion, and applying IPM. The positive environmental impacts of RSPO certification are consistent with the results from previous studies.

The economic impacts on the smallholders are evident, including the smallholder's access to inputs and services; access to the market and obtaining a premium price for FFB; FFB yield increase; average cost per kg of FFB; and net return from oil palm production, accordingly. The certified smallholders received a premium price at an average of 0.22 THB per kg. In 2022, the average FFB yield and costs per kg of FFB of the certified and non-certified were 3,569.8 and 2,662.4 kg per rai, and 1.88 and 2.16 THB, respectively. Therefore, the certified and non-certified obtained net returns of 22,198 and 13,773 THB per rai, or 681,494 and 279,943 THB per smallholder, respectively.

When comparing the economic variables, namely FFB yield, prices, and net return, between the well-established and newly certified smallholders, they are all higher for the well-established certified smallholders.

Thus, RSPO certification is economically rewarding; the certified smallholders are better off in terms of their economic livelihoods.

CHAPTER 7

Assessment of Policy Implications Related to the Oil Palm Industry and Sustainability in Thailand

This chapter attempts to assess the policy related to the oil palm industry in Thailand and narrow it down to focus on the last three plans, which consist of: 1) overview of oil palm development policy in Thailand; 2) oil palm and palm oil industry development plan 2008–2012; 3) oil palm and palm oil industry development plan 2013–2017; 4) comprehensive oil palm and palm oil development strategy, 2017–2036; 5) RSPO development at the provincial level; 6) assessment of policy implications for new planting, productivity, and land rights; and 7) assessment of policy implications for production standards and sustainability.

7.1 Overview of oil palm development policy in Thailand

Thailand's oil palm industry is an important industry that the government has prioritized through subsidies, support, and industrial management strategies throughout the entire supply chain. The Thailand Oil Palm Board (TOPB), or the National Oil Palm Policy Committee, which was established by the government in 2008, has the authority to develop plans and policies for palm oil industrial management, including enforcing and monitoring the outcome of policy implementation. These plans and policies may then be presented to the Cabinet for approval, or they may be ordered to direct the relevant government agencies to act in accordance. Therefore, the TOPB is a committee with complete authority to make policy decisions and implement them. The committee also set the direction of the oil palm industry's development plan and acted as an industrial management system. However, the committee is primarily concerned with short-term measures to respond to market volatility.

Regarding the national development plan in Thailand, the oil palm and palm oil development plan is integrated into a national agricultural action plan (Level 3 in *Figure 7.1*) and is supervised by the agriculture and cooperative action plan and the 20-year agricultural and cooperative strategies. It is also linked to other national development plans. *Figure 7.1* illustrates the relationship between the oil palm industry development plan and the various levels of development plans, including alternative energy and renewable energy development plans. In order to achieve the goals of levels one and two of the national plans, respectively, plan objectives and expected outcomes should be attained.

Additionally, the government has drafted the Oil Palm and Palm Oil Act B.E...., which essentially establishes the TOPB, creates the Palm Oil and Palm Oil Fund by mandating that palm oil mills pay money (CESS) into the fund in accordance with the criteria set by the Board, and promotes and supports the development of the Palm Oil Industry Development Plan, which is currently awaiting consideration by Parliament in the year 2023.

The mechanism for driving the development of the entire oil palm industry is still carried out through the main governmental structure, namely the MOAC, the Ministry of

Energy (MOE), the Ministry of Commerce (MOC), and the Ministry of Industry, which manage the entire industry throughout the supply chain by operating in accordance with the powers, duties, and missions of each ministry.

The MOAC, MOE, MOC, and MOI are continuing to act as the primary engines for the development of the entire oil palm industry. These ministries administer the industry's supply chain in accordance with their respective obligations and authorities. For instance, the DOAE contributes significantly to improving farming efficiency and training farmers. In addition, OAE is the Office of the Secretary of TOPB, and DOA is responsible for R&D. The responsibility of managing and developing the middlemen belongs to the Department of Internal Trade. The MOE promotes biodiesel initiatives, palm oil-based power generation, and other strategies for balancing domestic palm oil supply and demand, as shown in *Figure 7.2*. The Ministry of Industry, through the Department of Industrial Works, is responsible for palm oil mills and downstream industries. In addition, there are partners in industrial development based on mutual benefits from the commercial sector, academia, and non-profit organizations (GIZ).

However, due to the inefficiency of the public administration system, many of the objectives of the development plan were not achieved. The industrial stakeholders anticipate that the Oil Palm and Palm Oil Act is essential to improving productivity, reshaping industry, boosting competitiveness, and promoting sustainability in accordance with its development plan.

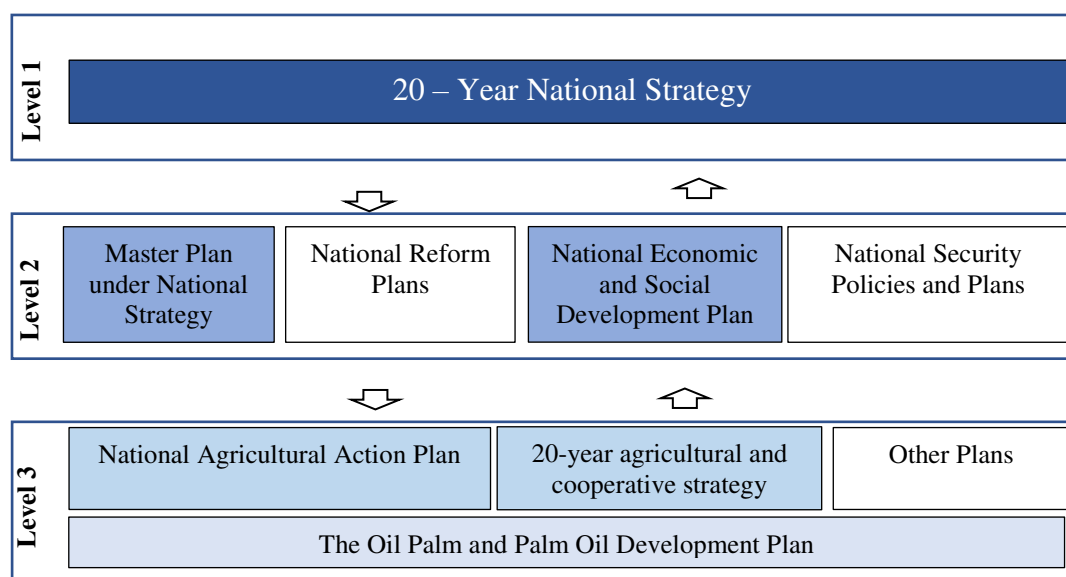


Figure 7.1: Structural relationship between the oil palm industry development plan and various levels of development plans

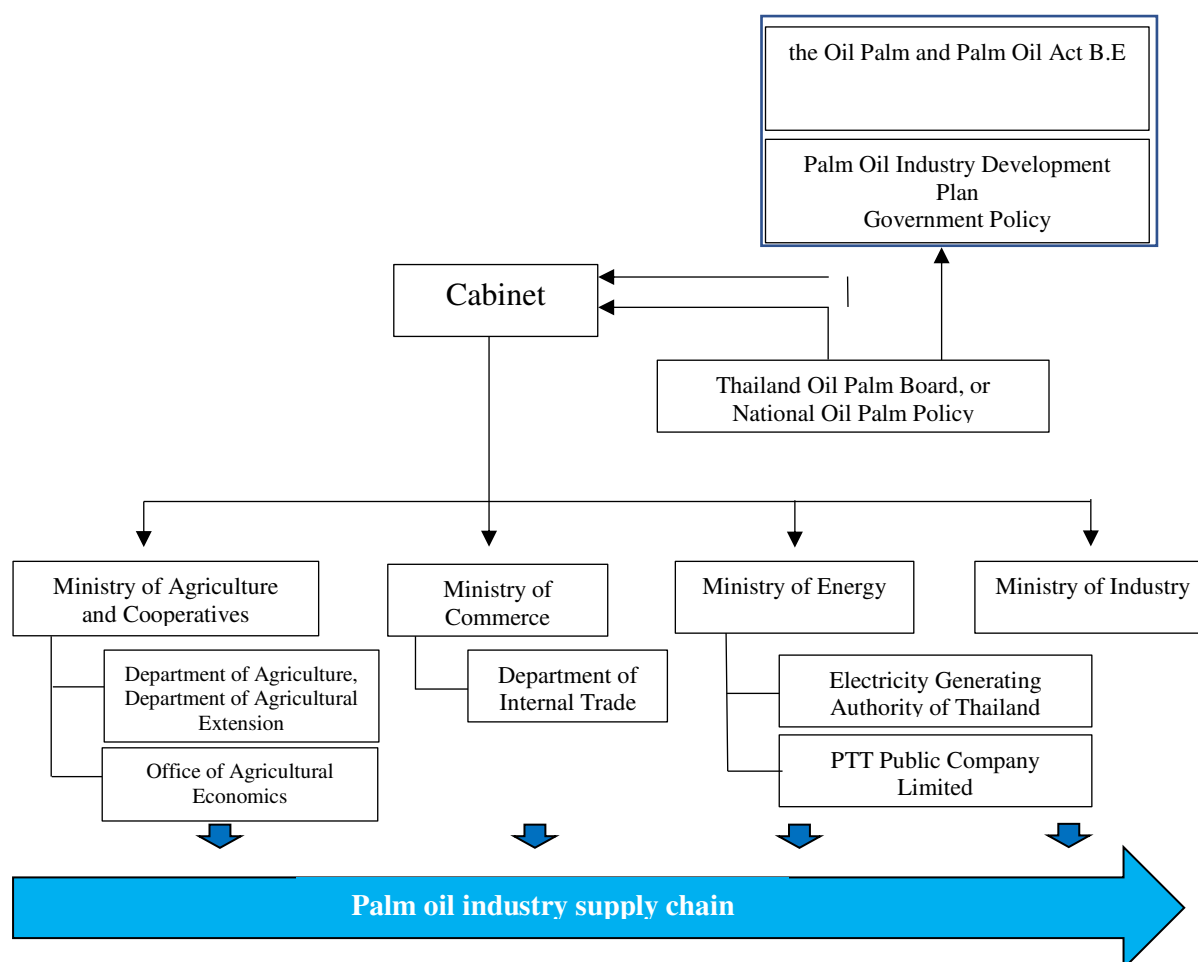


Figure 7.2: Government structure related to the implementing mechanism of the development plan

7.2 Oil palm and palm oil industry development plan 2008–2012

In December 2007, the Cabinet adopted the development strategy for the palm oil and oil palm industries for the period 2008–2012. The strategy desires to increase the total area of oil palm plantations by 2.5 million rai, increase replantation areas with new varieties by 0.50 million rai, improve yields from 3.0 tons to 3.50 tons per rai per year, and raise the oil extraction rate from 17 percent to 18.5 percent. This plan consists of five development strategies, as follows:

1) Increasing productivity and product value strategies by (1) expanding plantation areas in suitable areas, replanting with new varieties, and promoting good farm management; (2) supporting the oil palm and palm oil industries to restructure in order to become a competitive industrial sector; and (3) promoting the integration of marketing and production based on the potential and fortitude of farmers.

2) Increasing marketing efficiency strategies by (1) supporting energy policy as the primary tool for maintaining price stability, market stability, and production restructuring;

and (2) strengthening palm oil and product marketing policies in order to encourage fair competition and fairly share benefits throughout all industries.

3) Renewable energy strategy: (1) continue to support biodiesel production and consumption in accordance with the nation's capacity to produce biodiesel; and (2) regulate, monitor, and restrict the use of used oil for additional purposes.

4) Research and development strategies: (1) support research and development of high-quality palm oil; (2) support research and development of high-value products; (3) strengthen and support human resources development in oil palm and palm oil research and development; and (4) promote technological transfer to farmers.

5) Administrative and management strategies by (1) reforming the laws, norms, and regulations governing oil palm and palm oil; (2) establishing an organization for the general public and the Oil Palm and Palm Oil Development Fund.

At the end of this plan, the action plan to expand oil palm plantations through the strategy of improving production efficiency in existing plantations had implemented 17 projects. One project relied on the strategy of research and development of oil palm, which is consistent with the objective of increasing the productivity and value of oil palm and developing human resources. The results of the operating plan show that new plantation areas could be implemented at only 297,550 rai, or 11.9% of the target of 2.5 million rai, which included 146,991 rai of paddy fields and wetland in the southernmost provinces, 37,291 rai of new areas in the Pak Phanang River Basin, 46,134 rai of land reform area, 46,754 rai of oil palm production enhancement projects, and 20,380 rai of other areas. As a result, the plan placed an important focus on the expansion of new plantations and productivity growth. It also created a public need for a law and systematic industrial management that could regulate and administer the palm oil sector.

7.3 Oil palm and palm oil industry development plan 2013 – 2017

From 2013 to 2017, the development plan is aimed at promoting oil palm plantations in suitable areas. The plan aimed to increase new planting areas by 200,000 rai per year, or a total of 1.0 million rai, and replanted old oil palm plantations by 100,000 rai per year, or a total of 0.5 million rai. In oil palm harvested areas, it also aimed to increase FFB yield to 3.0-3.5 tons per rai per year. In addition, this plan had targets to increase oil extraction rate at 18.5%, promote global quality standards, and develop palm oil and palm oil products that were environmentally friendly. This plan involved five development strategies as follows:

1) Increasing production efficiency and product value strategies by (1) increasing new plantation areas that are suitable for oil palm planting in accordance with the zoning map from the MOAC, including promoting a soil analysis and providing guidance on the management of soil and fertilizer. (2) Promote and speed up the rehabilitation of old-age oil palm plantations in suitable areas by replanting with good varieties under good production management, including the establishment of a replanting aid fund. (3) Promote the restructuring of the palm oil industry and palm oil into an effective production sector

that relies on knowledge and good management in order to improve efficiency and be competitive in a free trade system. (4) Support the integration of marketing and production based on the strengths and potential of farmers and the farmers' institutions, including linkages with the private sector, in order to shift from individual work towards organization work. (5) Collaborate in setting up rules and regulations among the key stakeholders, such as smallholders, ramps, and mills, that help improve oil extraction rates.

2) Increasing marketing efficiency strategies by (1) promoting flexible energy policies as a means of ensuring price and marketing stability (2) strengthen marketing policies for palm oil and its products that could encourage competition and equality among the stakeholders. (3) establish and enforce standards for palm oil and its products that comply with international standards for the entire system, and implement mandatory GMP procedures for ramps, mills, and refineries into operation along the supply chain. (4) Set policy regarding the benefits for new investors.

3) Use of renewable and alternative energy strategies: (1) support the continued production of renewable and alternative energy that is consistent with the oil palm and palm oil's capacity for producing biodiesel, biomass, and bioenergy. (2) impose strong and severe penalties, such as regulating and monitoring the use of used oil that is reused for consumption, but promote using only renewable energy sources and ensuring that there is a viable market for it. (3) promote the development of B100-compatible engine systems.

4) Research and development strategy: (1) support research and development on topics related to systematic industrial management and provide farmers with full information. (2) promote research towards the development of new products, technologies, and manufacturing processes for high-value goods. (3) Support research to assess and reduce externalities from environmental impacts and technologies that are applicable. (4) Support research on quality standards and management, such as the use of instruments for assessing oil quality and the utilization of old oil palm trees. (5) Support human development in R&D related to oil palm and palm oil, in technological transfer at the farm level. (6) research and development of high-yielding oil palm varieties

5) Administrative and management strategies by: (1) establishing the Oil Palm and Palm Oil Act as a national agenda, revising laws, rules, and regulations to be a comprehensive industrial governance framework; (2) establishing a fund and organization for the management and development of the palm oil and oil palm industries in order to ensure the industry's overall efficiency and competitiveness; (3) promoting and developing agricultural logistics; 4) preparing a database for the whole system, such as GPS, plantations, ramps, factories, etc.

It is valuable to note here that, in terms of goals and strategies, there are no differences from the previous plan. Thailand had 5.8 million rai of oil palm plantations in 2018, an increase of 4.5% from 2017. The harvested area was 5.1 million rai (+5.1%), 15.4 million tons of oil palm were harvested (+9.1%), and 2.8 million tons of crude palm oil were produced (+5.8%). Nationwide, there were 240,000 farmers, of whom 79% were smallholders. There are 19 refined palm oil factories with an overall capacity for production

of 2.5 million tons per year and 149 CPO mills with an estimated total production capacity of 2.8 million tons per year.

However, the development of oil palm-related industries and the promotion of production and marketing by the authorities still lack linkage to downstream industries, such as the food industry, the oleochemical industry, which is under the supervision of the MOI, and the biodiesel industry, which is under the supervision of the MOE. Because Thailand's palm oil output was not competitive in the global market. Thailand was unable to compete in the global market because its production costs were higher than those of the major producers, namely Indonesia and Malaysia. As a result, about 75% of crude palm oil is used for domestic consumption, and the amount that is exported depends on the surplus of supply each year. More exports of palm oil were recently promoted by the government in order to cope with periods of oversupply.

7.4 Comprehensive oil palm and palm oil development strategy in 2017–2036

This plan aims to increase farmer incomes and transform the palm oil industry into the oleochemical industry. The strategy consists of production, innovation, palm oil and standards, energy, marketing, and management strategies as follows:

1) Production strategy

1.1) Increase palm oil extraction rates by: (1) establishing a network of cooperatives, farmer organizations, community enterprises, harvesters, ramps, and CPO mills to collaborate on improving oil extraction rates; and (2) promoting production in suitable areas to increase oil extraction rates.

1.2) Increase yield and reduce production costs by: (1) promoting production planning in suitable areas using agricultural maps; (2) supporting the appropriate use of fertilizers; (3) promoting technology transfer through learning centers and Plang Yai and soil management training; (4) promoting research and development in oil palm production, such as good variety and appropriate technology specific to production areas; (5) using effective farm management and farmer organizations to reduce costs and minimize harvest losses; (6) promoting water management in the plantation by building small water supply sources and promoting the conservation of soil moisture in the plantations.

1.3) Increase supplementary farm income by conducting research and development and promoting other agriculture activities that can be raised, grown, or interplanted in the plantations in each region.

2) Innovation strategy

2.1) Develop the upstream oleochemical industry through: (1) promoting investment in technology and innovation utilization to improve processing efficiency and promote downstream industries; (2) promoting research about innovation for product development and integrating knowledge and technology.

2.2) Develop the downstream oleochemical sector by: (1) conducting a feasibility study on the production, marketing, technological, and financial viability of the industry, as well as the related industries, and establishing a national plan for the development of the

oleochemical industry; (2) restructuring the entire system of the oil palm and palm oil industries, including regulations, investment promotion, innovation and technology research, standardization, and product testing centers; and (3) developing Thai machinery technologies for the oleochemical sector by supporting domestic Thai manufacturers.

3) Strategy regarding the oil palm and palm oil standards

3.1) Planting and harvesting by: (1) reviewing Thailand's oil palm standards; (2) promoting the adoption of GAPs among farmers; and (3) enforcing the implementation of Thailand's oil palm branch standards.

3.2) Trading according to the standards, enforcing measures to increase oil extraction rate, and GMP for oil palm collection centers

3.3) Mills: (1) improving mill quality standards (green industry); (2) enhancing efficiency of mills by increasing OER

3.4) Establish standards throughout the supply chain and promote global standards.

4) Energy strategy

4.1) Support research to improve biodiesel's quality in order to increase the percentage of palm oil consumption.

4.2) Increase biodiesel consumption by integrating relevant public and private sectors and raising the percentage of biodiesel use.

5) Marketing strategy

5.1) Management: (1) demand and supply management; (2) minimize and cease market intervention; (3) supply chain fairness i.e. price tag, quote OER with FFB prices

5.2) Expand the market for palm oil products by: (1) establishing linkages between SMEs and manufacturing and the oleochemical industry; and (2) promoting the exports of palm oil and its products.

5.3) Establish oil palm and palm oil information centers and disseminate information.

6) Administrative and management strategy

6.1) Endorse the legal enforcement of the Oil Palm and Palm Oil Act.

6.2) Supervision, monitoring, and evaluation of palm oil and oil palm development strategies

The implementation of those three previous plans was claimed to have achieved some development, such as expanding new planting areas, promoting the adoption of good varieties, and increasing the proportion of palm oil used in the energy sector. It also highlights increasing farm income and provides a mechanism to regulate the market by balancing supply and demand. However, the RSPO standard is not directly addressed by any plans or programs, despite attempts to encourage Thailand's palm oil standards (TSPO), which are still in the early stages of national standardization, to become international standards recognized across the whole world. The government is still primarily focused on implementing policies to support the palm oil industry through market intervention, measures to balance supply and demand for palm oil consumption among the energy and industrial sectors, and measures to support the export of palm oil to address the short-term issue of palm oil prices. For instance, the TOPB approved a provision allowing

the Electricity Generating Authority of Thailand (EGAT) to purchase CPO from mills. 4.60 thousand tons of excess stock were reportedly used between 2018 and 2019. In addition, the TOPB urged PTT Public Company Limited to support measures to increase the use of CPO and reduce crude oil stockpiles at a meeting held in March 2019. It is expected that the 100,000 tons of CPO purchased will be quickly used for producing B100, B20, or other products.

So far, it seems that the implementation of these plans has no links to the food and oleochemical industries. It had no objective of encouraging or enhancing global market competition. Measures to balance palm oil production may not be responsive or timely when the price fluctuates. The current problems are a result of several factors, including an ineffective industry management structure, a lack of a supply chain management system, and the negative impacts of market intervention. This is caused by the enfant terrible industry's policy trap.

7.5 RSPO development at the provincial level

So far, the results have revealed that the Surat Thani Provincial Oil Palm and Palm Oil Development Plan and the SCPOPP Project were the two agricultural development projects that clearly demonstrated RSPO objectives for oil palm development. They are summarized as follows:

The Surat Thani Provincial Oil Palm and Palm Oil Development Plan aimed to position the province as a role model for the development of the country's agriculture and palm oil sectors. Six strategies for development have been identified: 1) Increasing the potential of producing high-quality palm oil; 2) Improving efficiency of extraction techniques and promoting the development of palm oil refineries in Surat Thani province; 3) Improving processing to increase product value; 4) Promoting marketing; 5) Increasing management systems; and 6) Promoting public relations to increase awareness of oil palm throughout the supply chain. Also, one of the goals under strategy 1 was explicitly stated, namely that 635 plots must be RSPO-certified through a supporting budget, which is a straightforward way to encourage farmers to obtain RSPO certification.

As for the SCPOPP project, it attempted to support and promote quality palm production with RSPO standards between 2018 and 2022. This project is an international cooperation program of GIZ, DOAE, and DOA. The project engaged several stakeholders, including 19 CPO mills, 75 farmer groups with 3,600 smallholders, and 72,000 rai of oil palm plantation areas in Surat Thani, Krabi, and Chumphon. The project also prepared an oil palm training curriculum for the smallholders. It is known as the Thailand Oil Palm Smallholder Academy (TOPSA). Also, 38 master trainers and 250 lead farmers have been trained by the project. According to an in-depth interview, in 2021, at the end of the project, more than 400 farmers had obtained RSPO certification, and some of them were members of the local RSPO groups.

By the end of 2022, GIZ expects that this project will have more than 1,500 certified smallholders and an increased farm income of 20–40% (German International Cooperation

Agency, 2023). The project is positive about the increasing potential of farmers to comply with the RSPO standard. However, the results might not be as good as expected because of the limits set on the project by the collaborating government agencies, as discussed earlier. Moreover, the unwillingness of smallholder groups to adapt and a lack of appreciation of RSPO certification among the smallholders and some DOAE officials are the key challenges. Future support from the government for this type of project is required.

7.6 Assessment of policy implications for new planting, productivity, and land rights

The results showed that the three plans for the development of palm oil and oil palms similarly emphasize promoting new planting in suitable areas and increasing yield (*Table 7.1*). As part of the first plan, it was aimed to expand the new planting area by 500,000 rai annually, with a total target area of 2.5 million rai. The yield per rai was also aimed at improving from 3.0 tons to 3.5 tons per year. The implementation of the plan showed a 297,000-rai increase in new planting areas, which expanded into abandoned paddy fields, farm land in the Pak Phanang River Basin, and swamp areas in southern border provinces. The yield per rai was not achieved.

In the second plan, new planting areas aimed to increase by 200,000 rai annually with a goal of 1.0 million rai, and yield increased to 3.50 tons per rai. The findings showed that there had been an increase in new planting areas of 1.2 million rai, which had expanded into rubber plantations, abandoned paddy fields, etc. The average yield is still not progressing. It was less than 3.0 tons per rai per year.

Between 2017 and 2021, there was an increase of 500,000 rai in new planting, and in 2021, the yield was only 2.8 tons per rai. New plantings have been growing at a slower rate. According to the survey results, oil palm is still being planted in the old economic crop areas, such as rubber plantations, abandoned paddy fields, empty fields, and orchards.

Table 7.1: Assessment of policy for new planting, productivity

Items	Plan 1	Plan 2	Plan 3
Plan	Oil Palm and Palm Oil Industry Development Plan 2008–2012	Oil Palm and Palm Oil Industry Development Plan 2013–2017	Comprehensive Oil Palm and Palm Oil Development Strategy in 2017–2036
Goals of new planting areas (rai)	new planting areas by 500,000 rai annually, with a goal of 2.5 million rai	new planting areas by 200,000 rai annually, with a goal of 1.0 million rai	promoting new planting in suitable areas
New planting areas at the end of the plan	total new planting: 297,000 rai	total new planting: 1.2 million rai	total new planting during 2017-2021: 500,000 rai
New expanded areas (land use before oil palm)	abandoned paddy fields, farmland in the Pak Phanang River Basin, and swamp areas in southern border provinces	rubber plantations, abandoned paddy fields, empty land, orchards	rubber plantations, abandoned paddy fields, empty land, orchards
Targeted yield	3.50 per rai per year	3.50 per rai per year	3.50 per rai per year
Yield at the end of the plan	Less than 3.0 per rai per year	Less than 3.0 per rai per year	Less than 3.0 per rai per year

Regarding farmland rights, they were still constrained in Thailand. According to the survey, some 42.1% of oil palm plots, were used for rubber production, while some 25.6% were used for rice paddies, 19.5% were un-used land, and 10.5% were used for other agricultural activities. It is obvious that many agricultural plots, such as rubber and paddy fields, were replaced by oil palm. Oil palm plantations weren't reported to have encroached on forests at that time (Somjai et al., 2018); rather, traditional agricultural areas were converted for new plantings. But there was a problem with land rights. For instance, the project's survey data showed that 13% of farmers owned land title deeds. All 477 oil palm holdings, the majority of which were owned by smallholders, had land titles. Nor Sor 4 (63.2%) and Sor Por Kor (16.8%) were the most common land titles. There were some Por Bor Tor 5 (8.6%) that were not eligible for the RSPO Standard. The government, however, is more concerned with the issue of land rights and is attempting to address the complicated and challenging legal and structural aspects of the nation's land tenure.

7.7 Assessment of policy implications for production standards and sustainability

According to the last three oil palm and palm oil plans, production standards and sustainability were on the agenda in the second and third plans. In the second plan, it was mentioned in Strategies 1 and 2. The focus was on the establishment of joint measures to increase OER and establish and enforce standards for oil palm and its products in accordance with international standards, which can be interpreted as the RSPO standards. In the third plan, it emphasized standards, which focus on establishing production standards that are internationally recognized, developing GAP, oil palm bunch standards, and GMPs for ramps and factories. Those reflected the fact that production standards and sustainability standards are recognized at the development policy level. However, the RSPO standard was not explicitly addressed in any development plans.

However, the RSPO standard is gradually being adopted. By May 2022, RSPO Thailand's oil palm growers' membership will consist of 63 groups of small-scale and large-scale farmers, of which 19 are RSPO-certified ISH groups, characterized by over 5,400 farmers with a certified area of 170,591.81 rai (27,295 ha), or 2.8% of the total oil palm plantation area. As seen in *Figure 7.3*, the RSPO-certified groups dominated in Surat Thani and Krabi provinces (see details in Chapter 2). The CPO mills and refinery factories were primarily responsible for the increase in RSPO-certified groups. To further improve the RSPO standard certification during the existing plan, government agencies began focusing on and involving farmers through farmer development projects.

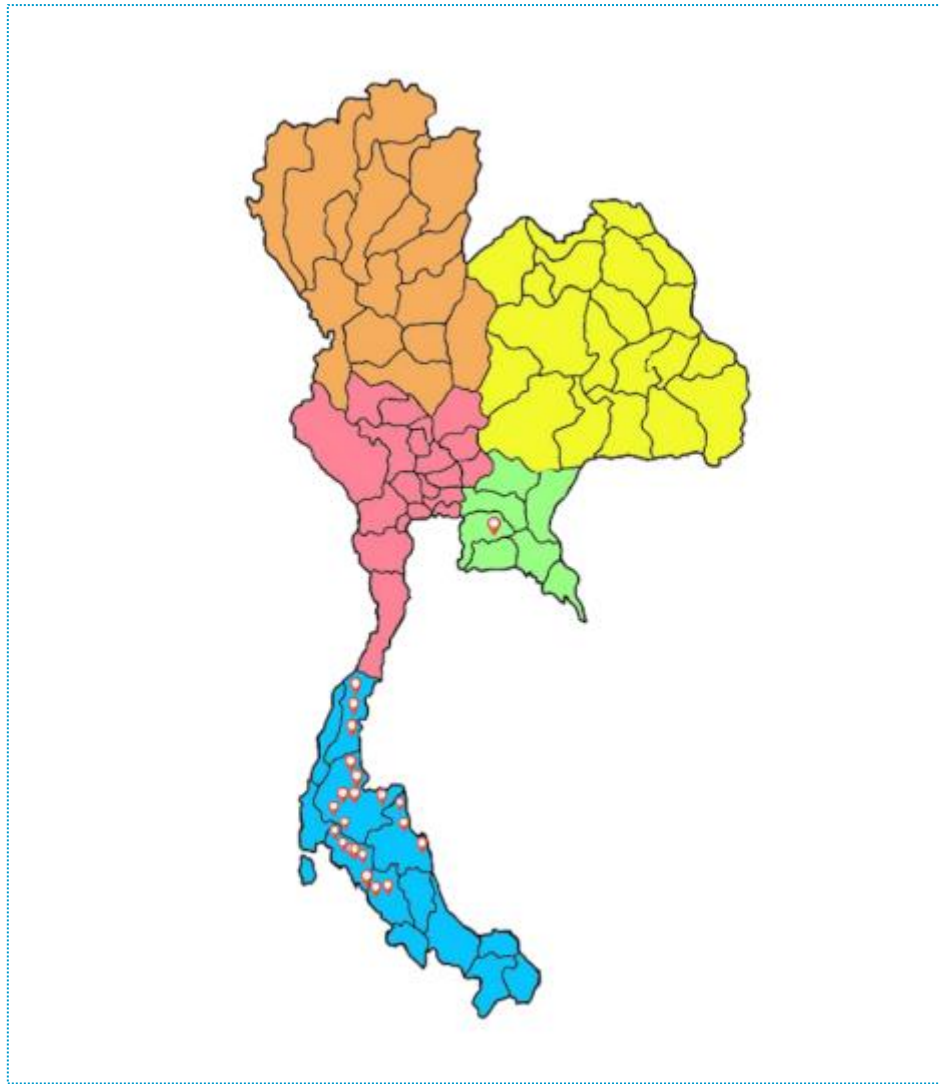


Figure 7.3: RSPO-certified group map in Thailand in 2022

CHAPTER 8

Conclusions and Recommendations

This chapter is the conclusion of this research. It has three parts, namely the conclusion for each objective, recommendations, and problems and obstacles in conducting the research.

8.1 Conclusions

The research on “Oil Palm Development in Thailand: Trends and Progress of Sustainability Efforts in Palm Oil Production and Procurement” has five objectives: 1) to understand palm oil production and consumption trends and to review the environmental, economic, and social impacts in different parts of Thailand; 2) to assess the benefits and challenges (including costs) faced by Thai smallholders in relation to RSPO certification – with a particular focus on the implementation of the RSPO ISH Standard; 3) to determine the impact of RSPO on the livelihoods of smallholders, comparing RSPO certified and non-RSPO certified farm households; 4) to assess policy implications on productivity growth, forest protection, mosaic landscapes, land rights and sustainability certification in relation to the palm oil impact on livelihoods and the environment; and to provide recommendations on reducing the environmental, economic and social impacts of oil palm plantations in Thailand, in particular on the elements for improvement in the ISH Standard.

Data were collected in five provinces of the study area in the southern region, namely, Surat Thani, Krabi, Chumphon, Trang, and Nakhon Si Thammarat. Data collection includes desktop and primary collection. The primary data were collected through personal interviews, in-depth interviews, focus group meetings, and participation in RSPO meetings and seminars. A personal interview was directed to 302 smallholders: 158 certified and 144 non-certified smallholders. The research team also arranged seven focus group meetings with the certified group manager and the committee. In-depth interviews were also targeted at the key stakeholders in the supply chain, namely the partner mills of the certified groups, the auditor, the President of the Thailand Sustainable Palm Oil Alliance (TSPOA), consultants of the certified groups, representatives of the GIZ project, and government officials at a provincial and national level. The data were analyzed qualitatively, descriptively, and quantitatively. The quantitative analysis was conducted using a t-test.

The conclusion for each objective is shown as follows:

8.1.1 Palm oil production and consumption trends and the environmental, economic, and social impacts in different parts of Thailand

Thailand ranks third in world palm oil production, which will account for about 4.30% of world production in 2021. In 2021, oil palm production in Thailand will involve 0.4 million farm households and 6.3 million rai (1 million hectares) of the total planted area. The oil palm planted area has gradually increased by approximately 2 million rai (0.32

million ha) during 2012–2021. 85.5% and 9.0% of the planted areas are in the southern and central regions, respectively. In 2021, Thailand obtained roughly 16.8 million tons of FFB, or 2.768 tons per rai (17.3 tons/ha) on average. Currently, total crude palm oil production is mainly used for domestic consumption, both as food and biofuel. In 2021, 75% of CPO was allocated for the domestic market, 52% was used for the food industry and oleochemical products, and the rest (48%) was used for biofuel.

The growing trend in the oil palm and palm oil industries in Thailand, like in other producing countries, has contributed to economic growth, created employment, and provided economic returns to stakeholders along the supply chain, especially for the southern region economy, where the climate is suitable for oil palm trees and the industry is geographically concentrated. At the farm level, over 0.4 million smallholders can earn regular cash income from their plantations twice a month. Relating farm businesses, input businesses, particularly chemical fertilizer and planting materials, show similar growth as a result of rising demand from oil palm expansion. Around 2,200 ramps spread across the country play a vital role as middlemen connecting smallholders and mills.

The oil palm processing, midstream, and downstream industries also play a significant role in economic development and employment due to the large companies involved. The food industry and oleochemical products create value-added products for palm oil. The export of palm oil and products containing palm oil can also generate income and employment for those businesses. The palm oil-based biofuel can reduce dependence on fossil fuel imports.

It seems that in Thailand, economic gains from oil palm production outweigh the negative environmental impacts. The negative environmental impacts from the expansion of production areas are not as severe as those in Indonesia or other countries since the expansions took place on agricultural lands. However, mitigating the negative environmental impacts of oil palm production is imperative to sustain economic growth, smallholder welfare, and others along the supply chain.

8.1.2 Costs, benefits, and challenges faced by Thai smallholders in relation to RSPO certification

So far, in Thailand, none of the certified RSPO groups were initiated by the ISH on their own. The mills and third parties supported the certification process. Most certified groups are connected with the CPO mills and manage their groups with full mill aid. The mill initiated the groups' formation and provided all resources to cover the costs.

The upfront costs for a starting member of 100 and 60 smallholders were about 1,280,000 and 1,204,000 THB, or 12,800 and 20,067 THB per member, respectively. The expenses for the certification procedure accounted for the second biggest upfront costs: 23.8% and 25.3%. The main audit costs for 60–100 members are around 295,000 THB.

The recurrent costs for the group sizes of 100, 150, 200, and 250 members were 972,500, 1,120,000, 1,410,000, and 1,603,500 THB per year, or 9,725, 7,467, 7,050, and 6,414 THB per member, respectively. Certification costs were about a quarter of the total recurrent cost annually. Most of the certified group managers and the committee reflected

that the certification costs are high, partly due to lump-sum payments, and the cost structure of the certified group is not fully assessed.

The benefits of RSPO Standard certification for ISH in Thailand were realized when the smallholders adopted and improved their oil palm management practices. The benefits are achieved in the form of improving productivity (yield/rai) and FFB quality, reducing cost per unit of FFB, obtaining premium FFB prices, and adopting environmental and social practices.

The real economic benefits from the certification for the certified smallholders are the changes in net benefits with and without certification. The results reveal that even for the group with the smallest size of 60 members, the RSPO certification still generates net economic benefits, and net economic benefits increase as the smallholder group grows. A group with 260 members could generate net economic benefits of as much as 10.416 million THB per year. In addition, adopting OPSP to comply with the standards generates social and environmental benefits. It can be concluded that investment in the RSPO certification for ISH is efficient.

However, there are still several problems and challenges faced by Thai ISH in complying with the RSPO Standard requirements. These include aspects of market, government policy, public awareness, the RSPO standard and certification process, RSPO, smallholders, personnel, and experts to support technical services, and the RSPO standard certification process.

8.1.3 Impact of RSPO on the livelihoods of smallholders, comparing RSPO-certified and non-RSPO-certified households

The impact of RSPO certification on the livelihoods of smallholders was drawn from the data collected from 302 smallholders, including 158 certified and 144 non-certified RSPO smallholders in five provinces in the southern region.

The results showed that around 90% of the smallholders are over 40 years of age, with the average being 55.62 years. About 75% obtained, at most, only secondary education. 55.6% of them are male. Male is higher (63.3%) for the certified smallholders. For male farmers who are married, housewives assist their husbands in some activities on the farm. However, most smallholders still depend on hired laborers on their farms, and the trend of hiring labor is increasing.

85.1% of the smallholders grow oil palms as their primary source of income, and 83.1% of them have diversified their sources of income. 54.7% of the smallholders have over 15 years of experience in oil palm production, with an average of 18.2 years of experience. The certified smallholders have more experience than the non-certified. The certified smallholders have joined the groups for 6.1 years on average. However, only 1.4% of the non-certified smallholders are members of the oil palm production groups. The smallholders owned, on average, about 37.1 rai (5.94 ha). The certified smallholders have larger land holdings and oil palm production areas than the non-certified, at 42.8 and 30.7 rai on average and 31.6 and 21.5 rai, respectively. Most land usage before oil palm was agriculture, especially for rubber and rice.

The certified smallholders have adopted the OPSP more than the non-certified in all practices. 74.1% of the certified smallholders participated in the RSPO group activities at a high level. All of them are satisfied with their certified groups. Only 32.6% of the non-certified smallholders perceived the RSPO standard. They all realize the benefits of joining the certified groups.

The social benefits of RSPO certification for ISH are the improvement of knowledge in oil palm production and related aspects (100.0%); the better relationship among the smallholders and between the smallholders and the CPO mills (99.4%); the health risk of the smallholder, family member, and labor decreases (98.6%); safety from household accidents and hired laborers improves (94.4%); and increasing awareness of the non-certified smallholders about sustainability in oil palm production (52.5%).

Regarding the positive environmental impacts, the certified smallholders have a higher percentage of adopting environmentally friendly practices compared to the non-certified. In Thailand, the negative environmental impacts of deforestation from oil palm production should not cause too much concern. Since most of the land used before oil palm was agricultural. Other practices that create environmental benefits include stopping the application of chemicals, reducing chemical use, adopting soil, water, and natural resource conservation, OHS adoption, placing fronds and leaf spread over the entire plantation to control weeds and soil erosion, and applying IPM. The positive environmental impacts of RSPO certification are consistent with the results from previous studies, such as Thongrak and Kiatpathomchai (2012) and Thongrak et al. (2016).

The economic impacts on the smallholders are evident, including the smallholder's access to inputs and services; access to the market and obtaining a premium price for FFB; FFB yield increase; average cost per kg of FFB; and net return from oil palm production, accordingly. The certified smallholders received a premium price at an average of 0.22 THB per kg, while most non-certified smallholders do not receive premium prices. The average FFB yield of the certified smallholders is significantly higher than that of the non-certified smallholders. It was 3,569.8 and 2,662.4 kg per rai in 2022, respectively. The well-established certified smallholders also obtained higher FFB yields than the newly certified. In contrast, the costs per kg of FFB are lower, at 1.88 and 2.16 THB, respectively. Regarding the prices of FFB received, they were 7.7 and 7.3 THB per kg for the certified and non-certified, respectively.

Given those prices, FFB yields, and costs, a net return of 20,776 and 13,773 THB per rai was attained, respectively. Therefore, given the oil palm harvested areas of 30.7 and 20.4 rai, the net oil palm income of the certified smallholders is higher than that of the non-certified. These are 637,826 and 279,943 THB in 2022, respectively. It is evident that RSPO certification is economically rewarding. Thus, certified smallholders are better off in terms of their economic livelihoods.

When comparing the economic variables, namely FFB yield, prices, and net return, between the well-established and newly certified smallholders, they are all higher for the well-established certified smallholders.

8.1.4 Policy implications

In Thailand, TOPB, which was established by the government in 2008, has the authority to develop plans and policies for palm oil industrial management, including enforcing and monitoring the outcome of policy implementation. So far, at a national level, there have been three oil palm and palm oil development plans: 1) an oil palm and palm oil industry development plan for 2008–2012; 2) an oil palm and palm oil industry development plan for 2013–2017; and 3) a comprehensive oil palm and palm oil development strategy for 2017–2036.

The implementation of those plans reveals some progress toward targets. The expansion of new planting areas has accounted for about 2 million rai, most of which expanded into agricultural land, such as rubber plantations, abandoned paddy fields, empty fields, and orchards. However, the targeted yield of 3.5 tons per rai per year has not been achieved.

Regarding farmland rights, oil palm plantations weren't reported to have encroached on forests at that time; rather, traditional agricultural areas were converted for new plantings. But there was a problem with land rights. There were some Por Bor Tor 5 (8.6%) that were not eligible for the RSPO Standard. The government, however, is more concerned with the issue of land rights and is attempting to address the complicated and challenging legal and structural aspects of the nation's land tenure.

As for production standards and sustainability, they were on the agenda in the second and third plans; however, the RSPO standard was not explicitly addressed in any development plans. Nonetheless, the RSPO standard is gradually being adopted. To further improve the RSPO standard certification under the existing plan, government agencies began focusing on and involving farmers through farmer development projects.

8.2 Recommendations

Based on the above results, the research team is now able to present the key suggestions regarding the model for moving towards the RSPO certification of ISH and to the stakeholders as follows:

8.2.1 Model for the RSPO certification of ISH

The most appropriate model for moving towards the RSPO certification of ISH in Thailand is that the smallholder groups have to form alliances with the mills and downstream industries and follow the Public-Private Partnerships for Agribusiness Development (Agri-PPPs). This Agri-PPP model has high potential to help develop the agriculture sector and provide multiple benefits that can contribute towards sustainable agricultural development that is inclusive of smallholder farmers. This research finding confirms those statements and all partners realize the “win-win situation” among them. However, we hope the public will play more roles in this regard in the oil palm and palm oil sectors (see more in Section 8.2.5).

Agri-PPPs offer a number of potential benefits deriving from the combination of the functioning and economic efficiency typical of the private sector with the public sector's role as the creator of an enabling environment and regulator to ensure that social interests are considered. Agri-PPPs showed improvements in efficiency as major benefits.

For smallholders, these research results showed evidence of positive impacts on net income through improved market access, increased productivity, improved product quality, reduced costs through the adoption of new technologies, and increased capacity of the smallholder groups. These also result from their access to knowledge and inputs through their participation in smallholder groups. The smallholder groups work closely with the mills, implying that most of the problems facing the smallholders have solutions.

Regarding the public-sector partners, in addition to achieving socio-economic targets, general benefits from involvement in PPPs included the strengthening of public-sector institutions and skills in project or program design and management.

At the firm level, such as for mills, benefits were always seen in terms of increased sales and market shares and/or greater availability of quality raw material supplies. Also, Agri-PPPs were found to reduce transaction costs, such as by organizing smallholders into groups and ensuring exclusive purchase rights for raw materials. In-kind contributions such as the provision of public extension services, supporting infrastructure, and the use of government facilities also helped to reduce the risks associated with a challenging business environment.

In sum, the appropriate model for moving towards the RSPO certification of ISH in Thailand follows Agri-PPPs, and each partner is presented in Figure 8.1.

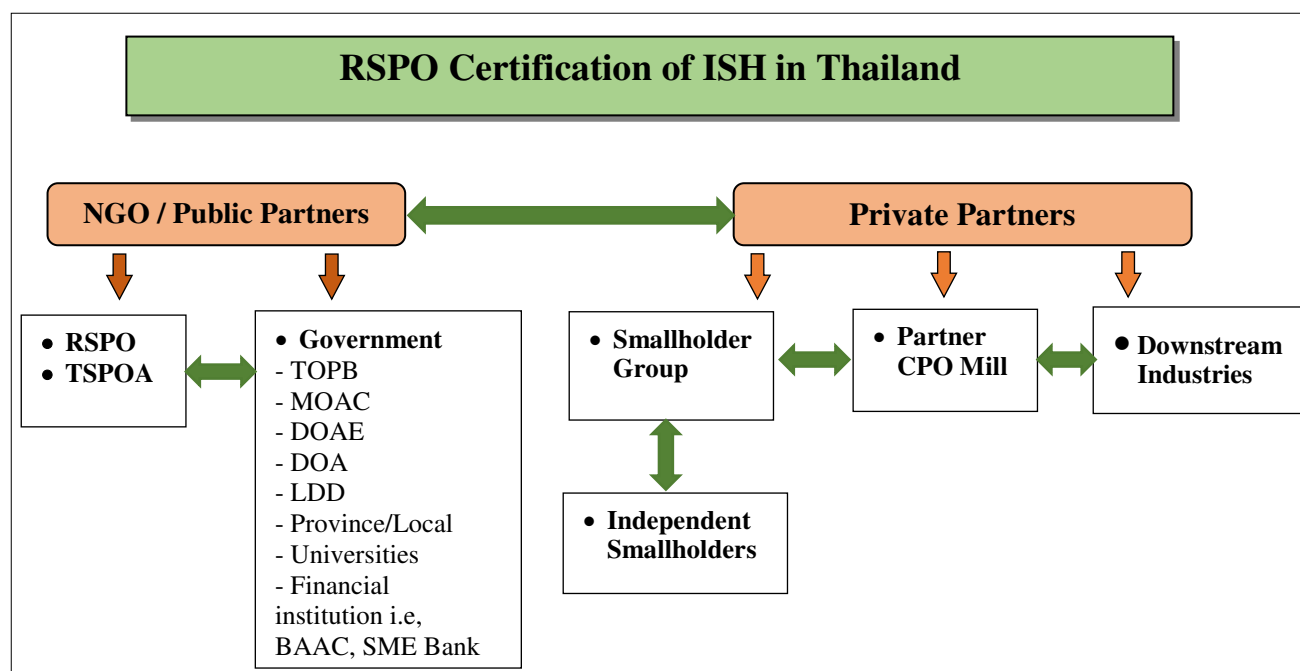


Figure 8.1: Model for the RSPO certification of ISH in Thailand

8.2.2 Recommendations to RSPO

1) RSPO should increase staff presence in Thailand, particularly locally, to better facilitate smallholders' understanding of the standard and certification process. This should include Q&A sessions on the standard and certification.

2) RSPO should review its communication systems between RSPO and certified groups concerning the standard and certification process.

3) RSPO should lead initiatives to raise public awareness about the RSPO standard and certification. This can be achieved through various channels, such as the Thailand Sustainable Palm Oil Alliance (TSPOA), government officials at all levels (like the DOAE), and others in the supply chain. Information on RSPO, including benefits and costs, should be communicated appropriately through a combination of online and offline channels.

4) Regarding the internal audit, where smallholder groups are required to conduct audits for 100% of members, RSPO should review this requirement and consider a staggered approach based on the group's development and CSPO prices.

5) RSPO, especially its representatives in Thailand, should communicate more effectively with smallholder groups regarding the details of criteria and indicators that often cause confusion. Major issues appear to pertain to environmental aspects such as criteria 4.1–4.2 and 4.6–4.7.

6) RSPO should strive to streamline the auditing process to reduce the time spent, such as completing audits within three months and approvals within two weeks. This requires collaboration between auditors and RSPO groups. Additionally, RSPO should aim to expedite processes like LUCA, add new group members, and expand oil palm production areas.

7) RSPO should develop or modify the application for the HCV assessment to make it more stable and user-friendly for smallholders. The supervision process should also be easily accessible.

8) RSPO should undertake additional efforts to enhance the capacity of Thai auditors, allowing RSPO groups to secure services promptly and affordably. The RSPO may take the initiative in estimating certification demand, training new auditors with a focus on ISH standards for the Thai environment, and involving mill personnel and group managers. In the process of increasing capacity, RSPO could consider subcontracting auditors as an alternative, which may foster competition and help determine acceptable audit fees.

9) RSPO should actively engage in strengthening group managers by enhancing their capabilities in all essential aspects, including entrepreneurship, which is often lacking.

10) Thus far, RSPO's focus has primarily been on certification process-related issues. Therefore, RSPO should also emphasize technical assistance, coordinating with academic and governmental institutions as necessary.

8.2.3 Recommendations to the smallholders

1) We kindly suggest that certified smallholders who may not have attended sufficient group activities consider allocating more time for these, especially for trainings. By participating more actively, their understanding and adoption of OPSP will be enhanced. In addition, we encourage a deeper comprehension of the RSPO criteria and the habit of receiving regular updates about the certification process to minimize misunderstandings.

2) For certified smallholders who might have incomplete farm records, we recommend better record-keeping and maintenance for improved farm management. This will facilitate self-evaluations on technical, economic, and financial aspects of the farm on a regular basis.

3) Certified smallholders who experience challenges implementing BMPs should feel encouraged to share their concerns with the group. This could encompass matters such as soil and leaf analysis, collective purchasing of chemical fertilizer, forming harvesting teams, credit, etc.

4) We invite certified smallholders who excel in their performance to generously share their knowledge and experiences regarding RSPO criteria and certification with others, including non-certified smallholders. This could significantly help in raising awareness among smallholders.

5) We encourage non-certified smallholders to consider joining local RSPO groups for potential additional benefits while acknowledging the associated costs. Participation in group activities, particularly training and internal auditing, is crucial for a better understanding of RSPO requirements and, thus, improved OPSP adoption. Enhancing their comprehension of RSPO criteria is also recommended.

6) Non-certified smallholders who are already group members and aspire to leverage RSPO certification to boost productivity and livelihood could express their needs to the group for progression. The group committee could explore external assistance and learn from certified groups with similar structures.

7) Non-certified smallholders who are not yet part of an oil palm group might find it beneficial to join one and actively engage in group activities to comprehend the developmental steps and appreciate the benefits therein.

8) We advise smallholders to seek improvements in both oil palm production and the production of other agricultural commodities. This could create alternative income sources for families.

8.2.4 Recommendations to the smallholders' group

1) Certified groups, functioning as business units, should frequently update information regarding key factors that may influence the group's performance and members' livelihoods. This includes, but is not limited to, marketing trends (prices of CSPO, demand for CSPO), and climatic conditions.

2) It's advisable for the smallholder group to enhance communication and coordination among its members and with other related agencies, such as DOAE officials, RSPO, and more.

3) We recommend strengthening smallholder groups by regularly and comprehensively boosting committee capacities, with a focus on nurturing entrepreneurship. This will mitigate reliance on external support, thereby fostering group resilience.

4) Emphasizing members' training and excursions should be a priority for the smallholders' group. Regular organization of these activities can expedite the adoption of OPSP.

5) The certified group should remain committed to the RSPO ISH Standard, treating them as routine practices. Active solutions to reduce Corrective Action Requests (CARs) should be sought.

6) For the development and strengthening of the certified group, hiring some permanent staff, such as Farm Advisors (FA) and information management personnel, could prove efficient and effective.

7) Beyond ensuring compliance with the RSPO criteria, the certified group should concentrate on resolving members' challenges that directly impact their economic livelihoods. These may include soil and leaf analysis, collective purchasing of chemical fertilizer, arranging harvesting teams, credit, etc.

8) The certified group should aim to enhance efficiency in managing the group with a serious business-oriented approach. This can be achieved not just by increasing revenues but also by reducing costs. Regular monitoring and evaluation can aid in identifying the right solutions.

9) Smallholder groups that are members of RSPO but are not ready for certification should seek potential partner mills to ensure sustainability.

10) Smallholder groups that aim for RSPO certification but still lack technical and financial assistance should explore partnerships with potential mills, seek assistance, or consider hiring consulting organizations and freelance teams, which are now readily available in Thailand.

11) Based on findings from Chapter 5, which highlight the existence of economies of scale and the relatively high initial cost per member for small group sizes, it is recommended that newly formed groups aim to recruit at least 100 members to ensure efficient administration.

8.2.5 Recommendations to mills

1) It is advisable for mills to assess the market demand for Certified Sustainable Palm Oil (CSPO) across the supply chain, aiming to encourage increased consumption of CSPO within the food industry and others. Mills and their supply chains should also consider addressing emerging challenges. Implementing via the Thailand Sustainable Palm

Oil Alliance (TSPOA) could be a beneficial option to explore since TSPOA covers key stakeholders in the oil palm supply chain in Thailand.

2) Mills can contribute to the development of strong and genuine commercial partnerships with farmers by actively assisting in the formation of farmers' groups. It is important for mills to establish a clear policy that supports these groups and their members. Allocating resources and budgets in advance to prepare smallholder groups for certification, along with providing incentives to individual smallholders during the setup phase (such as premium prices and other benefits), can be helpful.

Priority should be given to establishing partnerships with farmers who sell Fresh Fruit Bunches (FFB) directly to mills, mill ramps, or partner ramps. Mills should also ensure that the benefits of RSPO certification are effectively communicated to smallholders, and the income generated from CSPO should be distributed equitably among the members.

3) Mills and group managers should actively involve the group committee in group administration and the Internal Control System (ICS) to enhance participation.

4) Collaboration between mills and government organizations is essential to secure resources such as technical assistance, inputs, credit, and funding for smallholder groups and their members.

5) Mills should focus on providing smallholders with valuable marketing information and updates relevant to the industry, keeping them informed about the latest developments.

6) To support cost reduction in production, mills can consider assisting or collaborating with certified groups to procure chemical fertilizers for their members and smallholders who supply FFB. Additionally, mills could offer free empty bunches to smallholders in proportion to the quantity of FFB they supply.

7) Mills that aid smallholder groups in achieving RSPO certification should maintain transparent records of all resources invested in the group, ensuring accurate recognition of the actual expenses incurred.

8.2.6 Recommendations to the government

These recommendations to the government are based on the study results, responding to the goals of the 2017–2036 oil palm and palm oil reform strategic plan, and addressing past policy implementation inefficiencies. The value-based RSPO standard should serve as a tool for agricultural development to improve efficiency, promote sustainable resource use, restructure the industry, and compete in the global market.

The suggestions to the government agency are as follows:

1) Given the lack of awareness about RSPO standards and certification among oil palm smallholders and government officials, DOAE should cooperate with RSPO organizations to raise public understanding and awareness. This could include producing and disseminating informational materials, conducting educational programs in schools, and establishing oil palm learning centers in each community.

2) The Thailand Oil Palm Board (TOPB) should direct concerned institutions, such as the DOAE, to promote the RSPO standard and its adoption by farmers on a wider scale. This could include education and training programs, encouraging the implementation of RSPO standards in all extensive oil palm production provinces, forming and developing RSPO trainers, supporting budgets for learning activities, and developing digital support systems for the RSPO standard's implementation.

3) The Office of Agricultural Economics (OAE) should revise the comprehensive oil palm and palm oil reform strategy 2017–2036 to include additional plans and projects supporting RSPO standards. OAE should also establish a provincial-level oil palm and palm oil industry development plan.

4) DOAE should promote the adoption of the RSPO standard among oil palm Plang Yai through collaboration with the private sector, civil society, and educational institutions.

5) In provinces with extensive oil palm plantations, the DOAE and Provincial Office should consider establishing a local administrative division responsible for driving development. This could involve integrating budgets, human resources, and project implementation.

6) The role of the Sub-district Administrative Organization should be promoted in supporting the adoption of RSPO standards. This could be achieved by integrating projects with the DOAE, DOA, and RSPO groups.

7) The Department of Lands (DOL) should pay more attention to land ownership and land rights issues, which are currently structurally complex and hinder the promotion of RSPO standards.

8) The National Bureau of Agricultural Commodity and Food Standards (ACFS) should speed up the implementation of Thailand Sustainable Palm Oil (TSPO) standards according to the RSPO framework to enforce them as national production standards.

9) Despite the low environmental impacts of oil palm production in Thailand, government agencies should establish an oil palm sustainability platform to develop Thailand's sustainable oil palm and palm oil industries through supply chain collaborations.

10) The DOA and DOAE should increase financial support and local-level staffing to enhance palm oil production efficiency, reduce production costs, adapt oil palm plantation technology, and support farmer group activities. In addition, the Land Development Department (LDD) should improve the services for soil analysis so that most smallholders can get access to them.

11) Through MOAC, the government must focus on developing human resources among government officials and related personnel involved in oil palm production, standards, markets, and farmer group development.

12) The government needs to enforce rules, regulations, and standards, including the FFB standard, ramp standard, ramp registration, and the Palm Oil and Palm Oil Products Act.

13) The government should apply incentive measures, such as tax breaks and investment promotion schemes, to downstream industries (oleochemical and refinery

manufacturing) to support all aspects of production and enhance global market competitiveness with the RSPO standard.

8.3 Problems and obstacles in conducting the research

The obstacles encountered during conducting this research are most related to data collection. These are as follows:

1) Although the research teams have a letter from RSPO requesting cooperation, some certified groups declined to provide information regarding their group and certification.

2) Most of the certified groups chosen did not provide full costs to the research teams. This is partly because they are not sure what kind of information should be disclosed. In addition, since the mills support most of the sample groups, some costs are internalized in the mill administration costs. Most of the groups are not 100 percent business units.

3) It is hard to get access to non-certified smallholders in some areas, such as in Phanom district, Surat Thani, since the majority of smallholders are already members of the certified groups.

4) Due to the time availability of the certified group managers and the committees, it is difficult for the research team to make an appointment, especially in December 2022 and January 2023.

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Appendix

Appendix 1

Table: RSPO ISH groups

No.	Account Name	Primary Representative	Designation	Type of ISH group member	Relationship with palm oil mill
Surat Thani					
1	Ban Nadoem Oil Palm Collaborative Farming Community Enterprise	Mr. Charuek Thipdet	Group Manager	New	Independent SH group
2	Ban Ta Khun Oil Palm Collaborative Farming Community Enterprise	Mr. Sompong Tongaeid	Group Manager	New	Independent SH group
3	Chaiburi Oil Palm Collaborative Farming Community Enterprise	Mr. Udom Junsuk	Group Manager	New	Independent SH group
4	Donsak Oil Palm Collaborative Farming Community Enterprise	Mr. Wanna Pechyok	Group Manager	New	Independent SH group
5	Kantuli Oil Palm Collaborative Farming Community Enterprise	Mr. Mathee Hinghoy	Group Manager	New	Independent SH group
6	Khaotok Quality Oil Palm Production Community Enterprise	Mr. Songchai Pattana	Group Manager	New	Independent SH group
7	Khlong Chanuan Oil Palm Collaborative Farming Community Enterprise	Mr. Chamroel Agsonsombat	Group Manager	New	Independent SH group
8	Khlongpa Oil Palm Collaborative Farming Community Enterprise	Mr. Pornsak Phruekhiran	Group Manager	New	Independent SH group
9	Khlongsai Oil Palm Collaborative Farming Community Enterprise	Mr. Sirin Choomak	Group Manager	New	Independent SH group
10	Maluan Oil Palm Smallholders Community Enterprise	Mr. Pongsak Chingchit	Group Manager	New	Independent SH group
11	Pruthai Oil Palm Collaborative Farming Community Enterprise	Mr. Vichoeng Saras	Group Manager	New	Independent SH group
12	Saithong Oil Palm Collaborative Farming Community Enterprise	Watcharin Raungrut	Group Manager	New	Independent SH group
13	Songpraak Oil Palm Collaborative Farming Community Enterprise	Mr. Kamnuek Detprik	Group Manager	New	Independent SH group
14	Tamneab Oil Palm Community Enterprise	Mr. Gawee Sornnimit	Group Manager	New	Independent SH group
15	Tha U-Tae Oil Palm Smallholders Community Enterprise	Mr. Chaewalit Kaewkham	Group Manager	New	Independent SH group
Surat Thani					
16	Thachee Oil Palm Community Enterprise	Mr. Lerdchao Khoungneam	Group Manager	New	Independent SH group
17	Thakoei Oil Palm Collaborative Farming Community Enterprise	Mr. Thammanoon Kaesakul	Group Manager	New	Independent SH group
18	Wiang Oil Palm Smallholders Community Enterprise	Mr. Samrerg Margmool	Group Manager	New	Independent SH group

Table: RSPO ISH groups (cont.)

No.	Account Name	Primary Representative	Designation	Type of ISH group member	Relationship with palm oil mill
Krabi					
1	Aoluk Oil Palm Collaborative Farming Community Enterprise	Mr.Pairoch Phootong	Group Manager	New	Independent SH group
2	Khaodin Oil Palm Collaborative Farming Community Enterprise	Mrs.Rabiabrat Manimai	Group Manager	New	Independent SH group
3	Khaotor Oil Palm Grower Community Enterprise	Ms. Parichat Arisa Seangtan	Group Manager	New	Independent SH group
4	Khlong Kanan Oil Palm Collaborative Farming Community Enterprise	Mr.Niphon Phayayam	Group Manager	New	Independent SH group
5	Khlongthom Sustainable Oil Palm Production Community Enterprise Network	Mr.Pricharat Rueangsri	Group Manager	New	Independent SH group
6	Khlongyai Wanghin Oil Palm Collaborative Farming Community Enterprise	Mr.Thawee Haemin	Group Manager	New	Independent SH group
7	Prasong Oil Palm Collaborative Farming Community Enterprise	Mr.Sanan Sutchamnong	Group Manager	New	Not sure
8	Saithai Oil Palm Collaborative Farming Community Enterprise	Mr.Suriyo Saithai	Group Manager	New	Independent SH group
Chumphon					
1	Ban Don Plakmoo Oil Palm Grower Community Enterprise	Mr.Sunthon Thamnam	Group Manager	New	Independent SH group
2	Ban Faikhao Oil Palm Grower Community Enterprise	Mr.Sittirak Klaiaksron	Group Manager	New	Independent SH group
3	Ban Khuan Oil Palm Grower Community Enterprise	Mr.Somporn Jantawee	Group Manager	New	Independent SH group
4	Ban Prutakien Oil Palm Grower Community Enterprise	Mr.Prasong Kositkulporn	Group Manager	New	Independent SH group
5	Ban Srahaao Sufficiency Economy Community Enterprise	Mr.Authai kruasai	Group Manager	New	Independent SH group
6	Ban Tahong Oil Palm Collaborative Farming Community Enterprise	Mr.Somkhit Sammanee	Group Manager	New	Independent SH group
7	Ban Thep Wangthong Oil Palm Collaborative Farming Community	Mr.Manop Sripayok	Group Manager	New	Independent SH group
8	Bang Maphrao Oil Palm Collaborative Farming Community Enterprise	Mr.Chutchawan Sawadpanich	Group Manager	New	Independent SH group
9	Bangmak Oil Palm Grower Community Enterprise	Ms.Umarporn Thaithaworn	Group Manager	New	Independent SH group
10	Lang Suan Land Settlement Cooperative Limited	Nongluck Sinchoo	Group Manager	New	Supported by Palm Oil mill
11	Na Praya Oil Palm Collaborative Farming Community Enterprise	Mr.Paranyu Kongtaruea	Group Manager	New	Independent SH group
12	Pangwaan Quality Oil Palm Production Community Enterprise	Mr.Komtawan Srankaew	Group manager	New	Independent SH group

Table: RSPO ISH groups (cont.)

No.	Account Name	Primary Representative	Designation	Type of ISH group member	Relationship with palm oil mill
13	Poh Daeng Oil Palm Grower Community Enterprise	Miss Aemwipa Kaewpichai	Group Manager	New	Independent SH group
14	Tha Mapla Oil Palm Grower Community Enterprise	Mrs.Duangkamon Lengrabam	Group Manager	New	Independent SH group
15	Thasae Moo 12 Oil Palm Collaborative Farming Community Enterprise	Mr.Nipot Chinseekong	Group Manager	New	Independent SH group
16	Thasae Moo 4 Oil Palm Collaborative Farming Community Enterprise	Mr.Sumit Chamnankan	Group Manager	New	Independent SH group
17	Thasae Moo 6 Oil Palm Collaborative Farming Community Enterprise	Mr.Somphon Khongnaphon	Group Manager	New	Independent SH group
18	Thasae RSPO Community Enterprise	Rungkamol Nuamsiri	Group staff	New	Independent SH group
19	Thayang Oil Palm Production Community Enterprise	Mr.Somphon Punthongkam	Group Manager	New	Independent SH group
20	Thung Tako Oil Palm Collaborative Farming Community Enterprise	Mr.Aphichat Patsuwat	Group Manager	New	Independent SH group
Chumphon					
21	Trap Anan Oil Palm Production Community Enterprise	Mr.Kanuag Legbunjong	Group Manager	New	Independent SH group
22	Wangmai Oil Palm Collaborative Farming Community Enterprise	Miss Keat Meglad	Group Manager	New	Independent SH group
Trang					
1	Trang sustainable palm oil grower community enterprise network	Saravorn Yaotuck	Sustainability Administrator	New	Independent SH group
Nakhon Srithammarat					
1	Palmplangyai Palmdeesrinakorn Community Enterprise	Thanakan Suphon	Group Manager	Old	Supported by Palm Oil mill

Remark: New = New ISH group under the GIZ project (non-certified)

Appendix 2

Table: Summary of review literatures regarding oil palm smallholders in Thailand

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
Nupueng, et al. (2022) Surat Thani and Krabi provinces (339 samples (77 RSPO-certified, 108 non-RSPO-certified, 87 Thai-GAP certified, and 67 non-Thai-GAP certified farmers))	- age: 51, 48, 49, and 50 yrs old, respectively - education: 58.8%, 46.3%, 46%, and 44.8% primary education, respectively. - household member: 4.4, 4, 4.7, and 5.1 people, respectively. - oil palm income: 2,900.2, 2,334.5, 2,837.6, and 2,430.4 THB/rai/year, respectively. - oil palm farming experience: 20.3, 16.4, 16.3, and 15.5 years, respectively. - group membership: 55.8%, 26.9%, 61.2%, and 25.4% yes, respectively.	- oil palm plantation area: 3.3, 3.6, 4.8, and 3 ha, respectively. - household farm labor: 2.1, 2.2, 1.9, and 2.1 people, respectively. - distance from plantation to palm oil mill: 4.7, 4.9, 5.3, and 5.1 km, respectively.
Noothimthong (2021) Chumphon province (390 samples)	- age: 71.5% > 50 yrs old	- oil palm plantation area: 90.5% ≤ 40 rai (6.4 ha) - land rights documentation: 84.6% title deed - age of oil palm tree: 76.1% ≥ 20 years - type of fertilizer: 49.7% use only chemical fertilizers, and 47.7% use chemical fertilizers with organic fertilizers - harvested FFB output: 50.5% 1-5 ton/time - FFB selling place: 75.9% land settlement cooperatives
Thongrak, et al.(2021) Satun and Phatthalung Provinces (200 SH)	-age: 54 yrs old, 72% age > 50 ปี -education: 75% ≤ secondary education -family member available in oil palm (OP) activity: < 2 people -membership in OP group: 54% -main occupation in OP production: 36% -secondary occupation: 94% yes -experience in OP production: 15 yrs -household landholding area: 34.71 rai (5.5 ha) -oil palm income: 7,049 THB/month -household income: 22,232 THB/month -debt status:70% -average debt: 615,435TB	-Oil palm production area:19.6 rai (3.14 ha) -land use prior to OP: agricultural land 67% e.g. rubber, paddy -cultivar: 99% Tenera -compound fertilizer: 20%, strength fertilizer: 80% -leaf analysis: 26%, -irrigation: 14% -hired labor: 64% -farm record: 26% -FFB/rai/year: 2,418 kg/rai -variable cost/kg. of FFB: 2.43 TB -FFB selling place: 95% sell to ramp -Distances from plantation to FFB selling place: 3.72 km

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
Chitsopon & Tuvadaratragool (2020) Prachuap Khiri han, Chumphon, Surat Thani, Ranong, Phangnga, Krabi, Phuket, Trang, and Satun provinces (400 samples)	- age: 31.2% 40-49 years old - oil palm farming experience: 42.8% $\leq$ 5 years	- oil palm plantation area: 66.3% $\leq$ 20 rai ($\leq$ 3.2 ha) - FFB: 48.8% $\leq$ 5 ton/month
Innocenti & Oosterveer (2020) Surat Thani and Krabi provinces (101 samples)	- age: 51.4 years old - education: 7.2 years - household member: 4.4 people - non-farm income: 32% yes - oil palm farming experience: 12 years on average	- oil palm plantation area: 9.3 ha - number of oil palm tree: 127.1 tree/ha
Kaewtatip (2020) Nakhon Si Thammarat province (115 samples)	- age: 60% > 60 yrs old - main occupation: 77.4% farmer - household income: 51.3% > 100,000 THB/year - debt status: 65.2% indebt - oil palm farming experience: 81.4% $\geq$ 5 years - group membership: 100% yes - characteristic of landholding area: 100% proprietary area - source of knowledge regarding oil palm production: 83.5% government agency - training on oil palm management: 72.2% $\geq$ 3 times - receiving government support for oil palm production: 100% yes	- oil palm plantation area: 59.1% $\leq$ 10 rai (1.6 ha) - household farm labor: 75.7% 1-2 people - type of labor in oil palm activity: 34.8% use only hired labor, 33.1% household labor and hired labor, and 32.1% use only household labor - ridge planting: 90.4% yes - type of fertilizer: 67.8% use only chemical fertilizers - frequency of chemical fertilizer application: 70.43% 3 time/year - criteria for applying chemical fertilizer: 77.4% nutrient requirement - weeding: 96.5% grass trimmer - cost of oil palm production: 58.3% > 15,000 THB/rai
Nuengmatcha & Hemthanon (2020) Nakhon Si Thammarat province (112 samples)	- age: 57.1% 46-55 yrs old - education: 32.1% primary education - household member: 54.5% $\leq$ 4 people - household income: 99.1% $\geq$ 70,001 THB/year - household expense: 41.1% 80,001-120,000 THB/year - savings: 63.4% > 100,000 THB/year - oil palm farming experience: 71.4% $\leq$ 10 years - household landholding area: 84.8% $\leq$ 30 rai (4.8 ha)	- oil palm plantation area: 87.5% $\leq$ 30 rai (4.8 ha) - household farm labor: 78.6% $\leq$ 4 people - hired farm labor: 43.8% - seedlings source: 22.3% Univanich - type of fertilizer: 61.6% use only chemical fertilizers - amount of used chemical fertilizer: 42.9% applied 20 kg/rai/year - chemical fertilizer application frequency: 66.9% 3 time/year
Suebpongsakorn (2020) Surat Thani and Krabi provinces (396 samples)	No reporting	- oil palm plantation area: 26.3 rai (4.2 ha) - farm labor: 1.9 people - fertilizer cost 54,228.9 THB/year - chemical cost: 1,598.5 THB/year - planting cost: 3,534.3 THB/year - harvesting cost: 29,007 THB/year - FFB output: 580.6 ton/year - revenue: 493,047 THB/year

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
Thongrak (2020) Surat Thani, Krabi, and Chumphon provinces (400 SH)	-age: 56 yrs old -education: 87% ≤ secondary education -family member available in OP activity: < 2 people (1.9) -main occupation in OP production: 53% -secondary occupation: 95% yes -experience in OP production: 17 yrs -household landholding area: 43.5 rai (7 ha) -OP income: 14,219 THB/month -household income: 34,830 THB/month -debt status: 72% -average debt: 575,774 THB/household	-oil palm production area: 27.3 rai (4.4 ha) -land use prior to oil palm: agricultural land 73% (e.g. rubber, paddy) -cultivar: 77% Tenera -compound fertilizer: 54% -strength fertilizer: 46% -soil analysis: 17%, leaf analysis: 2% -chemicals use: 20%, hired labor: 83% -irrigation: 17%, -farm record: 33% -FFB/rai/year: 3,020 kg -variable cost/FFB: 1.43 THB -FFB selling place: 58% to independent ramp -Distances to FFB selling place: 4.4 km to ramp, and 9.8 km to mill
Boonyanuphong & Chuaysakul (2019) Nakhon Si Thammarat province (405 samples)	- age: 53.6 yrs old - education: 69.2% primary education - main occupation: 86.3% oil palm farming - oil palm income: 143,882.3 THB/year - debt status: 52.4% in debt, 78.8% ≤ 500,000 THB - oil palm farming experience: 7.6 years	- oil palm plantation area: 13.7 rai (2.2 ha) - land or space condition: 71.3% flood plain - seedlings source: 92.3% private nursery - age of oil palm tree: 7.4 years - source of water: 64.9% irrigation canal - distance from home to plantation: 102.7 km - harvesting: 56.9% hire harvesting team - frequency of harvesting: 16.9 day - FFB selling place: 99.8% private ramp
Chaisongkram & Worrapimphong (2019) Satun province (140 samples)	- age: 40.7% 41-50 yrs old - education: 68.6% primary education - main occupation: 71.4% farmer - income: 70.1% ≤ 100,000 THB/year - oil palm farming experience: 97.2% ≤ 5 years	- farm area: 73.6% ≤ 5 rai (0.8 ha) - land rights documentation: 40.7% title deed - household farm labor: 77.9% ≤ 2 people
Kunsaengkaew, et al. (2019) Surat Thani provinces (247samples)	-age: 54 yrs old -education: 69% ≤ secondary education -family member in OP activity: < 2 people (1.89) - membership of RSPO group: 3.28 yrs -main occupation in OP production: 84% -secondary occupation: 73% yes -experience in OP production: 19 yrs -household landholding area: 47.6 rai (7.6 ha) -OP income: 31,840 THB/month -household income: 52,890 THB/month -debt status: 66% -average debt: 739,827 THB/household	-OP production area: 36.49 rai (5.8 ha) -seedlings: 99% Tenera -compound fertilizer: 35% - strength fertilizer: 65% -soil & leaf analysis: 13% -chemicals use: 45%, - IPM: 57%, -hired labor: 91%, -irrigation: 19% -farm record: 100%, -FFB/rai/year: 3,039 kg -FFB selling place: partner CPO mill & ramp -Receiving premium FFB price: 100% -Purchasing strength fertilizer at a lower price: 39% -Receiving discount for seedlings from mill: 17% -Receiving empty bunch CPO mill: 42%

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
Paengphunga (2019) Krabi province (244 samples)	- age: 43.1 years old - education: 59.8% primary education - household member: 3.3 people - main occupation: 94.7% farmer - secondary occupation: 19.7% yes - group membership: 82.8% yes - oil palm income: 7,398.2 THB//rai/year - oil palm expense: 3,971.9 THB/rai/year - oil palm farming experience: 12.6 years	- farm area: 27.2 rai (4.4 ha) - farm landholding: 99.6% proprietary area - oil palm plantation area: 15.8 rai (2.5 ha) - land topography: 97.2% plain - type of soil: 56.6% loam - household farm labor: 95.9% yes - hired farm labor: 53.7% yes - seedlings: 56.1% Tenera & 42.2% Surat Thani 2 - source of oil palm seedlings: 61% private company - planting space: 90.7% 9×9×9 m - frequency of applying chemical fertilizer: 29% 4 times/year - watering: 95.9% no, - frond trimming: 98% yes - weeding: 98.9% labor - pest management: 94.4% pesticide - investment fund source: 54.5% proprietary money - frequency of harvesting: 96.3% 15 days - FFB output: 2.9 ton/rai/year - FFB selling place: 59.8% ramp
Phitthayaphinant & Satsue, 2019 Satun province (387 samples)	- age: 54.5 years old - education: 66.7% primary education - main occupation: 63.3% oil palm farming - secondary occupation: 71.8% yes - group membership: 50.4% yes - household income: 184,888.1 THB/year - household expense: 128,374.3 THB/year - oil palm income: 70,280.5 THB/year - savings: 17,312.7 THB/year - debt status: 215,570.3 THB - oil palm farming experience: 15.7 years	- farm area: 19.1 rai (3.1 ha) - oil palm plantation area: 11.2 rai (1.8 ha) - initial oil palm plantation area: 9.2 (1.5 ha) - land topography: 77.3% plain - type of soil: 34.6% sandy loam - farm household labor: 1.2 people - frequency of applying chemical fertilizer: 1.7 time/year - frequency of applying organic fertilizer: 0.8 time/year - irrigation: 89.2% no - cost of oil palm production: 4,326.2 THB/rai/year - frequency of harvesting: 43.9% 15 days - FFB output: 2.9 ton/rai/year - FFB selling place: 93% private ramp - FFB transport to the selling place: 58.7% self-transport
Sermphol (2019) Nakhon Si Thammarat province (140 samples)	- age: 48.6 years oil - education: 32.9% primary education - household member: 4.2 people - oil palm income: 104,980 THB/year - debt status: 7,920.3 THB - oil palm farming experience: 3 years - group membership: 52.9% yes - training on oil palm management: 75.7% yes - source of knowledge regarding oil palm production: 72.9% government agency	- oil palm plantation area: 12.1 rai (1.9 ha) - household farm labor: 2 people - hired farm labor: 45% yes - seedlings: 60% Tenera - planting space: 90.7% 9×9×9 m - chemical fertilizer: 18-46-0, 0-0-60, and 21-0-0 - method of fertilizing: 94.3% spreading - irrigation: 95.7% no - frond trimming: 72.1% frond trimming before fertilizing - pest: rose beetle, rhinoceros beetle - animal pest: mouse

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- IPM: 80.7% to 100% yes, depending on the type of plant disease and pest - hired labor cost: 15,224 THB/year - chemical fertilizer cost: 31,171.6 THB/year - organic fertilizer cost: 9,230.1 THB/year - pesticide cost: 3,392.1 THB/year - FFB output: 3.1 ton/rai/year
Thongrak, et al.(2019) Satun and Nakhon Si Thammarat (118 samples)	-age: 54 yrs old -education: 45% ≤ secondary education -family member available in OP activity: < 2 people (1.6) -main occupation in OP production: 39% -secondary occupation: 73% yes -experience in OP production: 9 yrs -household landholding area: 47.6 rai (7.6 ha) -OP income: 31,840 THB/month -household income: 52,890 THB/month -debt status: 55% -average debt: 739,827 THB/household	-OP production area: 27.4 rai (4.4 ha) -land use prior to OP: agricultural land 89% (e.g. rubber, paddy, fruit trees) -seedlings: 77% Tenera -compound fertilizer: 37%, strength fertilizer: 63% -soil & leaf analysis: 13% -chemicals use: 28%, -IPM: 5%, -hired labor: 91% -irrigation: 61% -farm record: 100% -FFB/rai/year: 3,975 kg -variable cost/kg. of FFB: 1.50 TB -FFB selling place: 57% sold to mill -Distances to FFB selling place: 3.9 km
Juyjaeng & Suwanmaneepong (2018) Prochuap Khiri Khan province (60 samples (30 members and 30 non-members of the Large Agricultural Plot Scheme (LAPS))	- age: 90.1% > 50; 53.3% > 50 years old - education: 66.7% ; 80.0% primary education - household member: 80.0% ≤ 4; 73.3% ≤ 4 people - oil palm farming experience: 76.7% 10-20 ; 76.7% 10-20 years - household landholding area: 53.3% 20-50 rai (3.2-8 ha) ; 83.4% < 20 rai (3.2 ha) - training on oil palm management: 56.7% > 5 time/year; 100% ≤ 5 time/year - contact with agricultural extension staff: 50% > 5 ; 100% ≤ 5 time/year	- year participated in the LAPS: 80% 2016, 20% 2017 - oil palm area participating in the LAPS: 60% < 20 rai (3.2 ha); 40% 20-50 rai (3.2-8 ha) - household farm labor: 96.7% ≤ 4; 100% ≤ 4 people - cultivar: 70% Tenera; 63.4% Tenera - age of oil palm trees: 76.7% 10-20 years; 80% 10-20 years - fixed cost: 500 THB/rai for both farmer's group - variable cost: 3,528.5; 2,805.2 THB/rai - total cost: 4,028.5; 3,305.2 THB/rai - FFB yield: 1.1 ton; 1.4 ton/rai/year - price of FFB: 4.9; 3.9 THB/kg - return: 25,873.8 ; 20,527.7 THB/rai; respectively
Korfak, 2018, Ranong province (45 samples)	- age: 53.6 years old - education: 60% primary education - main occupation: 88.9% oil palm farming - secondary occupation: 33.3% rubber farming - household member: 4 people - oil palm income: 14,350.6 THB/rai - debt status: 73.3% in debt - oil palm farming experience: 42.2% 6-10 years - group membership: 93.3% yes - characteristic of landholding area: 97.8% proprietary area - training on oil palm management: 37.8% 1-5 times	- oil palm plantation area: 13.3 rai (2.1 ha) - land topography: 82.2% plain - land use prior to oil palm plantation: 46.7% fruit farming - seedlings: 62.2% Tenera - source of oil palm seedlings: 40% private company - age of oil palm trees: 44.5% 11-15 years - compound fertilizer: 64.4% - criteria for applying chemical fertilizer: 46.7% based on soil and leaf analysis - frequency of applying chemical fertilizer: 42.2% 3 time/year - chemical fertilizer application rate: 40% 2 kg/tree/time - organic fertilizer application: 91.1% yes - soil and water conservation: 86.7% yes

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- source of water: 55.5% rain - weeding: 66.6% non-chemicals - IPM: 68.9% yes - farm record: 44.5% keep receipts, but, no records - FFB yield: 3.4 ton/rai/year - seedlings cost: 1,291.3 THB/rai/year - total cost: 4,421.1 THB/rai - return over total cost 9,929.6 THB/rai - FFB selling place: 57.8% private ramp - price of FFB: 4.2 THB/kg - FFB transport to the selling place: 44.4% hire transport
Kumnerdpetch (2018) Prochuap Khiri Khan, Chumphon, Surat Thani, Krabi, Trang, and Nakhon Si Thammarat provinces (493 samples)	- age: 44.4% 41-55 years old - education: 62.9% primary education	- oil palm plantation area: 82.6% $\leq$ 30 rai (4.8 ha)
Thongrak, et al (2017) Surat Thani, Krabi, and Trang (341 samples)	- age: 53 years old - education: 60% $\leq$ secondary education - household member 3.3 people - family member available in oil palm activity: 1.9 people - main occupation in oil palm production: 80.4%	- oil palm production area: 43.6 rai - land use before oil palm: agricultural land 82.7% (e.g. rubber, paddy, fruit tree); - number oil palm plot: 2.1 - age of oil palm tree: 12.2 years - oil palm seedlings: 95.4% Tenera - irrigation: 2.5%; - hired labor: 95% - Citizenship of hired labor: 88.6% Thai - chemicals use: 100%; - use strength fertilizer: 77.1% - frequency of applying fertilizer: 41.9% 1 once/year - IPM 36.7%; - harvesting cycle: 15-20 days 62.1% - FFB selling place: 92.6% partner ramp/mill - Nearest distances to FFB selling place: 4.9 km - FFB/rai/year: 3,029 kg
Chumsri, et al.(2017) Surat Thani province (220 samples)	- age: 49.4 years old - education: 59.1% primary education - household member: 4.1 people - oil palm income: 237,460 THB/year - oil palm expense: 100,858.5 THB/year - oil palm farming experience: 15.4 years - group membership: 33.6% yes	- farm area: 43.1 rai (6.9 ha) - oil palm plantation area: 31 rai (4.9 ha) - plantation topography: 78.2% plain - labor in oil palm activity: 4.2 people - oil palm seedlings: 81.4% Tenera - source of oil palm seedlings: 57.7% private seedling plot - planting space: 75% using 9×9×9 m - source of water: 94.1% rain - pest: 55.9% rhinoceros beetle - animal pest: 77.3% mouse - FFB output: 2.6 ton/rai/year - frequency of harvesting: 67.2% 16-20 days - FFB selling place: mill
Riyapun (2016) Chumphon province (165 samples)	- age: 47.9 years old - education: 32.1% primary education - household member: 3.8 people - oil palm income: 237,460 THB/year - oil palm expense: 62,037.6 THB/year - oil palm farming experience: 13.8 years	- farm area: 27.8 rai (4.4 ha) - oil palm plantation area: 17.9 rai (2.9 ha) - household farm labor: 2.6 people - hired farm labor: 1.4 people - number of oil palm tree: 21.4 tree/rai - age of oil palm trees: 13.1 years - FFB output: 2.9 ton/rai/year

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- FFB selling place: 66.6% private ramp - price of FB: 4.9 THB/kg
Saengsathion & Reweeewan (2016) Surat Thani province (66 samples)	- age: 48.5 years old	- oil palm plantation area: 3.6 ha - hired farm labor cost: 3,432.2 THB/ha - fertilizer cost: 8,724.3 THB/ha - other input cost, e.g., herbicide cost, fuel cost for mowing: 865.5 THB/ha - harvesting cost: 8,185.2 THB/ha - transportation and fuel cost: 3,919 THB/ha - FFB output: 21.1 ton/ha/year
Satsue & Phitthayaphinant (2016) Surat Thani and Krabi provinces (395 samples)	- age: 52.9 years old - education: 60.5% primary education - main occupation: 85.6% oil palm farming - secondary occupation: 66.3% yes - household member: 3.8 people - household income: 590,406.3 THB/year - oil palm income: 474,141.3 THB/year - household expense: 363,582.3 THB/year - savings: 59,729.9 THB/year - debt status: 67.9% in debt, 296,481.5 THB - oil palm farming experience: 17.9 years - group membership: 50.6% yes - household landholding area: 36.3 rai (5.8 ha)	- farm area: 34.6 rai (5.5 ha) - number of farm plot: 2.3 plots - oil palm plantation area: 26.2 rai (4.2 ha) - farm household labor: 1.5 people - frequency of harvesting: 66.1% 20 day/time - FFB output: 128.5 ton/year - cost of oil palm production: 4,326.2 THB/rai/year - FFB selling place: 52.2% private ramp - price of FFB: 3.7 THB/kg - check the price of FFB before harvesting: 67.9% no - FFB transport to the selling place: 63% hire transport - distance from plantation to the FFB selling place: 3.7 km
Sungkhara (2016) Surat Thani province (305 samples (79 RSPO-certified farmers and 226 non- RSPO-certified farmers))	- age: 50.6 years old - education: 31.5% primary education - main occupation: 52.8% oil palm farming - income: 27,393.4 THB/month - oil palm farming experience: 12.6 years	- oil palm plantation area: 18.6 rai (2.9 ha) - plantation topography: 86.2% plain - source of oil palm seedlings: 63.3% government agency - irrigation: 78.4% no - total cost: 8,497.2; 6,041.8 THB/rai/year - FFB output: 3.5 ton; 2.6 ton/rai/ - price of FFB: 4.1 ; 3.9 THB/kg - total return: 14,268.6; 10,241.6 THB/rai/year - net profit: 5,771.4; 4,199.8 THB/rai/year, respectively
Chubthong, et al. (2015) Pathum Thani province (140 samples)	- age: 45 years old - education: 40.7% primary education - household member: 45.7% 4 people - oil palm income: 52,225 THB/month - oil palm farming experience: 58.6% 4-5 years	- oil palm plantation area: 33.5 rai (5.4 ha) - land rights documentation: 89.3% A.L.R.O 4-01 - household farm labor: 34.3% 2 people - cultivar: 35.7% Compact - planting space: 9×9×9 m - chemical fertilizer applied: 16-16-0 and 14-14-21 - frond trimming: harvesting time - pest management: labor - frequency of harvesting: 14 days - fertilizer cost: 8,001-18,000 THB - chemical cost: ≤ 3,000 THB - wage: 250 THB/day/person - FFB selling place: private company

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
Kerdkaew (2015) Pathum Thani province (140 samples)	- age: 45 years old - education: 39.3% secondary education - household member: 67.2% ≤ 4 people - oil palm farming experience: 55% ≤ 4 years - oil palm income: 84.4% ≤ 20,000 THB/year	- oil palm plantation area: 55% ≤ 20 rai (3.2 ha) - household farm labor: 36.4% ≤ 2 people - hired farm labor: 48.6% no - cultivar: 39.3% Yangambi - source of oil palm seedlings: 35.7% Suksomboon - planting space: 98.6% 9×9×9 m - frond trimming: harvesting time - planting ground cover: 93.6% no - formula of chemical fertilizer: 47.1% 16-16-0 and 33.6% 14-14-21 - nutrient requirement assessment: 100% no - pest management: 63.6% labor - average FFB weight: 74.2% ≤ 25 kg - cost of FFB: 97.1% ≤ 3 THB/kg - FFB selling place: 72.9% Suksomboon - price of FFB: 75.7% 4.1 THB/kg - expected price of FFB: 100% ≥ 4 THB/kg
Ramtep (2015) Trang province (266 samples)	- age: 50.8 years old - education: 38.7% college degree and higher degree - household member: 4 people - oil palm income: 299,370.6 THB/year - oil palm expense: 99,058.8 THB/year - oil palm farming experience: 10 years	- oil palm plantation area: 19.8 rai (3.2 ha) - labor in oil palm activity: 2.7 people
Benchasri & Jaisamut, (2014) Krabi province (348 samples (174 RSPO- certified farmers, and 174 non-RSPO- certified farmers))	RSPO-certified famers - age: 52.9 years - education: 35.1% primary education - household member: 1.4 people - main occupation: 89.7% oil palm farming - secondary occupation: 42% rubber farming - oil palm income: 14,681.6 THB/rai - debt status: 69% no - oil palm farming experience: 48.3% > 15 years - group membership: 100% yes - training on oil palm management: 73% ≥ 6 times Non-RSPO-certified famers - age: 51.8 years - education: 46.6% primary education - household member: 1.3 people (non-RSPO-certified farm) - main occupation: 74.1% oil palm farming - secondary occupation: 37.9% rubber farming - oil palm income: 13,037.8 THB/rai - debt status: 50.6% indebt - oil palm farming experience: 67.8% ≤ 15 years - group membership: 56.9% yes - training on oil palm management: 51.7% no	RSPO-certified famers - land use prior to oil palm plantation: 50.5% abandoned area - type of labor in oil palm activity: 43.1% household labor and hired labor - seedlings: 97.7% Tenera - type of chemical fertilizer: 63.8% straight fertilizer - frequency of applying chemical fertilizer: 62.1% 2 times/year - chemical fertilizer application rate: 46% 2 kg/tree/time - criteria for applying chemical fertilizer: 67.8% nutrient requirement - organic fertilizer application: 52.3% no - source of water: 94.3% rain - soil and water conservation: 87.9% yes - IPM: 88.5% no; - weeding: 72.4% herbicide - farm record: 60.3% yes; - FFB output: 3.6 ton/rai/year - fixed & variable cost of oil palm production: 251.3 & 7,203.2 THB/rai, respectively - net profit : 7,227.1 THB/rai - price of FFB: 4.1 THB/kg - FFB transport to the selling place: 52.3% hire transport Non-RSPO-certified famers - land use prior to oil palm plantation: 40.8% abandoned area - type of labor in oil palm activity: 47.7% household labor and hired labor

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- cultivar: 97.1% Tenera - type of chemical fertilizer: 54.6% compound fertilizer - frequency of applying chemical fertilizer: 67.8% 2 time/year - chemical fertilizer application rate: 46% 2 kg/tree/time - criteria for applying chemical fertilizer : 51.1% farmers' experience - organic fertilizer application: 69% - source of water: 94.3% rain - soil and water conservation: 75.3% no - IPM: 97.7% no; - weeding: 50.6% - farm record: 10.9% yes; - FFB output: 2.8 ton/rai/year - fixed & variable cost of oil palm production: 356.9 & 7,943.1 THB/rai, respectively - net profit: 4,737.9 THB/rai - FFB selling place: 75.9% private ramp - price of FFB: 4.1 THB/kg - FFB transport to the selling place: 71.3% hire transport
Khongsawat, et al. (2014) Narathiwat province (131 samples)	- age: 56.8 years old - education: 73.3% primary education - income before participating the project: 5,452.7 THB/month - income after participating the project: 8,184.7 THB/month	- oil palm area participating the project: 7.1 rai (1.1 ha) - household labor in oil palm activities: 2.7 people
Chaisan (2013) Pachin Buri province, Eastern region (148 samples)	- age: 47.9 years old - education: 59.4% college degree - main occupation: 87.8% oil palm farming - secondary occupation: 52.7% no - household member: - income: 224,287.2 THB/year - debt status: 58.1% no - group membership: 56.1% no - receiving information regarding oil palm production: 77% yes - training on oil palm management: 57.4% no	- oil palm plantation area: 21.1 rai (3.4 ha) - land rights documentation: 98.6% title deed/A.L.R.O 4-01 - household farm labor: 2.2 people - hired farm labor: 2.1 people - age of oil palm trees: 5 years - FFB output: 2.1 ton/rai/year - FFB selling place: 77% ramp
Chataweth (2013) Chumphon province (201 samples)	- age: 48 years old - education: 42.8% primary education - main occupation: 81.1% oil palm farming - secondary occupation: 22.4% rubber farming - household member: 3.9 people - oil palm income: 216,194.2 THB/year - oil palm farming experience: 15.9 years - group membership: 58.7% yes	- farm area: 24.2 rai (3.9 ha) - oil palm plantation area: 17.6 rai (2.8 ha) - space condition: 54.7% plain - type of soil: 39.8% clay loam - household farm labor: 2.3 people - hired farm labor: 3.4 people - cultivar: 100% Tenera - source OP seedlings: 62.2% private company - seedlings' age: 43.8% $\geq$ 12 months - planting space: 65.2% $10 \times 10 \times 10$ m - frequency of of applying chemical fertilizer: 45.8% 4 time/year - irrigation: 98% no; - frond trimming: 89.6% yes - weeding: 71.6% labor

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- fertilizer, herbicide, mowing, and frond trimming cost: 2,290.8, 306.2, 437.8, and 330.9 , THB/rai, respectively - harvesting cost: 1,854.4 THB/ton - frequency of harvesting: 82.1% 15 days - FFB selling place: 81.1% ramp
Nantha (2013) Bueng Kan province Northeastern region (190 samples)	- age: 48.1 years old - education: 53.2% primary education - household member: 3.7 people - oil palm income: 8,557.6 THB/rai - oil palm farming experience: 3.1 years - group membership: 95.8% yes - household landholding area: 28.4 rai (4.5 ha) - source of knowledge regarding oil palm production: 93.2% government agency - training on oil palm management: 1.3 times	- oil palm plantation area: 22.5 rai (3.6 ha) - plantation topography: 72.1% lowland - farm household labor: 2.4 people - hired farm labor: 2.4 people - cultivar: 100% Tenera - source of oil palm seedlings: 89.5% oil palm research center - frequency of applying chemical fertilizer: 3 time/year - chemical fertilizer applied for harvested palm: 7.1 kg/tree/year - irrigation: 91.1% no; - frond trimming: 96.3% yes - weeding: 90.5% herbicide - use of chemical fertilizer& organic fertilizer: 73.7% yes - cost of oil palm production: 4,587.3 THB/rai - frequency of harvesting: 94% 15 days
O-krit, 2013 Surat Thani province (161 samples)	- age: 52.8 years old - education: 39.1% college degree - household member: 4.4 people - oil palm income: 189,525.7 THB/year - oil palm expense: 74,067 THB/year - oil palm farming experience: 7.2 years - group membership: 82.6% yes - source of knowledge regarding oil palm production: 100% government agency - training on oil palm management: 1.8 times	- farm area: 43.6 rai (6.9 ha) - oil palm plantation area: 23.4 rai (3.7 ha) - household farm labor: 2 people - hired farm labor: 1.6 people - age of oil palm trees: 7.5 years - FFB output: 2.4 ton/rai/year - FFB selling place: 100% private ramp - price of FFB: 4 THB/kg
Phitthayaphinant, et al., 2013, Krabi province (150 samples)	- age: 48.4 years old - education: 50% primary education - household member: 4.3 people - household income: 525,303.3 THB/year - oil palm income: 52,225 THB/month - debt status: 60.7% no - oil palm farming experience: 17.7 years - group membership: 64% yes	- oil palm plantation area: 29.1 rai (4.7 ha) - household farm labor: 2 people
Sritawan, 2013, Bueng Kan province (184 samples)	- age: 51.9 yrs old - education: 61.4% primary education - household member: 4.1 people - secondary occupation: 87% rubber farming - farm income: 178,940.2 THB/year - non-farm income: 68,250 THB/year - oil palm income: 49,039.6 THB/year - group membership: 75% yes - household landholding area: 42.1 rai (6.7 ha) - source of knowledge regarding oil palm production: 71.2% farmer's friend - training on oil palm management: 52.2% yes	- oil palm plantation area: 12.9 rai (2.1 ha) - plantation topography: 68.5% lowland - household farm labor: 2.5 people - seedlings: 100% Tenera - source of oil palm seedlings: 76.1% oil palm research center - planting space: 75.5% 9×9×9 m. - chemical fertilizer for very young palm: 75% 15-15-15 and 61.4% 21-0-0 - chemical fertilizer applied for harvested palm: 67.9% 15-15-15 and 58.7% 0-0-60 - frequency of applying chemical fertilizer: 2 time/year - irrigation: 66.2% no; - frond trimming: 80.4% yes

Table: Summary of review literatures regarding oil palm smallholders in Thailand (cont.)

Author/ Study area (Sample size)	Smallholders' attributes	Oil palm management practice (OPP)
		- pest management: 69% yes; - weeding: 89.7% yes - FFB output: 1.4 ton/rai/year - frequency of harvesting: 15 days - FFB selling place: 67.4% cooperative ramp
Thongrak, et al. (2011) Surat Thani, Krabi, Sa Kaew, and Trat provinces (501 samples)	-age: 50 yrs old -education: 86% ≤ secondary education -family member available in OP activity: < 2 people (1.86) -main occupation in OP production: 79% -secondary occupation: 78% yes -experience in OP production: 15 yrs -household landholding area: 66.7 rai (10.7 ha) -OP income: 23,532 THB/month -household income: 39,221 THB/month -debt status: 71% -average debt: 391,428 THB/household	-OP production area: 44.6 rai (7.1 ha) -land use prior to OP: agricultural land 58% (e.g. rubber, paddy, oil palm) - seedlings: 99% Tenera -apply chemical fertilizer: 95% -chemicals use: 56%; -hired labor: 81% -irrigation: 11% -farm record: 30% -FFB/rai/year: 2,848 kg -variable cost/FFB: 1.50 THB -FFB selling place: 52% sell to ramp -distances to FFB selling place: 6.5 km

Appendix 3

The atmosphere during data collection

Surat Thani



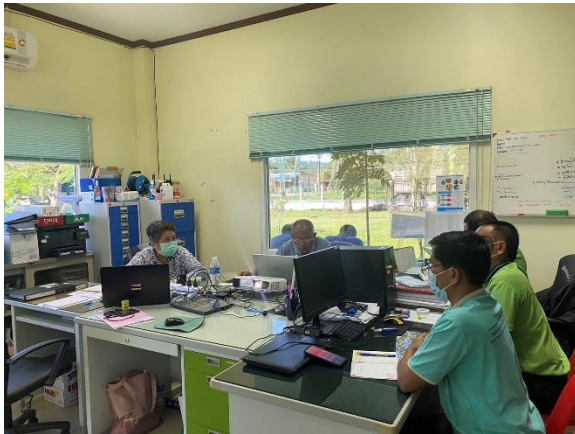
Surat Thani



Krabi



Krabi



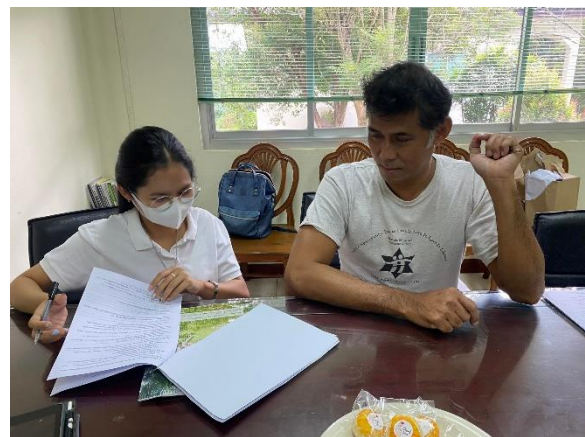
Chumphon



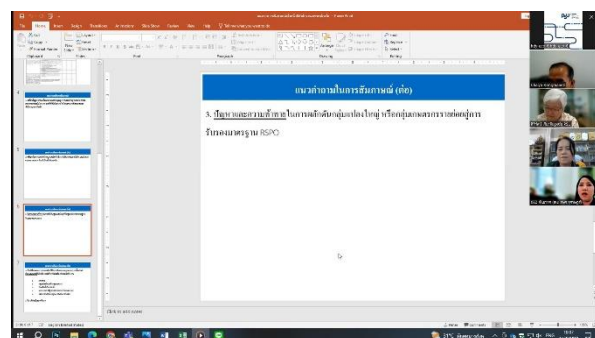
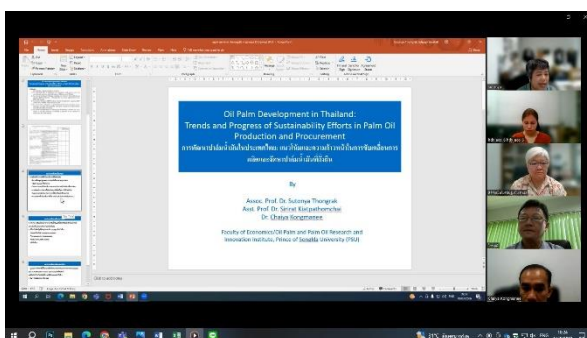
Trang



Nakhon Si Thammarat



In-depth interview



In-depth interview

The screenshot displays a video conference in progress. The main window shows a presentation slide with the following content:

**Oil Palm Development in Thailand:
Trends and Progress of Sustainability Efforts in Palm Oil Production and Procurement**

2. Objective

This study has 6 objectives which are as follows:

- 1) To understand palm oil production and consumption trends and to review the environmental, economic, and social impacts in different parts of Thailand.
- 2) To assess benefits and challenges (including costs) faced by Thai smallholders in relation to RSPO certification – with a particular focus on the implementation of the RSPO ISH Standard.
- 3) To determine the impact of RSPO on the livelihoods of smallholders, comparing RSPO certified and non-RSPO certified farm households.
- 4) To assess policy implications on productivity growth, forest protection, mosaic landscapes, land rights and sustainability certification in relation to the palm oil impact on livelihoods and the environment.
- 5) To provide recommendations on reducing the environmental, economic and social impacts of oil palm plantations in Thailand, in particular on the elements for improvement in the ISH Standard.

The video interface includes a top toolbar with icons for chat, share, and other functions, and a right sidebar with participant thumbnails and names.

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