



UNIVERSITETET I AGDER

# **Drivers and Barriers Towards a Sustainable Palm Oil Industry:**

A Case Study of Riau Province in Sumatra, Indonesia

LINE FARDAL NILSEN

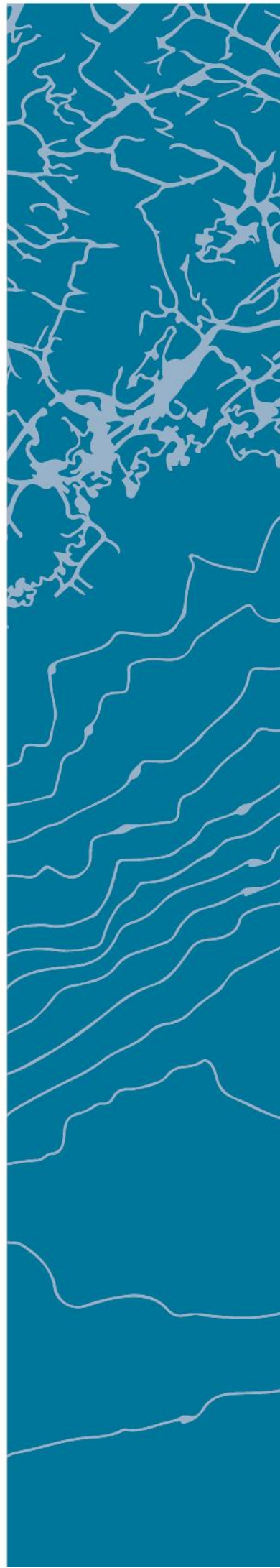
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## **ABSTRACT**

Demand for vegetable oils has expanded greatly the last decades due to the increased global population and larger consuming societies across the world. Palm oil is the most important and used vegetable oils in the world. The palm oil industry in Indonesia have received much attention the last decades due to public concern regarding deforestation and international attention regarding climate change and GHG emission reduction. Even though Indonesia have signed agreements to reduce emissions, Indonesia aims to nearly double its palm oil production by 2020 to meet the rising global demand. Despite international and national pressure against deforestation and the use of palm oil in various commercial products, the palm oil industry not shut down in the near future. Instead, governments, companies and organisations are aiming to shift the focus towards making the industry more sustainable and gain various certifications to continue economic growth. Initiatives such as the Roundtable on Sustainable Palm Oil (RSPO) and Indonesian Sustainable Palm Oil (ISPO) have been established in the attempt of making the industry more sustainable. Even though these initiatives have gained some success, they have also received criticism for not creating significant changes in the palm oil industry as well as being uncertainty about what sustainability certifications imply for the livelihood of smallholders. This thesis has explored the socio-economic and environmental impacts of the palm oil industry in Riau province in terms of researching the drivers and barriers for a sustainable palm oil industry.

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## **Abbreviations and Acronyms**

|                 |   |
|-----------------|---|
| BAPPENAS        | National Development Planning Agency                    |
| BOD             | Biochemical Oxygen Demand                               |
| CDM             | The Clean Development Mechanism                         |
| CH <sub>4</sub> | Methane   |
| CIFOR           | The Centre for International Forestry Research          |
| CO <sub>2</sub> | Carbon Dioxide  |
| COD             | Chemical O  |
| CPO             | Crude Palm Oil  |
| EFB             | Empty Fruit Bunch                                       |
| EU              | European Union  |
| FFB             | Fresh Fruit Bunch                                       |
| GHG             | Greenhouse Gas  |
| HCS             | High Carbon Stock                                       |
| HCV             | High Conservation Value                                 |
| IDH             | The Sustainable Trade Initiative                        |
| IDR             | Indonesian Rupiah                                       |
| ISPO            | Indonesia Sustainable Palm Oil                          |
| NES             | Nucleus Estate and Smallholder                          |
| NGOs            | Non-governmental Organizations                          |
| POME            | Palm oil mill effluent                                  |
| RAN-GRK         | National Action Plan to Reduce Greenhouse Gas Emissions |
| RSPO            | Roundtable on Sustainable Palm Oil                      |
| UN              | United Nations  |
| UNDP            | United Nations Development Programme                    |
| UNFCCC          | United Nations Framework Convention on Climate Change   |
| UN SDGs         | United Nation Sustainable Development Goals             |
| USD             | US Dollar   |
| WRI             | World Resources Institute                               |
| WWF             | World Wildlife Fund                                     |

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# CHAPTER 1

## INTRODUCTION

### 1.1 Title of the Master Thesis

Drivers and Barriers Towards a Sustainable Palm Oil Industry: A Case Study of Riau Province in Sumatra, Indonesia.

### 1.2 Introduction

The fast and continuing expansion of cultivating palm oil in Indonesia has raised concerns across the international arena where various governments, Non-Governmental Organisations (NGOs), environmentalists, civil society groups and the United Nations Sustainable Development Goals (UN SDGs) among others have drawn attention to the impacts of palm oil plantations on local communities and the environment. The production of palm oil from the oil palm trees originated through the need of a new commodity after the decreasing of the slave trade in the beginning of the 1800s (Henderson and Osborne, 2000). The attention around the expansion involves a great variety of activists and there are now many environmental and social NGOs as well as advocacy groups working on the issues related to the palm oil industry. In the centre of this focus there seems to lay questions of both social and environmental sustainability. Further, the concern for the common environment and climate change has gained major attention across nations and on a global scale (Agrawal et.al, 2014). Most of the international concern and focus is on stopping deforestation, illegal logging and burning practices, some even lobby to boycott the palm oil industry all together.

Deforestation and forest degradation through infrastructure development, conversion of land, agricultural expansion and destructive (and illegal) logging among others stand for nearly 20% of global greenhouse gases (GHGs) (Agrawal et.al, 2014). This percentage of GHG emissions is thus more than the entire global transportation sector and second to the energy sector. According to a wide range of scientists there is an agreement that to compel the impacts of climate change, the global average temperature cannot increase more than 2 degrees Celsius (IPCC, 2016). For this to be feasible, the reduction of emissions from the forest sector is a crucial measure, combined with other mitigation actions.

The focus in this study relies on researching the socio-economic and environmental impacts of the palm oil industry in Riau province in Sumatra, Indonesia, where the emphasis is on the drivers and barriers towards a sustainable palm oil industry. Furthermore, it is an attempt to

envisage alternatives for the future development of natural resource use within the palm oil industry, and to look at the possibilities for alternative solutions to a sustainable palm oil industry.

### **1.3 Historical Background Indonesia**

The Republic of Indonesia is located in Southeast Asia and is the largest archipelagic country in the world. Extending 5,120 kilometres from east to west and 1,760 kilometres from north to south, Indonesia consists of over 17,508 islands (CIA, 2016). It is ranked as the fourth most populous country in the world, with more than 255 million inhabitants. Indonesia is a developing country where its development is exceedingly dependent on forestry and forest-related sectors such as agriculture and mining (Indrarto et.al, 2012). Indonesia is the largest exporter of palm oil in the world, and according to United Nations Development Programme (UNDP) around 60% of workers in the palm oil industry are local smallholders both independent and employed by palm oil companies (UNDP, 2016). This entails that the palm oil industry is not only big business for foreign palm oil companies, but also for the job creation and livelihood of a large part of the local population in Indonesia. The economy in Indonesia is highly dependent on the palm oil industry as well as other forestry related businesses such as timber, pulp and paper (Alisjahbana and Busch, 2017).

However, Indonesia is facing many challenges towards its development, where one critical challenge is deforestation and GHG emissions. The large and growing population combined with rapid industrialisation presents serious environmental issues. These issues are often given a lower priority due to weak and under-resourced governance as well as high poverty levels (Indrarto et.al, 2012). The environmental issues entail large-scale illegal and legal deforestation, destruction of peatlands and related wildfires causing haze and smog over Indonesia as well as Singapore and Malaysia. Environmental problems associated with industrial development and rapid urbanisation such as air pollution, waste management, and water services among others (WWF, 2016). However, Indonesia has experienced a slightly improving performance in the Environmental Performance Index (EPI) ranking at 133 out of 180 countries in 2018 (EPI, 2018). Much of the deforestation in Indonesia is caused by the expansion of the palm oil industry which requires land allocation as well as changes to the natural ecosystems (EPI, 2016). These expansions can generate wealth for the local communities, but they might also degrade ecosystems and cause social problems. Due to these expansions, Indonesia has become the world's third largest emitter of GHGs (WRI,

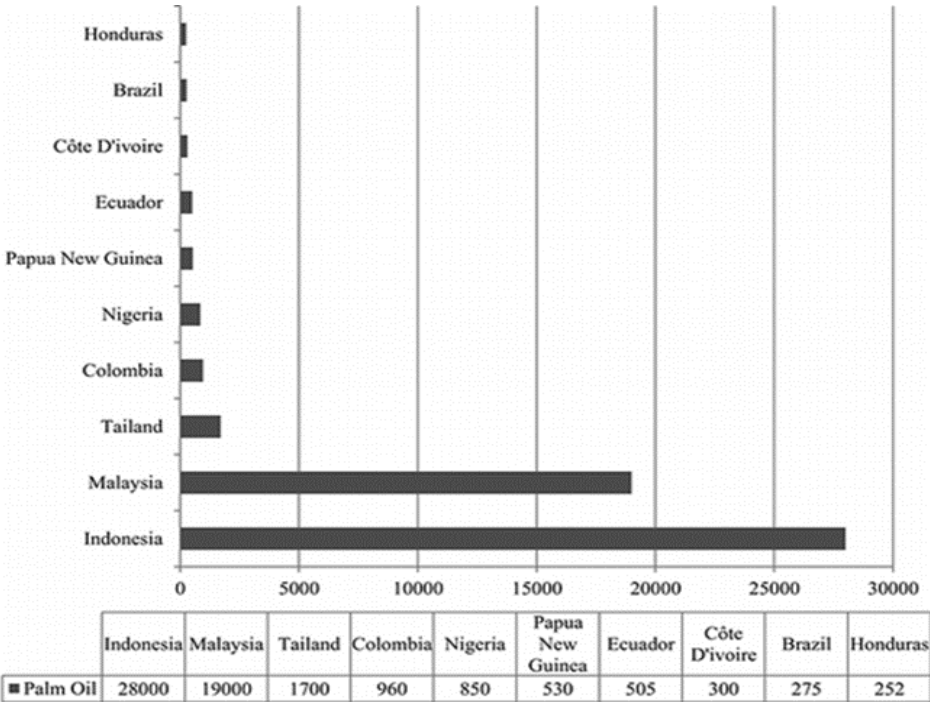
2017). According to the International Union for Conservation of Nature, in addition to climate change and environmental degradation, these types of activities threatens the survival of indigenous and endemic species, including around 140 species of mammals who are threatened as well as critically endangered species such as the Sumatran orangutan and Javan rhinoceros among others (IUCN, 2015). While Indonesia is richly endowed with lush natural resources, the environmental degradation is continuing at a fast rate. Unlike in most industrialised countries, Indonesia's GHGs are mostly the result of forest fires, environmental degradation, and methane gas emissions from wastewater created within palm oil production (IUCN, 2015). The palm oil industry has been a significant contributor to the Indonesian economic growth and development, providing significant government revenues from export taxes, poverty alleviation through employment and being essential in developing infrastructure in rural areas (Obidzinski, 2013). Being a country extremely vulnerable to climate change, the World Bank stated in 2010 that Indonesia must adapt to the various environmental pressures. After this statement, Indonesia has become a frontrunner in the international limelight due to eagerness to reduce its GHGs (World Bank, 2014). However, in 2016 Indonesia was the largest producer and exporter of palm oil worldwide, with plantations covering more than 11 million hectares (Directorate General of Estate Crops, 2016). According to the UNDP, 40% of the palm oil in Indonesia is produced by smallholders (UNDP, 2015). Hence, palm oil has a strategic value in supporting Indonesia's national development due to the ways in which palm oil plantations are the prime movers of agribusiness development, create much-needed jobs and income for smallholders, as well as generating national revenue (GCP Indonesia, 2015).

#### **1.4 History of the palm oil industry in Indonesia**

The oil palm, (*Elaeis guineensis*) is a tropical plant said to have originated in the ancient rainforests of West Africa, which was discovered by the Portuguese explorer Alvise Cadamosto in the 15th century (Corley and Tinker, 2007). Today, the oil palm exists in West Africa, Southeast Asia and in South and Central America. During the 19th century the demand for palm oil grew due to economic development and new inventions such as margarine, candles, soaps, as well as for industrial usage (Corley and Tinker, 2007). Palm oil became a popular replacement to butter due to its better durability and was much cheaper to produce. Further the demand for palm kernel oil also increased due to its many forms of usage. As a vegetable oil, palm oil is extracted from the mesocarp of the palm oil fruit, and palm kernel oil is derived from the kernel of the same fruit. The main difference between the

two oils is the levels of saturated fat, where palm oil entails 52 % and palm kernel oil entails 86 % saturated fat (FAO, 2017). The palm oil is widely used in food products such as cooking oil, margarine, feedstock for biofuel, and palm kernel oil is mainly used as a raw ingredient in consumer products such as cosmetics, candles, soaps, shampoo, and detergents among others (Corley and Tinker, 2007). Oil palm trees need a stable amount of sunshine and rain which makes them grow best in tropical and semi-tropical environments such as rainforests, where temperatures range between 24 and 28 degrees Celsius (Gro-Intelligence, 2016). The average lifespan of the trees are around 25 to 30 years, where fruit production starts within the third year of development and the harvests reach peak levels around their eighth to tenth year (Gro-Intelligence, 2016). Historically, since substantial capital is required to plant, fertilize, harvest, and process oil palms, private and governmental companies had monopolized the palm oil industry. Plantation companies have had the technical capability to build palm oil mills for processing fresh fruit bunches of oil palms to obtain crude palm oil. Since the 19th century, smallholders have cultivated coconut, cacao and rubber on their own land, but none had the ability to try to cultivate oil palms for a long time (UNDP, 2013). However, under the regime of President Suharto from 1968 to 1998, the situation changed. At the end of the 1970s, Suharto initiated a rural development project called Nucleus Estates and Smallholders (NES) that was strongly supported by the World Bank and international donors. People who participated in this project, were given two-hectare plots inside company plantations on which to cultivate cash crops such as oil or rubber palms (Carthy, 2010). The NES projects were implemented in several places in Indonesia and made small-scale oil palm cultivation in Indonesia possible for the first time. In the 1990s, independent smallholders, was increasing in number in Sumatra. The independent smallholders were attracted by large profits from oil palm cultivation and influenced by the success of NES (Carthy, 2010). In the last half-century, oil palm cultivation by both smallholders and plantations has expanded, which has drastically changed the landscape of rural societies and livelihood strategies in the outer islands of Indonesia. Based on the 2013 Census of Agriculture, smallholders cultivated 3,133,711 hectares with oil palms in Indonesia, where Sumatra is at the expansion core with Riau Province holding the substantial expansion of oil palm cultivation by smallholders (WRI, 2013). According to Rasiah and Sharin (2006), the development of the palm oil sector can in a broad sense be described in four phases. The first phase was when the commercial planting started in Sumatra in 1911 and further expanded to around 90 000 hectares by 1938. Yet, from 1938 to 1968 growth was slow due to World War II and the period after independence. However, 1968 marked a shift in policies and the entering towards the second

phase with state-led production where the former Dutch estates were turned into state-owned plantations (Rasiah and Sharin, 2006). The expansion was mainly led by government investments in the state-owned plantations called Perseroan Terbatas Perkebunan (PTPs) from 1969 to 1988. As a tool for rural development, the government promoted smallholder production of palm oil in the late 1970s where the agricultural policy focused on food security with state ownership in strategic industries with price caps on palm oil to control inflation (Larson, 1996). The third phase from 1988 to 1994 the palm oil production shifted from state-led to market-led growth where most of the growth arose in a joint government/state-private sector development scheme. From 1994 and onwards was the fourth phase where the private sector became the main driver for expansion with government support (Rasiah and Sharin, 2006). According to statistics compiled by scientists at the Center for International Forestry Research (CIFOR), high demand for edible palm oil across the world has made Indonesia the top global producer of crude palm oil as shown in Figure 1 (CIFOR, 2013).



**Figure 1:** The most important palm oil producers in the world (million tons) (Source: Hosseini and Wahid, 2013).

Indonesia is now the largest producer of palm oil in the world with over 600 palm oil mills (POMs). The large and rapidly growing palm oil industry puts thus a demand for the

improvement of agricultural, industrial, and sustainability practices (Indonesian Ministry of Agriculture, 2017).

### **1.5 Background for the Study**

The palm oil industry has gained major focus across the world due to its environmental consequences, such as deforestation, lack of biodiversity and GHG emissions being some of the main issues. Since there is already a large focus on deforestation and lack of biodiversity, the focus for this thesis is more centred on what is being done to create a more sustainable palm oil industry in terms of innovative solutions, such as sustainable certifications and reducing GHG emissions through methane gas capture within the palm oil industry. Methane (CH<sub>4</sub>) capture from palm oil mill effluent (POME) has already been investigated and implemented in some places in Indonesia, as well as in Malaysia and Thailand (WRI, 2014). This suggests that it is already known that CH<sub>4</sub> capture is possible, and that this could be a part of the road towards sustainability within the palm oil industry.

### **1.6 Problem Statement: The Aim and Scope of the Thesis**

Despite efforts towards sustainability and forest conservation, to meet the rising global demand for palm oil, Indonesia aims to nearly double its palm oil production by 2020 (UNDP Indonesia, 2015). Even though the economy has been growing rapidly due to political stability and good economic policy, climate change makes the task of development for developing countries a hard challenge (Ministry of Environment Indonesia, 2015). These two vast challenges, the need to continue economic development and at the same time follow climate change agreements and GHG emission reduction need a solution. One of the solutions could be find alternative and sustainable ways to continue its development. As it does not seem likely that despite international and national pressure against deforestation and the use of palm oil in various commercial products, the palm oil industry will simply shut down any time soon due to its high demand. Instead, governments and companies are now starting to shift the focus towards making the industry more sustainable and gain various certifications to continue doing business as usual. Pekanbaru and the surrounding communities in Riau Province in Sumatra, Indonesia (Figure 2) has been chosen as the study area for this specific research. The aim is to understand the environmental and socio-economic framework, policy conditions and the ongoing activities that influence the course of the development of local, national and international work towards a sustainable development of the palm oil industry.



**Figure 2:** Map of Riau Province, Sumatra, Indonesia. (Source: Google Maps, 2017).

### 1.7 Description of the Case Study Area

The case study area for the thesis was mainly Pekanbaru and the surrounding areas in Riau. Pekanbaru is the capital city of Riau Province and a large economic centre on the eastern part of Sumatra Island. It has an area of 632,26 km<sup>2</sup> with a population of 1,093,416 and is located on the banks of the Siak River which runs into the Strait of Malacca and gives Pekanbaru direct access to the busy strait and functions as a trading port (CIA, 2017). The city of Pekanbaru is a business district for oil, mining, and palm oil industries as well as a central shipping harbour in Indonesia. The palm oil mills are situated slightly farther from the city centre, with somewhat vast distances from each other with open deforested landscape which has been replaced with large areas of palm oil plantations. Driving across the countryside there are oil palm trees as far as the eye can see, as shown in Figure 3 below.



**Figure 3:** Aerial photo of a road running through a palm oil plantation in Riau. Source: Reuters, 2016.

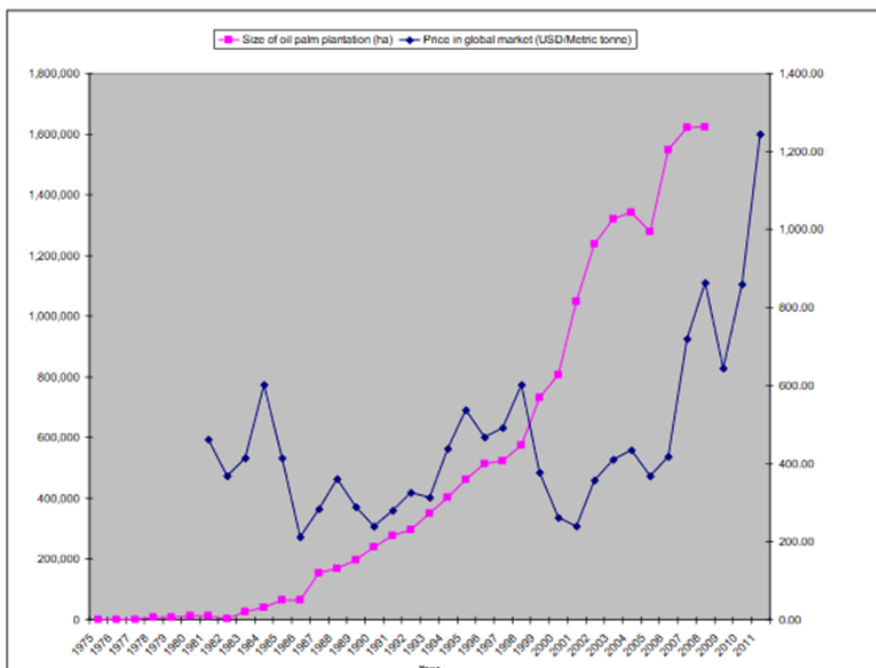
Pekanbaru received the “cleanest city” award (Adipura) in the category of large cities for the seventh time in 2011, and the city is known for its wide main streets and large median road. Despite its award for the cleanest city, Pekanbaru suffers from haze problems on a regular basis due to forest fires, especially in the dry season as there is little rain to put the fires out (FAO, 2010). Major land concessions are being granted for commercial interests and large areas are under the control of palm oil companies that clears land to plant oil palm trees as well as other commercial interests (Colchester and Chao, 2011). Due to these concessions being granted might imply that economic growth is higher valued than environmental sustainability. The fires are not always started by local smallholders but by corporate plantation owners who use slash and burn methods to clear the land areas more rapid. In addition to affecting Indonesia, these fires cause a haze that affects surrounding areas such as Singapore and Malaysia and is known as “the burning season” (Colchester and Chao, 2011). Figure 4 shows forest fires in Riau, which have become very common in the area.





**Figure 4:** Forest fires in Riau province, Sumatra. (Source: AFP, 2018).

Rapid development of palm oil plantations in Riau has caused the province to become the largest producer of palm oil in Indonesia, with the largest area harvested in the country (Ministry of Agriculture, 2011). Hence, one of the reasons for choosing Riau Province specifically, was to view what is being done in terms of sustainability efforts in the area that has the largest expansion of palm oil plantations and thus also the largest groups of smallholders depending on the industry. Furthermore, this will ultimately also affect the surrounding communities in social, political, economic and environmental ways. In 2011, up to 24% of the total national production comes from palm oil plantations in Riau, as. (Ministry of Agriculture, 2011).



**Figure 5:** Size of palm oil plantations and price in global markets in Riau Province, 1975-2011 (Source: Ministry of Agriculture, 2011).

Around 1.9 million hectares of land (around 21%) of the total area of Riau Province are registered palm oil plantations owned by smallholders, private enterprises, and state owned. Plantations owned by smallholders involve around 400 000 families which produces around 5.9 million tons of fresh fruit bunches annually on around 1 million hectares. These fruit bunches are processed in 144 palm oil mills in the province (Ministry of Agriculture, 2011).

### **1.8 Research Objective**

The main objective of the study is to understand the drivers and barriers towards a sustainable palm oil industry in Riau Province.

### **1.9 Research Questions**

- What are the environmental and socio-economic impacts of palm oil cultivation in Riau Province?
- What actions are being done in Riau Province to enable a more sustainable palm oil industry?
- What are the main challenges of a sustainable palm oil industry in Riau Province?

## **CHAPTER 2**

### **LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

This chapter will review existing literature, documents, information regarding the palm oil industry and a theoretical framework with a deeper look into the various elements put in place to promote sustainable development.

#### **2.1 Environmental Impacts of Palm Oil Production**

Indonesia and Malaysia have accomplished great success in the development of a global dominance in the field of palm oil cultivation. The production growth stems from how the climate in these countries are greatly suited for oil palm tree cultivation and their initial embrace of integrated plantation systems as well as large-scale and modern refineries which offer superior economies-of-scale (Verheye, 2010). Even though industrialisation and urbanisation are at the core of the recent economic development in Indonesia, the palm oil industry still contributes to economic growth to a certain extent. The large-scale development commenced by the large plantation companies has utterly impacted rural livelihoods and the natural environment in Indonesia. Sumatra and Kalimantan in particular, are affected by many issues, such as haze problems caused by forest clearing fires and land of local people being taken over by plantation companies, and plantation companies taking over land that belong to local people. However, the numbers of smallholders are increasing as well as improving their economic position to an unprecedented extent due to working in the palm oil sector (UNDP, 2013).

Problems with monoculture plantations such as palm oil plantations is firstly that they presuppose clearing existing vegetation enabling cultivation of the desired single crop by converting the forest into large scale crops (WWF, 2016). Palm oil is known to cause pollution in water and soil, significant soil erosion and massive carbon dioxide (CO<sub>2</sub>) emission from fires set to clear land for the plantations as well as CH<sub>4</sub> emissions from palm oil production. This destroys the natural habitat for local wildlife and endangers biodiversity. Furthermore, the nearby ecosystems undergo changes and are exposed to contamination from pesticides and waste. This can have long-term impacts (WWF, 2016). Global market forces affect the continuing international demand for natural resources such as oil, gas, timber, paper, palm oil and other foodstuffs from Indonesia as well as national demand as Indonesia is increasingly becoming a consumer society as the rest of Asia. The international and national demand is contributing to the pressure on the Indonesian forests and affects the

surrounding communities and their livelihood (Howell and Bastiansen, 2009). The economic growth of Indonesia has accelerated in the recent decades and has placed Indonesia as one of the top countries with high economic growth in the global South. Hence, there are various potential barriers to implement and sustain a sustainable forest management in Indonesia as there are many stakeholders with different interests to consider in the process (Howell and Bastiansen, 2009). Since 2011, the government of Indonesia have implemented a forest moratorium. The forest moratorium entails a suspension on issuing new concessions on peatlands and forests. This is an attempt to create a better balance between economic, cultural, social and environmental development (Murdiyarto et al., 2011). The mission for the moratorium is to reduce GHG emissions. The moratorium could be very beneficial in terms of environmental conservation, but it may also become a threat to business and palm oil companies, and further impact smallholders depending on palm oil expansion (Rakhmindyarto 2012).

## **2.2 Socio-economic Impacts of Palm Oil Production**

Demonstrations and protests against palm oil have become a global trend, where many in the EU, the US and Australia advocate for avoiding it all together. However, there is a growing recognition that even if all big western companies and manufacturers stopped using palm oil in their products, the problem with unsustainable palm oil would not disappear. Both India and China each consume more palm oil than the EU (Campbell et al., 2016). Palm oil cannot be excluded from the current consumer market, because the worldwide demand for palm oil is expected to further increase to approximately 240 million tons by 2050 (Campbell et al., 2016). If countries and consumer campaigns turn away from palm oil altogether, damaging forms of production might prevail, and an even worse outcome might occur if boycotts would push companies to use other oils instead and cause even more damage. This is because oil palms produce much more oil per hectare than other vegetable oil plants and are in this way in need of much less land to produce sunflower oil and rapeseed oil among others, which makes palm oil the most efficient oil crop on the market (Padfield et al., 2011). A point often overlooked is the impacts of replacing palm oil in terms of “indirect land use” or “opportunity cost”. For example, if the global demand for oil and fats remains the same, the issue would then evolve around what the environmental and social costs of replacing palm oil with another oil crop would be (Padfield et.al, 2011).

Meeting global demand for oils and fats by replacing palm oil with an alternative oil crop would require a much larger area of land than palm oil cultivation require today (Schmidt,

2010). Hence, such expansions are most likely to lead to deforestation somewhere else in the world. Furthermore, according to Schmidt (2010) recent research suggests that palm oil is environmentally preferable to other oils if the new oil palm plantations are not replacing primary forest or peat land. Moreover, the palm oil industry employs close to one million people making it the second largest employer after the government. Many argue for the double standards held by western and European views regarding the industry in terms of the many rules and certifications of their natural resource use that compromises their growing economies when the western economies have not done the same. When urban and rural poverty is still an everyday reality for many, it is hard not to understand their interests for a continued growth in the palm oil industry due to the benefits of an economic growth and prosperity (Hansen, 2012).

Destructive, uncontrolled and illegal resource extraction in the sectors of agriculture, mining, fishery and forestry has led to environmental disasters such as floods, landslides and droughts, that adversely affect the agricultural production. This further impacts the local economy, the balance of the market trade, undermines livelihoods and Indonesia's ability to meet poverty alleviation goals (Ardiansyah, 2014). Global energy demand poses a future threat as an increase in the production of biofuel adversely affect land use and forest cover by creating incentives to convert forest into plantation crops, rather than planting in already degraded areas. This is because by converting tropical forests for new crop production for biofuel can release large quantities of GHGs that far exceed any potential annual savings from biofuels (Ardiansyah, 2014).

## **2.3 Methane Capture**

### **2.3.1 Methane Gas**

Methane (CH<sub>4</sub>) is a GHG that remains in the atmosphere for about 9-15 years and is over 20 times more effective in trapping heat in the atmosphere than CO<sub>2</sub> over a period of 100 years and is thus more devastating to the climate. CH<sub>4</sub> is emitted from both natural and human-influenced sources (EPA, 2017). The human-influenced sources include petroleum and natural gas systems, agricultural activities, coal mining, landfills and wastewater treatment among others, processes (UNECE, 2017). The 2013 IPCC Assessment report that the pollution power produced by CH<sub>4</sub> gas is 34 times greater than CO<sub>2</sub>. CH<sub>4</sub> is also a primary constituent of natural gas and an important energy source. Hence, efforts to prevent or utilise CH<sub>4</sub> emissions can provide significant energy as well as economic and environmental benefits

(UNECE, 2017). With the expanding middle class living in urban areas in Indonesia indicates a larger demand for high quality energy services in the future. The increased energy demand will most likely continue to grow and thus the need for energy could be derived from renewable sources such as CH<sub>4</sub> capture through proper palm oil waste management (EPA, 2015). Indonesia currently has approximately 600 mills, largely concentrated in Sumatra and Kalimantan (IPOB, 2010). The US Environmental Protection Agency's Global Methane Initiative estimates that up to 37.7 million tonnes of CO<sub>2</sub> equivalent could be reduced every year if all these mills would have CH<sub>4</sub> capture facilities and conversion technologies (US EPA, 2017). Currently, less than around 10 percent of the mills are using these technologies. If all the captured CH<sub>4</sub> from these mills were used to offset emissions from diesel generators, which are often used to power the remotely located grids nearest to palm oil mills, an additional 5.2 million tonnes CO<sub>2</sub> each year could be avoided (CIFOR, 2016).

### 2.3.2 Palm Oil Waste Management and POME to energy in Indonesia

One of the key challenges to achieve an ecological and sustainable palm oil production is through a controlled discharge of the occurring waste products. Approximately 70% of the harvested fruit bunch is waste (Singh et.al, 2010). Palm oil waste production can be categorized as solid waste and including empty fruit bunches (EFB), palm pressed fibres (PPF), palm kernel shells (PKS) and palm kernel cake (PKC) and liquid palm oil mill effluent (POME).

In Indonesia and other palm oil producing countries, palm oil is driving rural development, economic growth, as well as poverty alleviation in the communities. However, this comes with an environmental price tag often with clearing of land, loss of biodiversity and tropical forests (WRI, 2016). In addition to climate threats from forest clearing, CH<sub>4</sub> emissions from wastewater from POME represent a significant and increasing source of atmospheric warming (Taylor et.al, 2014). At a palm oil mill, the typical wastewater facility emits around 3,288 million tonnes CH<sub>4</sub> a year, equating to 111,804 million tonnes CO<sub>2</sub> emission a year because of the greater global warming potential of CH<sub>4</sub> (Taylor et.al, 2014). The environmental degradation caused by the improper disposal of POME leads to water and soil pollution. Accordingly, waste management techniques are essential to minimize the environmental impact that comes with the fast expansion of oil palm plantations and production (Wu et.al, 2010). Several types of waste are generated through processing fresh fruit bunches (FFBs) from palm oil trees in palm oil production. Washing, cleaning, and oil extraction processes

generate the liquid waste POME. Through the oil extraction process, there are three large operations that generate the bulk of POME;

- Sterilizing fresh fruit bunches
- Clarifying extracted crude palm oil: pressing station, separation, clarification
- Empty fruit bunch (EFB) pressing

For each ton of processed FFBS, the palm oil mill discharges around 0.7-1 m<sup>3</sup> of POME. Fresh POME is acidic with a pH of 3.3-4.6, and holds a temperature of 60-80°C. It is a brownish thick liquid with high solids, Chemical Oxygen Demand (COD), oil and grease as well as Biological Oxygen Demand (BOD) values (Winrock International, 2015).

POME decomposes in the absence of oxygen, and biogas is formed naturally. When this gas is unharnessed it is a contributor to global climate change. Typically, biogas is composed of 25-45% CO<sub>2</sub>, 50-75% CH<sub>4</sub>, as well as traces of other gases (Rupani et.al, 2010). When POME collection is uncontrolled, CH<sub>4</sub> is released directly into the atmosphere, where CH<sub>4</sub> is 21 times more powerful and hazardous than CO<sub>2</sub>. A biogas plant can take advantage of this natural decomposition process and is able to generate energy. In this way the organic liquid waste generated during palm oil production (can) represent a major untapped resource of energy. Hence, by converting POME to biogas it can produce energy as well as significantly reduce the impacts of climate change from palm oil production. Since POME contains a considerable amount of phosphate, potassium, magnesium, calcium and nitrogen, it is a good fertilizer for palm oil plantations. However, mill operators must preheat the POME before they can apply it to the fields. Applying untreated POME directly to the land can water-log the soil and kill vegetation (Rupani et.al, 2010). The Environmental Ministerial Decree number 28/2003 sets the discharge limits for land application of POME, as well as forbid discharging POME directly into water due to its adverse environmental effects (Winrock International, 2015). The Indonesian government regulates the levels of allowed contents in treated POME that mills can discharge into bodies of water through the Environmental Ministerial Decree number 51/1995. The oil extraction process does not add chemicals, making POME non-toxic, but it pollutes aquatic environments by depleting dissolved oxygen. Thus, to meet regulatory standards, mill operators must treat POME before discharging it into waterways (Winrock International, 2015).

Almost all palm oil mills in Indonesia use open ponding systems to treat POME due to their operational simplicity and low costs. In the effluent process, POME flows through a series of ponds and treatment steps. Even though the ponds may differ from mill to mill, the systems generally consist of four types of ponds; a fat pit, cooling pond, anaerobic pond, and aerobic pond. In the fat pit, the remaining grease and oil in POME is collected (Winrock International, 2015). Since oil is the main product of the mill, the mill operators typically recover oil from the fat pit and combine it with the primary crude palm oil (CPO) product. To create optimal conditions for the decomposition of organic material in the anaerobic and aerobic ponds, the cooling pond decreases the temperature of POME (Abdullah and Sulaiman, 2013). After the treatment in the four ponds, the effluent is safe to use as a fertiliser or to discharge to waterways. However, even though the ponding system is economically beneficial, it is land intensive, and releases a large amount of CH<sub>4</sub> gas into the atmosphere primarily from the decomposition occurring in the anaerobic pond. This release of CH<sub>4</sub> from the POME treatment system accounts to around 70% of the total GHG emissions in CPO production. When microorganisms such as bacteria, degrade organic material in the absence of oxygen, biogas is formed. Biogas consists of 25-45% CO<sub>2</sub>, 50-75% CH<sub>4</sub>, and small amounts of other gases (Winrock International, 2015). Biogas is around 20% lighter than air and has an ignition temperature between 650 - 750 degrees Celsius. It is a colourless and odourless gas that burns with a clear blue flame (like that of liquid petroleum gas). Biogas burns with 60% efficiency in a conventional biogas stove; it has a caloric value of 20 MJ/Nm<sup>3</sup>. The volume of biogas is expressed in units of normal cubic meters (Nm<sup>3</sup>), the volume of gas at 0°C and atmospheric pressure, which makes up the bulk of biogas can combust with oxygen (Schnürer, 2016). The release of energy from combustion makes biogas a potential fuel and can serve any heating purpose from cooking to fuel an industrial burner. In gas engines, biogas converts its energy content into heat and electricity (Schnürer, 2016). Furthermore, but less common, compressed biogas can power motor vehicles through combustion. The biogas production process exploits the natural ability of microorganisms to degrade organic wastes. The decomposition process produces biogas and a nutrient-rich residue suitable for use as a fertilizer, and the organic wastes function as the substrate on which the organisms grow (Schnürer, 2016). Any biodegradable organic material can serve as a feedstock to produce biogas, although some materials work better technically and economically. Costly inputs reduce the economic benefits of outputs (Carlini, 2017). One of the main attributes of biogas technology is the ability to generate biogas from inexpensive and abundant organic wastes such as POME. Biogas production using readily available biodegradable wastes has two key advantages and



are economically attractive because both the biogas and slurry are valuable (Laskri et al., 2015). Hence, project owners gain a safe way to process biodegradable waste that might otherwise end up in landfills or waterways, avoiding negative environmental impacts and rather turn it into a renewable source. The scenario of economy and agriculture in Indonesia has changed due to the importance of oil palm as a product. The presence of palm oil wastes has created a large disposal problem, and the fundamental principles of waste management are to minimize and recycle the waste, as well as recover the energy and dispose the waste (Carlini, 2017). These principles apply to agro-industrial wastes such as palm oil residues as they do to municipal waste. In Malaysia, one unique aspect of renewable energy sources is how some palm oil mills are self-sufficient in energy, using the palm oil waste matter as fuel to generate steam in waste-fuel boilers for palm oil processing and power-generation with steam turbines (Abdullah and Sulaiman, 2013).

An innovative approach for emission reduction has been treating POME from open lagoon ponds to a closed anaerobic sludge reactor to generate green energy in the form of biogas holding CH<sub>4</sub>. However, improper techniques for the management and treatment of POME produce hazardous effects to people and contribute to global warming. According to Ahmad and Ghufran (2018), various studies reveal that about 80% of palm effluent is being disposed of partially treated in open lagoon areas. The treatment of POME in an anaerobic reactor replaces the open lagoon of aerobic system for cleaner production as shown in Figure 6 below (Ahmad and Ghufran (2018)).



**Figure 6:** POME to Biogas power generator. (Source: Musim Mas, 2015).

CH<sub>4</sub> is generated during the Anaerobic digestion of POME. By capturing and using this gas, the group total CO<sub>2</sub> emission saving is equivalent to 300 000 tonnes per year (Waarts and Zwart, 2013). This is equivalent to the amount of carbon emitted by 60 000 cars in one year and 15-35% of total palm oil emissions. Current estimates of CH<sub>4</sub> emissions across the region from POME is equal to almost 30% of Indonesia's fossil fuel emissions (Zafar, 2018).

In Riau Province the palm oil company Musim Mas have implemented CH<sub>4</sub> capture facilities for GHG reduction and energy creation at some of their mills (Musim Mas, 2017). PT Musim Mas is among the first pioneer company to implement CH<sub>4</sub> capture facilities at palm oil mills in Indonesia. The CH<sub>4</sub> capture facility was built between 2002 and 2006 (Musim Mas, 2017). The energy created is used to run the production at the mills as well as nearby industries. The fact that this energy generation project has been in operation for a while, suggests that the constraints and the benefits of this kind of energy production is well understood by the personnel working at PT Musim Mas palm oil mill.

### 2.3.3 CH<sub>4</sub> Capture and POME to Energy in Thailand

At the Univanich Lamthap POME Biogas Project and Univanich TOPI Biogas Project in southern Thailand, climate-damaging CH<sub>4</sub> gas from palm oil production is captured at two large wastewater plants (The Gold Standard, 2010). Here, the energy produced from biogas is generated to run the plants and the surplus energy is fed into the local power grid. The industrial processing of palm oil produces large amounts of wastewater. The treatment of the wastewater causes substantial emissions of CH<sub>4</sub> (The Gold Standard, 2010). Before the two projects were initiated, the wastewater at the plants was being treated anaerobically in open ponds which was the normal and cheapest practices in the palm oil sector where the anaerobic decomposition of organic matter in wastewater led to CH<sub>4</sub> emissions to freely enter the atmosphere. However, for the two biogas projects a Covered In-Ground Anaerobic Reactor (CIGAR) system developed by the New Zealand company Waste Solutions Ltd was installed (Univanich, 2010). The CIGAR system enables an optimal anaerobic decomposition of organic matter and produces more CH<sub>4</sub> (biogas) on the one hand, as well as capturing the produced CH<sub>4</sub> with a membrane to use for energy. The biogas is burned in biogas engines, and the ensuing renewable electricity created is utilized for running the energy supply of the plant and the surplus energy is sold to the local energy network operator Provincial Electricity Authority (PEA) (Tantitham et.al, 2009). In addition to reducing CH<sub>4</sub> emissions, the plant

skims off the sludge that builds up in the ponds and use it as fertiliser in the fields. These projects have both created more jobs and the occurrence of a technology transfer. Univanich Palm Oil Public Co. Ltd. runs these projects in Thailand and has been a member of the RSPO since 2009 and hence committed to contributing towards the sustainable production of palm oil (Tantitham et al., 2009).

#### 2.3.4 Key Barriers for Methane Capture

Indonesia has enormous potential in renewable resources within palm oil production. The potential renewable energy resources are based on a technical assessment by the Ministry of Energy and Mineral Resources (MEMR), but do not necessarily consider the economic viability of individual projects (IEA, 2017). However, Government Regulation No. 79/2014 on the National Energy Policy requires that the development of renewable energy resources consider economic viability (IEA, 2017). According to Indonesia's National Council on Climate Change (DNPI), one of the main reasons for few Clean Development Mechanism (CDM) projects in Indonesia is because of the small profit margin. Business investors often support businesses that can create high profit margins of around 80%, and the profit margins for CDM projects in Indonesia have been around 10 to 15%. Another challenge with CH<sub>4</sub> capture facilities for renewable energy creation is channelling and injecting the electricity from the mills to the national grid. This is because the mills are often located far from the main grid (IEA, 2017). Hence, investments seem to be a big part of the challenge for implementing CH<sub>4</sub> capture facilities.

## 2.4 International Precedents

### 2.4.1 The Kyoto Protocol

In December 1997, The Kyoto Protocol was implemented and created legally binding obligations for 38 industrialized countries to withdraw their emissions of GHGs to an average of around 5.2% below their 1990 levels (UNFCCC, 2017). The targets in the Protocol cover six of the main GHGs such as CO<sub>2</sub>, CH<sub>4</sub>, nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and Sulphur hexafluoride (UNFCCC, 2017). The countries involved can themselves choose which of the six gases that will form part of their national emission reduction strategy. Activities such as deforestation and reforestation (emission or absorption of CO<sub>2</sub>) are covered in the land-use change and forestry sector (UNFCCC, 2017). The Kyoto Protocol can be viewed as a breakthrough in the global efforts towards sustainable

development and protecting the environment. This marked the first time that governments accepted legally-binding restrictions on their GHG emissions. The Protocol entailed cooperative mechanisms which aimed at cutting the cost of curbing the emissions (Khan, 2012). The Protocol establishes three cooperative mechanisms designed to help industrialised countries reduce the costs of meeting their emissions targets by achieving emission reductions at lower costs in developing countries than they could domestically. Hence, the Protocol includes three market-based mechanisms aimed at achieving cost-effective reductions, namely International Emissions Trading (IET), Joint Implementation (JI), and the Clean Development Mechanism (CDM). For this research, the CDM will be further investigated in terms of solutions for climate change and GHG emission reduction within the palm oil industry. The CDM allows the emission reduction projects that assist in creating sustainable development in developing countries to generate “certified emission reductions” (CER) for investors to use (Khan, 2012). The mechanisms give countries and private sector companies the opportunity to reduce emissions anywhere in the world—wherever the cost is lowest—and they can then count these reductions towards their own targets (IEA, 2007).

#### 2.4.2 The Clean Development Mechanism

The Clean Development Mechanism (CDM), contained in Article 12 of the Kyoto Protocol, allows private entities or governments in industrialized countries to implement emission reduction projects in developing countries. Further, the industrialised countries can in this way receive credit in the form of CERs, which they can count against their national reduction targets (Khan, 2012). The CDM attempts to promote sustainable development in developing countries, while allowing developed countries to contribute to the goal of reducing atmospheric concentrations of GHGs (UNFCCC, 2015). CDM is a project-based mechanism where the emission reductions are generated through specific projects and it is intended to promote investment in projects in developing countries. A requirement for a CDM project is that it must contribute to sustainable development in the host country, such as assist in reaching some of their economic, social, environmental, and sustainable development objectives (Khan, 2012). These objectives can be achieved by promoting environmentally friendly investment from industrialised countries and businesses. CDM projects must be validated, registered, their emissions reductions generated must be verified, and then the verified emission reductions can be certified. Only the certified emission reductions can be used by industrialised countries to comply with their emission reduction commitments (UNFCCC, 2015).

The CDM encourages the utilisation of up-flow anaerobic sludge blanket reactors for POME treatment and CH<sub>4</sub> capture to earn CER credits as a source of revenue. This can be viewed as beneficial for both palm oil companies and production as well as for surrounding communities and for global goals of emission reduction (Ahmad and Ghufuran, 2018). The CDM was set up to provide countries with some flexibility in the ways they meet their emission reduction targets under the Kyoto Protocol, while funding sustainable development. Today, the CDM is helping to address climate change and development outside its home in the Protocol (UNFCCC, 2015). The development of CH<sub>4</sub> capture installations such as biogas plants in Indonesia were financially feasible through carbon credit incentive from CDM. By the end of 2012, there were 36 registered CH<sub>4</sub> capture projects under the CDM, mostly for biogas flaring and not using the CH<sub>4</sub> for energy generation. Amongst the projects, 10 have successfully obtained CERs and received the economic benefits from carbon financing under the CDM (Winrock International, 2015).

#### 2.4.3 The Paris Agreement

The Paris agreement is an agreement aimed at curbing the emissions of CO<sub>2</sub> and other GHGs and will come into effect in 2020. The agreement aims to empower all countries involved to act towards preventing average global temperatures rising above 2 degrees Celsius and to reap the many opportunities and benefits that arise from a necessary global transformation to renewable, clean and sustainable development (Nigam and Singh, 2011). Indonesia has set goals for increasing power capacity by 35 GW, with 25% from renewable sources, and for increasing national electrification to 97% by 2019. These international and national goals support the scaling of investment in renewable energy projects such as POME-to-energy (IRENA, 2017). Although the Indonesian government has not published estimates of costs associated with its climate and clean energy goals, there is significant untapped potential for POME-to-energy to play a role in delivering on Indonesia's commitment (IRENA, 2017).

#### 2.4.4 Sustainable Palm Oil Certifications

Due to its land intensive industry, the palm oil industry has always been linked to the environment. Hence, unplanned development will lead to extreme land degradation of forest systems, loss of plant and animal habitats, as well as airborne and water pollution from large quantities of herbicides and pesticides for plantation maintenance (UNDP, 2007). The

Roundtable for Sustainable Palm Oil (RSPO) was established in 2004 to decrease these environmental effects from the palm oil industry. The RSPO is a non-profit organisation that brings stakeholders such as palm oil producers, palm oil buyers and NGOs together to discuss solutions for the environmental and human rights problems related to palm oil cultivation (RSPO, 2017). The RSPO aims at a better balance between social, ecological and economic practices. These stakeholders are developing the criteria and principles of a sustainable palm oil industry and facilitate the development of a sustainable palm oil production (UNDP, 2007). The guidelines proposed include a compliance with all applicable ratified international, national and local regulations, as well as adopting sustainable cultivation practices such as pesticide control, water management and soil erosion. Furthermore, the guidelines include a commitment to transparency, conservation of biodiversity and resources as well as community development (Mazzoni, 2014). With around 3000 members across the world representing sectors along the palm oil supply chain, it insures that large scale palm oil buyers commit to sustainable palm oil by deciding to only purchase palm oil from industries that have been RSPO certified (Mazzoni, 2014). However, only approximately 19 % of all palm oil producers worldwide were RSPO certified in 2017 and were following RSPOs principles and criteria of social engagement towards local population, no deforestation on high biodiversity plots and waste management to ensure sustainable production (RSPO, 2017). If the principles and criteria are not followed they can be withdrawn. All organisations in the supply chain using RSPO products are inspected to prevent overselling and mixing the RSPO palm oil with conventional (unsustainable) palm oil products. Palm oil growers will be evaluated for certification once every 5 years and if they become certified, they will annually be evaluated by a third-party for a continued compliance. Furthermore, the cost of these evaluations are payed by the ones who seeks RSPO certification (RSPO, 2017).

In 2011 Indonesia established the Indonesian Sustainable Palm Oil (ISPO) which aims to enhance the global competitiveness of Indonesian palm oil and bring it under a stricter environmental legislation. Thus, all Indonesian palm oil producers are compelled to receive ISPO certification (InPOP, 2015). Like RSPO, the ISPO also rely on a qualified third-party to conduct evaluations for certifications, but ISPO itself issues the certifications. In this way, the ISPO can maintain a high degree of control of the certification process (EIA, 2016).

Increasing smallholder and estate compliance with the ISPO certification scheme has been viewed as a key to achieve continued growth in palm oil production in a sustainable and equitable manner. Voluntary implementation of ISPO for independent smallholder farmers

began in 2015. Hence, there is significant room for improvement and development to enforce mandatory ISPO certification by 2022, which is a target set by the Ministry of Agriculture (UNDP, 2015). However, ISPO certification is very difficult for smallholders as their legitimacy and good agricultural practices are questionable in terms of being certified under ISPO. According to the Ministry of Agriculture the ISPO aims to assist smallholders in eliminating the various barriers to increasing their productivity, complying with regulations, and in becoming an integral part of a sustainable global supply chain (Ministry of Agriculture, 2015). ISPO standard is that all oil palm growers in Indonesia are required to comply with ISPO, and one of the principles of the ISPO standard is the mitigation and reduction of GHG emissions. However, the standard only requires mills to report their GHG emissions, and a focus on CH<sub>4</sub> capture does not yet exist within the ISPO standard (APEC, 2017). ISPO has indicated that new criteria which will go into effect by 2020 will require CH<sub>4</sub> capture for specified mills, with an aspiration that this will result in 60% of the country's mills implementing the technology (APEC, 2017).

## **2.5 Policy Framework**

Policy is formed as the directive for decision making; whereby it provides guidelines and a framework for all stakeholders within a predefined sector or sectors (Hayek, 2012). This suggests that policy is a command that orders stakeholders operating within a specific sector or sectors to follow certain rules, attached to specific roles and responsibilities, as they go about their operations (Hayek, 2012). Additionally, this gives the indication that policy is proactive; it should be implemented to solve challenges that arise rather than to be implemented to react to current challenges.

### **2.5.1 Indonesian Policy Framework**

The Indonesian Ministry of National Development (BAPPENAS) has implemented various international policies into the Indonesian policy framework through multiple development plans and agendas. The National Mitigation Action Plan (RAN-GRK) is one of them and aims to contribute to the global efforts to reduce emissions and to tap international funding for Indonesia. The RAN-GRK is integrated among sectors and support activities that revolve around reducing emissions and strengthen the policy framework (BAPPENAS, 2012). The main goal of the mitigation action plan is to focus on actions that are co-beneficial such as reducing GHG emissions by not compromising economic growth but enhance people's

welfare within the frame of sustainable development (Thamrin, 2011). Furthermore, protection of poor and vulnerable communities is also an important part of the mitigation action plan.

The RAN-GRK is an essential part of Indonesia's Development Plan. The plan follows up on the Indonesian commitment in dealing with climate change issues, such as the statement that Indonesia wants to reduce GHG emissions by 26% in 2020 with own efforts and to reach a reduction to a total of 41% with international support (Thamrin, 2011). Five priority sectors for mitigation activities have been advised in the RAN-GRK; Agriculture, Energy and Transport, Forestry and Peatland, Industry, and Waste Management, as well as other actions which supports the principles of poverty alleviation, economic growth and sustainable development (BAPPENAS, 2012). To realise this GHG emission reduction commitment, the RAN-GRK provide a policy framework for the central government, local governments, the private sector as well as various stakeholders to implement actions and activities related indirectly or directly to GHG emission reduction efforts from the year 2010 to 2020 (BAPPENAS, 2012). The ISPO system is a policy adopted by the Ministry of Agriculture on behalf of the Indonesian Government. The aim is to improve the competitiveness of the Indonesian Palm Oil in the global market and to reduce GHG emissions and draw attention to environmental issues. However, accomplishing the GHG reduction commitment could be regarded as ambitious since the cost of reaching these targets remains uncertain. Furthermore, within the various policies and action plans, the important roles of governments are stressed, but the provincial plans are yet to be accumulated (EIA, 2016).

## **2.6 Sustainable Development**

Concepts of the environment and development were for a long time viewed as two separate problem areas, where environmental problems were to be resolved in isolation from the politics of development and vice versa (Smukkestad, 2008). However, in the 1980s the global concern of how development was affecting the environment entered the agenda.

Environmental problems were then viewed as a consequence of which path of development countries had chosen, and it became evident that environmental and development problems in the global North are highly connected with environmental and development problems in the global South (Smukkestad, 2008). Because of this evidence, there have occurred many definitions of sustainable development over the years, but the most often used definition originates from the definition proposed by the Brundtland Commission in the report "Our



Common Future” from 1987. Here the concept is defined as “*meeting the needs of the present without compromising the ability of future generations to meet their needs*” (Smukkestad, 2008). However, the Brundtland Commission recommended continued focus on economic growth to reduce the pressure of the poor on the environment. This definition of sustainable development can be viewed as not bearing a clear solution, as the pressure on resources stems far greatly from industrialised countries in the global North, rather than from the developing and newly industrialised countries in the global South (Smukkestad, 2008). It is maybe not even a clear definition of the concept today. Because as both the global North and the global South are increasingly becoming larger consuming societies, it makes it even more difficult to not compromise the ability for future generations to meet their needs. According to McMichael (2008), the definition of sustainable development has been viewed as too broad even though it implies the importance of intergenerational equity and seeks to internalize the externalities of environmental degradation (McMichael, 2008). The goal of sustainable development is the long-term stability of the economy and the environment, which is only achievable through the acknowledgment and integration of economic, social, political, and environmental concerns in decision-making processes (SIDA, 2008). The newest addition to the sustainable development agenda, is the United Nations Sustainable Development Goals (SDGs). The 2030 Agenda for Sustainable Development aims to provide a global blueprint for people and the planet, in terms of dignity, peace and prosperity now and in the future. Thus, countries are translating the common vision into their national development plans and strategies to reach the set goals (UNDP, 2017). Another definition of sustainable development is made by the International Union for Conservation of Nature (IUCN) who states that sustainability is about the ability to live within the carrying capacity of the Earth’s ecosystems at the same time as improving the quality of human life (UN, 2018). A third definition is carried out by the environmentalist Paul Hawken due to the ways in which populations have used and destroyed natural resources faster than they can be restored. Hawken defines sustainable development as being able to stabilise the currently disruptive relationship between human culture and the living world (UN, 2018). The concept of development is in constant change, and growth in the developing countries cannot occur without changes in the development in the developed countries, where sustainable development has a central role for the future of development strategies. In later times it has become more common to claim that by raising the floor one also need to lower the ceiling in such a way that there will become a space for economic growth in developing countries at the same time as consumption and growth in developed countries slows down. Developmental work has started to focus more at

attitudes, processes and knowledge instead of the previous focus primarily on economic growth and industrialisation, foundational investments and infrastructure (Smukkestad, 2009).

## **2.7 Renewable Energy**

Renewable energy can be described as energy from a source that is not depleted when used but are repetitively replenished by nature when used such as the wind, water, plants, and the sun among others (USDOE, 2001). Natural gas, and its primary constituent, CH<sub>4</sub>, is a renewable energy resource. This suggests that energy production derived from CH<sub>4</sub> gas produced within palm oil production can become renewable energy. These renewable forms of energy can include electricity, heat, mechanical power, and chemicals (Pehnt, 2006). According to the UNDP, CH<sub>4</sub> has long been valued for its clean and efficient combustion properties. Even though CH<sub>4</sub> emits significantly lower amounts of toxic air contaminants and smog-forming pollutants that contribute to global climate change compared to petroleum or coal, the rise in palm oil production and rising material consumption in India and China entails that further CH<sub>4</sub> will be produced (UNDP, 2015). This makes it even more important that the continued release of CH<sub>4</sub> must be captured and form a renewable energy source within palm oil production facilities. Furthermore, transitioning to renewable energies supports significant progress on the Paris Agreement on climate change, as well as on the SDGs. A critical role for policies related to new renewable energy technologies has been to reduce the costs associated with making these technologies competitive with incumbent technologies (Pehnt, 2006). According to Hanson (2013), it is therefore important to understand how new technologies can improve and become more cost-effective. Much of this improvement is considered to occur through the participation and experimentation in markets. Then again, new technologies are often excluded from market participation due to the financial risks and high costs that private companies are not willing or able to bear. Thus, the creation of temporary protected spaces for immature renewable energy technologies is seen as an important goal for policy (Geels, 2005). The protected spaces can function as learning arenas where technologies can improve shielded from the mainstream market selection (Geels, 2005). However, such learning arenas are unlikely to develop for immature technologies without any state support. Accordingly, the ability to influence institutions is important for the improvement of new renewable energy technologies (Mazzucato, 2013). According to the UNDP, the renewable energy industry is evolving rapidly, and many opportunities exist to significantly scale this up and encourage a global energy transformation. These opportunities can be viewed as driven through the large power supply deficits across

the world and the eagerness for alternative solutions to fossil fuels for energy security and mitigating climate change (UNDP, 2015). Hence, with the goal of meeting national climate targets under the Paris Agreement, a marked decline in renewable energy costs in the future can enable an increasing interest from local, national and global energy companies and further create a larger environment for investments in developing countries. UNDP supports governments in developing on- and off-grid renewable energy technologies to transform their renewable energy markets and policies that catalyse investment in renewable energy technologies and achieving climate targets (UNDP, 2015).

## **2.8 Innovations**

An innovation can be viewed as the first attempt to put an idea or an invention of a product or a process into practice that catches value. Innovations usually occurs within a company or organisations. To enable an idea and into an innovation, there is a need to combine different types of knowledge, skills, abilities, and resources (Fagerberg, 2005). Innovations are continuous processes, where improvements for a product or process occurs all the time. In this way, one innovation can be viewed as the result of a long-term process involving many intertwined innovations (Fagerberg, 2005). Thus, an innovation is to develop something new, put it to use and make it have a purpose and value as a product, process, or service (Kline and Rosenberg, 1986). OECD define environmental innovation as production, assimilation or taking advantage of new products, production processes, services or business methods which hold the goal to protect and reduce environmental risks, pollution, and other negative effects of exploited resources (OECD, 2015). In this case, innovation can be viewed in the way combustion and capturing facilities have been created to capture CH<sub>4</sub> from POME to reduce GHG emissions as well as having the ability to create energy.

According to Nidumolu et.al (2009), innovation is being controlled by different forces that operates with each other. On the one hand there are market forces such as changes in income, relative costs and underlying demographics which are combined to produce continuous changes in commercial possibilities for a specific category of innovation (Nidumolu et.al, 2009). The other force is the progress in research and technology which provides opportunities to create new products for a lower cost. Companies that focus on making sustainability a goal will become competitive on a global scale in the future, as well as decreasing costs and increasing income (Nidumolu et.al, 2009). Management and skills are crucial for the development of a sustainable economy. The current economic system has

placed an enormous pressure on the planet while at the same time only covering the needs of one fourth of the people living here. Thus, companies are in need to develop more innovative solutions, which will only happen when world leaders acknowledge that sustainability equals innovation (Nidumolu et.al, 2009).

## **2.9 Political Ecology**

Political ecology can be viewed appropriate in this study. Even though the term is variedly understood, the definition by Øyhus (2011) is appropriate in how he states that political ecology is the study of how economic, political and social factors affect environmental issues. Political ecology analyses the influence states, societies, businesses, international economic structures, and geo-political power relations have on environmental problems, and further how these institutions and organisations may influence environmental policy at various levels (Øyhus, 2011). Deforestation and land clearance have in many cases been reflected in the material interests of powerful actors working either directly or through the apparatus of the state and is only analysed within the political frame such as agricultural growth, infrastructure and level of democracy (Adams, 2009). Today there is a larger focus on the realisation that there is a close connection between the development in developing and developed countries. All countries in the world today are in some ways connected to the world economy, either voluntarily or not (Amoore, 2005). A lot of what happens in the world economy are decided by rich and developed countries, which stand for around 80% of the worlds production, manages around 70% of the international trade, and deploys approximately 70-90% of all foreign direct investments, which has led to developed countries being able to construct and form the rules for the international economy (Chang, 2007).

## **CHAPTER 3**

### **METHODOLOGY**

In this chapter I have presented, described, and justified the methods used for collecting and analysing data for this thesis. The limitations and challenges encountered as well as ethical considerations of the study are also covered. The chapter is divided into three main parts. The first explains what research methodology, qualitative research methods and case study design entails. The second elaborates and justifies the course of the fieldwork in terms of choices and reflections made during the process, while the third sheds light on ethical reflections and considerations before, during and after the fieldwork. The chapter is summarised with reflections regarding the quality of the gathered data.

#### **3.1 Research Methodology**

Research methodology can be viewed as the systematic way to solve a research problem. Research methodology is thus the design of what a researcher will organise to solve a problem, and thus work towards gaining new knowledge (Rajasekar et al., 2006). According to Yin (2009) both quantitative and qualitative methods can be fruitful for case studies. However, this thesis used qualitative methods.

##### **3.1.1 Qualitative Research Methods**

According to Thagaard (2013), qualitative research methodology provides the foundation for an understanding of social phenomena based on comprehensive data on people and situations studied. It is characterized by focusing on process and meaning, analysis of text, proximity to the informants and a minor selection. Bryman (2012) states that qualitative research is emphatic in the ways in which individuals interpret their social world. Given the problem statement and research question for this study, it seemed beneficial to choose a qualitative approach using a case study design with interviews, partial observation and secondary data to gather information. According to Dalen (2013), an overall goal of qualitative research is to develop an understanding of a phenomena that is associated with the social reality of individuals, to gain a deeper insight into how people relate to different parts of their living situation. Interviews are probably the most used method of qualitative social research as it seeks to establish a relationship that enables information to be gathered through interaction between the interviewer and informants (Jacobsen, 2003). Research design can be understood

as the framework in which data is collected and analysed. The data collection methods are dependent on what information the researcher is looking for as well as what research design is chosen. Some of the downsides of qualitative research can be viewed through the fact that the scope is rather limited, and thus the findings are not always widely generalisable (Bryman, 2012).

### 3.1.2 Case Study Design

A case study design was used in this study. The design entails a detailed and intensive analysis of a single case and is concerned with the complexity and nature of the case in question. Cases are studied in their real-life context, where the understanding of how the case is influenced by, and influences its context is often of central interest to the researcher (Bryman, 2012). One of the aims was to study various peoples' attitudes and perceptions on the topic, which made it highly beneficial to use this type of method. This method enables an in-depth connection with the people involved in this field. Choosing a case study enabled a greater opportunity to learn more about how the environmental and socio-economic impacts of the palm oil industry has affected the people in Riau Province. Case studies also offer the benefit of studying phenomena in detail and within a context, particularly in situations where there are many more variables of interest than there are observations (George and Bennet, 2005).

However, case studies also have limitations and concerns. Limitations through a selection bias can affect the findings of the research and occur by the exclusion of cases that contradict favoured theory (George and Bennet, 2005). A further concern is that since experimental or statistical controls can be used in case study research, internal validity can be difficult to establish. Internal validity refers to causality and to whether the conclusion of the research (or theory developed) is a true reflection of the cases in question (George and Bennet 2005). In the case of this study, this translates to if my conclusion can show a true reflection of the drivers and barriers for a sustainable palm oil industry in Indonesia. Furthermore, a practical challenge of a case study design is that it can be demanding to carry out. One reason for this can be viewed through the need for in-depth access to case areas to help answer the research questions. Another challenge is the strains it places on the researcher in terms of dealing with the complexity within field research if several data collection methods are used (George and Bennet, 2005).

### **3.2 The Fieldwork: Choices and Reflections During the Process**

Due to a change of research topic after arriving in Indonesia, I was left with a rather limited time preparing for the fieldwork and the interviews. The fieldwork for the study was conducted in and around Pekanbaru in Riau province, Sumatra as well as in the capital city Jakarta, Java in Indonesia between March and April 2017 over a time span of 3 weeks. Riau province was chosen because it has the largest expansion of palm oil plantations and palm oil mill facilities in Indonesia, making it ideal for a study of drivers and barriers for a sustainable palm oil industry, as well as attitudes and perceptions of smallholders and people working within the industry. According to Thagaard (2013), it is important to be prepared to seek new arenas for recruitment for a research if it becomes a challenge to obtain interviews in the intended and originally planned arenas and environments. This happened in the beginning of my research as I changed my research topic during my stay in Indonesia. This has led to some of the interviews made for the study not being included in the empirical findings for the thesis. However, these interviews have given me knowledge on other topics regarding Indonesia. Considering this, it became clear that I had to expand my search for new informants to gain a broader and extensive empirical basis for the research I ended up with. Thus, through the answers received from interviews with smallholders, I understood that it was important to also include government officials, NGOs, as well as professionals working within the field of palm oil production, and sustainable development to help form a bigger picture of the current situation regarding my topic.

#### **3.2.1 Sources of Data Collection**

When choosing and developing primary research, one must consider the most appropriate method, to include its reliability and validity. The reliability and validity of the information for the study demands that both primary and secondary sources of data are used (Bryman, 2012). Qualitative research data collection methods are time consuming, and the data is therefore usually collected from a smaller sample than would be the case for quantitative approaches. The benefits of the qualitative approach are that the information is richer and has a deeper insight into the phenomenon under study (Kvale and Brinkmann, 2009). In terms of reliability, this can be viewed through the connection of different research on the subject and look for similarities within the information from this fieldwork. Even though peoples' attitudes and perceptions may vary from place to place, there can be similar barriers and drivers within the field of sustainable development. However, due to only focusing on some areas in Indonesia, how reliable the gathered data is will be up to each reader to judge and

decide. This also goes for the validity of the data in terms of it is mostly only telling the social truths of my informants. But as the information gathered has proved many similar aspects, it may be viewed as more valid. In terms of external validity, the study can be viewed in a somewhat generalised matter. This is due to the ways in which the drivers and barriers are similar for the various palm oil mills in terms of CH<sub>4</sub> gas capture from POME. This can be viewed from the previous existing literature and with this study. However, a major generalisation cannot be done as there are extremely many smallholders, palm oil plantations and palm oil companies across Indonesia, and this study only focused on communities in Riau province. Traceability and transparency throughout the research process allow the analysis and the conclusions made regarding (if) the connections between the empirical findings and theories can be transferred to other cases or processes being studied (Bryman, 2012). Some of the concern of having only a few voices speak for an entire subject is the same concern with biased informants and sample size. A part of this is tied to the fact that while general patterns can be identified, the individuality of the informants is still an important factor in the data collection (Kvale and Brinkmann, 2009).

### 3.2.2 Primary data

Primary data was collected using both observation and semi-structured interviews. According to Bryman (2012), the most common methods of data collection in a case study design are participant observation and interviews. This is because these methods create an intensive and detailed examination of a case. Observation entails observing the behaviour of individuals in terms of a schedule of categories (Bryman, 2012). According to Hartley (2004), with direct observation, a researcher studies people as they go about their daily lives without participating or interfering. This type of research is often unknown to those under study and must in this way be conducted in public settings where people do not have a reasonable expectation of privacy (Hartley, 2004). During the fieldwork, I participated and observed how local smallholders gathered the fresh fruit bunches from the palm oil trees (*Sawit*) and filled up dam trucks which were collected and driven to a palm oil factory for delivery and weighing at the palm oil mill. I was also able to observe how the local smallholders and palm oil company workers and middlemen cooperated and interacted throughout the delivery and payment process. Here I did not understand what was said because conversations were in a local language used in Sumatra, but the interaction seemed professional, yet informal and positive. It was interesting to be able to directly observe the nature of transaction and behaviours between smallholders and palm oil company workers. Later during the fieldwork, it was



beneficial to have an interpreter who spoke the local language on Sumatra and the areas I visited in Riau. The information obtained through observations complemented the information from the semi-structured interviews.

### 3.2.3 Interviews, Informants, and Access to the Field

The interviews used for this study were semi-structured interviews. Semi-structured interviews are usually guided through an *interview guide* that covers fairly the topics that the researcher wishes to cover. Further, they are mostly flexible which gives the interviewee a good opportunity for conversing with their answers instead of yes and no answers (Bryman, 2012). In this way, there is also an opportunity for the interviewer to pick up and ask further on what is being said by the interviewees that might be relevant to the study. I wanted to focus on interviewing smallholders from the local communities in Pekanbaru and surrounding areas in Riau province, workers at oil palm plantations and palm oil companies, government officials, as well as selected NGOs and representatives from private-public partnerships (PPPs) working with innovative solutions within the field of sustainable development. Further, I wanted to look at what strategies are in use and performed by palm oil companies, as well as how communities, governments and NGOs are working towards sustainable development efforts. This starting point made it possible to create a list of the different actors involved in the various areas within the field. In this way, the choice of informants can be viewed as a somewhat strategic selection, where the informants were selected based on the research questions at hand and their relevance in terms of their ability to provide information about the case.

The process of interviewing is likely to elicit a detailed and natural flow of information (Bryman, 2012). I planned some questions in advance but as I began interviewing, new questions arose during the meetings and became more like a conversation of exchanging information. The one-to-one interviews made it possible to correct misunderstandings during the interviews and created a possibility to use a translator and recording equipment. The interviews were undertaken primarily through planned and scheduled one-to-one interviews, and in terms of access to the field; through the assistance of so-called *gatekeepers* as well as *snowball sampling*. *Gatekeepers* refer to people that can provide access to an environment and to potential and relevant informants for a research (Hammersley & Atkinson, 2007). Regarding gatekeepers, I randomly got in contact with a local family outside a market in Pekanbaru, Riau. As there were few (or no) other foreign young women walking around by

themselves, they came up to me and was interested in knowing what I was doing there. As we came to talk, I explained the reason for why I was there, and it turned out that the mother in the family was a teacher but had inherited hectares of land with oil palm trees from her father. Her husband was an independent smallholder as well as a teacher in agricultural science at the (local) university. They were extremely friendly and willing to help me, and the woman Sri Yati, offered to be my interpreter for my upcoming interviews. Sri Yati and her husband had a friend working at the palm oil company Musim Mas in Kalimantan whom they called and asked the questions I had and translated them from English to Indonesian. Furthermore, they became my host family as they invited me to live at their house. They introduced me to local smallholders in the community as well as drove me to plantations and to a palm oil mill factory, which I would not have been able to if it were not for their help and assistance. Here they translated my questions to one of the managers at the palm oil facility.

The *snowball sampling* can be described as one is able to be introduced to new informants through an already existing informant. The term snowball sampling refers to a similar access as gatekeepers, only here the interviewee can provide information about other relevant informants within the field which the researcher can get in touch with (Atkinson and Flint, 2001). One example of the snowball sampling in the fieldwork was during my first meeting and interview with Fitriani Ardiansyah from The Sustainable Trade Initiative (IDH) in Jakarta. After the interview, he provided me with contact details of his colleagues who he thought might be helpful for my research. These informants further guided me to other contacts they knew within the field of the palm oil industry as well as NGOs and PPPs working with sustainable development.

Another example was when I attended interviews with informants I had obtained on my own, I was also further introduced and guided to people through my existing contacts, whom they considered to be relevant for the thesis. However, the snowball sampling might also bring limitations to a study. This is because the informant who provides the researcher with new informants, might have the same values, (world) views and interests as themselves and might thus create a (selection) bias in terms of affecting the data, as opposed to choosing informants more randomly. Because elements are not randomly drawn but are dependent on the subjective choices of the respondents first accessed, most snowball samples are biased and do not therefore allow researchers to make claims to generality from a specific sample (Atkinson and Flint, 2001). Even though this was not the case for all the interviews and informants, this

may nevertheless have limited the validity of the received information and thus affected my overall gathered data for the analysis in this thesis. Furthermore, snowball sampling can be biased towards the inclusion of individuals who knows each other and might therefore over-emphasise cohesiveness in social networks and will lack individuals who are not connected to any network that the researcher has considered in the fieldwork (Atkinson and Flint, 2001).

In some cases, the one-to-one interviews also involved my interpreter as the informant did not speak English. The numbers of how many I could interview became fewer than expected due to difficulties with getting in contact with informants. I had many appointments scheduled and agreed, but situations arose, and many were not able to meet me at the agreed time after all. Some of the informants rescheduled, but they were only available after I returned to Norway. This has indeed affected my overall intended collection of data and information for the thesis. I went from having 41 scheduled interviews to around 27. I still managed to receive more extensive information and data through interviews over email and Skype when I was back in Norway. However, a challenge here was the bad connection via Skype, and sometimes the long wait for email replies could amount to weeks and months. One can argue that this might also have affected the overall gathered data in terms of reliability, validity, and transferability of the findings.

#### 3.2.4 Secondary Data

Secondary data was retrieved from various literature published in reports, journals and books, newspapers, and articles to compliment the primary data. Secondary data holds information of already analysed phenomena, which can provide the researcher with existing knowledge on the subject as well as becoming vital in supporting new research and findings (Currie, 2005). Furthermore, the secondary data helped form much of the literature review and theoretical framework for this thesis. It provided a general background information of environmental and socio-economic impacts from the palm oil industry in Indonesia, as well as policies and innovative solutions within the field of GHG emission reduction and renewable energy.

#### 3.2.5 The Interview Situation and Limitations

To achieve a qualitative study, the thesis includes interviews of 27 people in total, 11 smallholders, 4 palm oil mill facility workers, 4 palm oil company employees, 1 representative from RSPO, 1 person involved in the provincial government as well as 6

people from NGOs. The interviews were conducted in offices, informal settings such as cafés at shopping malls and at palm oil mill facility offices. The interviews conducted in offices felt to some degree quite formal as being in a meeting, and the people being interviewed seemed to take more control in the dialogue than in the interviews with people at cafés or in the streets, which were more like informal conversations and had a more relaxed atmosphere. However, some of them would rather tell stories about their lives and wanted to hear stories about how life was in Norway. Even though it sometimes provided less information for the research, it was rewarding in terms of getting to know the people better and made the stay in Indonesia an even more enjoyable time. During the interview at one of the oil palm mill, it was difficult to get extensive and solid information because the head manager was not available and the assistant manager was cautious in answering my questions, because he said he did not know that much about the topic and what information I was seeking, as well as being afraid to answer “wrong” as they thought it might affect the company in a negative way. Most palm oil companies are used to people from other countries questioning the palm oil industry, and the manager was being a bit careful with his words. Even though the purpose of the research were explained, there were some miscommunication throughout the interview which made him reluctant to fully answer the questions.

Throughout the fieldwork in Indonesia, I attempted to transcribe as many interviews as possible, both from the one-to-one interviews written in notebooks as well as the interviews where a recording equipment was used. Transcribing the interviews along the way, made it easier to create a potential structure for the thesis, as well as removing irrelevant information for the writing process in Norway. When using recording equipment, I always asked in advance and did not record the interviews which were in local languages or Bahasa Indonesian, because I would not be able to use them as I came back to Norway. However, I regret that to some extent, since I felt some information was lost in translation. If I had recorded it, my interpreter who I am still in contact with, could have translated the whole interview in the aftermath of the interview.

The most challenging aspect of the fieldwork was interviewing people who worked at the oil palm mills. This was because many were reluctant to answer my questions due to not fully understand my intentions. Since I did not have any permission letter from the government or a university, the respondents were hesitant to answer my questions. Some were reluctant because they thought the research was connected to NGOs working against deforestation and

palm oil. Thus, they rather chose to say nothing than to risk giving incorrect information that could perhaps backfire on them and damage the reputation of the palm oil companies.

Another challenge was to get in touch with government officials to be willing to be interviewed for my research. Some replied over email explaining they could meet me, but later I got an email saying they were not able after all.

### 3.2.6 Power Relations in the Interview Situation

In the interview situation I saw it as important to blend in as much as possible, and I did not pose as if I was any expert on the various subjects. I rather tried to create a more relaxed and casual connection with the people I met and interviewed where I could learn as much as possible by still having a somewhat authoritative attitude. However, being a young woman travelling alone in Indonesia, I got myself in various situations that made my fieldwork occasionally complicated. Trying to explain my purpose and what I was studying was not relatable to everyone I met. Especially some older men, mostly in prominent positions, did not take me that serious, and made unnecessary comments they saw amusing, but made me feel slightly uncomfortable. By using an interpreter to ask my questions sometimes made the interviews seem more as the interpreter was the researcher, and I felt that not all information they shared came back to me. In some of the interviews it felt as if they were having a conversation and I was merely an observer or was viewed as a friend of the interpreter and not in charge of the interview situation. This might also have limited the information I gathered from the interviews and affected the overall collection of data.

### 3.3 Ethical Reflections and Considerations

As a fieldworker, I was a guest in someone else's country and community, and I tried my best to be attentive to the etiquette that governed the interactions. I came to learn certain local customs, in terms of considering who I approached and how I approached them. But throughout my stay I saw, as in most countries, you come a long way with a smile and a polite attitude.

Ethical considerations and conformation of anonymity is important while doing a fieldwork. According to Bryman (2012) it is important to make sure the people being interviewed know their rights and do not feel uncomfortable during the process (Bryman, 2012). Before, and after all interviews, I made sure that the informants had understood their rights and that I

could delete any answers or information if they did not want me to use it for the thesis after all. According to Kvale and Brinkmann (2009), another aspect to consider when doing a fieldwork is that we are not only asking people to take of their time to assist us, we are also asking them to trust us (Kvale and Brinkmann, 2009). In this way, each relationship built with the informants was different, but they can all be viewed as implicitly reciprocal. Identifying what my intentions were to my informants was perhaps the most crucial step I tried to take to ensure that I acted ethical towards the people I met. This was relevant when interviewing people regarding opinions on the environmental issues of the palm oil industry, and how they perceive how palm oil company owners and governments are tackling these issues. Many might feel uncomfortable talking about authorities and government officials and institutions.

When interviewing local participants, I started from the stance of believing what they told me was true, but I also kept in mind that they all have a natural reason to be biased about various issues being discussed. Hence, looking at the gathered information I saw it as important for me to look at it and analyse it in the most objective way possible. I have tried to keep in mind any underlying assumptions that my informants brought to the table. People in various positions tend to be biased about certain issues due to how these issues affect them personally from where they stand. In this case; smallholders, NGOs, government officials, palm oil company workers and owners all have different perspectives in terms of their opinions towards palm oil as well as their thoughts on issues regarding the environment and sustainable development.

During the interviews, I was unsure how to deal with compensation for my informants. It never seemed as if anyone wanted anything in return as everyone was willing to participate in the interviews. However, when the interviews were carried out at cafes, I offered to pay the bill when the interview was finished. Some of the informants accepted this, and others were very eager to pay for themselves and sometimes even for me. I gained a closer bond with some of my informants during the fieldwork, and as they became my friends, I still have contact with them today.

### 3.3.1 Informed Consent, Confidentiality, and Anonymity

Prior to the interviews, the topic was explained to the informants before seeking their consent to participate. It was clarified that participation was completely voluntary and that the participants could stop the interview at any point. I guaranteed anonymity for the informants,

and that I would delete all information after the thesis was handed in. As Bryman (2012) argues, it is important to guarantee anonymity for the informants who participate in interviews, as well as in conversations during and after observations and participatory observations (Bryman, 2012). Before conducting the interviews, I was concerned that some people would be reluctant or careful with talking openly about the impacts and effects from the palm oil industry due to fear of possible consequences. However, most people were very open and talked freely, but were very clear that their name were not to be mentioned in any way since participating in the palm oil industry contributed to their livelihood. Hence, before and during all the interviews I clearly underlined that all information I received would not be traced back to them, unless they wanted to be cited or quoted with their names.

### **3.4 The Quality of the Gathered Data**

The purpose of this chapter has been to shed light on and justify the choices made for the research process and methods in terms of theme and area as well as the tools chosen for the study. In this way, the attempt is to allow the readers themselves to decide on the quality of the data and the findings of the study. Furthermore, the purpose of this chapter has been to provide a basis for assessing the need for various considerations during the fieldwork and how challenges and limitations faced during the fieldwork might have impacted and affected the overall gathered data. Hence, the collected data is the product of the knowledge produced within the interaction between me and my informants as well as combining this with the gathered secondary data to both support and be critical of the findings which will be discussed in the analysis. Even though the data obtained using qualitative methods do not provide a basis for statistic generalisations, it may nevertheless provide a basis for transferability to existing and further research on the topic.

## **CHAPTER 4**

### **PRESENTATION OF FINDINGS**

#### **4.1 Introduction**

This chapter will entail the findings from my fieldwork based on the information gathered from twenty-seven respondents through observation and semi-structured interviews. The purpose of using observation and semi-structured interviews was to try and understand how the various respondents experience the drivers and barriers towards a sustainable palm oil industry. The various respondents entail smallholders, palm oil company workers, palm oil mill workers, representatives from NGOs as well as a representative from the provincial government in Riau Province. At the end of the chapter, I will present what some of the various respondents think can be done differently in Riau Province to make the palm oil industry more sustainable.

The most common types of smallholders are schemed or assisted smallholders and independent smallholders. Schemed or assisted smallholders are tied to either a palm oil mill or palm oil company through binding contracts in terms of selling their FFBs to them. Independent smallholders are not tied to any mills or companies through contracts. In Riau Province there are more independent smallholders than any other group of smallholders. Hence, during the fieldwork most of the smallholders I met and interviewed are independent smallholders.

Palm oil accounts for most of the income for all the smallholders, and at the same time they are some of the poorest smallholders in the world. The money they earn from growing palm oil is crucial to feed and care for their families. Furthermore, many people rely on the use of palm oil in cooking and everyday usage, since it is much cheaper than any other oil such as olive oil and rapeseed oil among others.

#### **4.2 Socio-Economic Impacts of the Palm Oil Industry**

The importance of palm oil became extremely evident during the stay in Indonesia, and in Riau province especially since most of the fieldwork played out there. The versatility of the palm oil is seen in its ability to form such a wide range of products, which is why the demand is continuing to grow across the world, and especially in Asian countries due to the fast and



large consuming societies they are becoming. This increase in palm oil demand comes in addition to the already large group of people relying on palm oil as an available and cheap cooking oil and is thus crucial when it comes to feeding the growing number of people on the planet.

#### 4.2.1 Smallholders

Independent smallholders have a choice of which company or mill they want to sell their FFBs to, as well as managing their land areas since ISPO certification is voluntary for smallholders. However, all smallholders are in some way partners with a limited number of company mills which can be about one to three different companies, that they sell their palm fruit to. Furthermore, all smallholders need to sell their fruit within a time frame due to withholding the freshness after harvesting the fruit. Independent smallholders cultivate palm oil without outside help in contrast to the schemed smallholders who have supply agreements and contracts with palm oil mills and companies. They receive seeds, fertilisers and technical assistance through their partnership scheme. In this way, schemed smallholders are more likely to be able to meet RSPO sustainability standards and become certified than independent smallholders. Some of the independent smallholders I met had not even heard about RSPO or ISPO certifications, and when it came to farming practices they got advice from neighbours or followed what they have learned from their parents;

We use the same farming practices that our parents have always done, and we and our neighbours help each other if we need fertilisers or seeds. If we get bad harvests, we can get advice from neighbours to see what we can do better next time (Independent smallholder 1, 30.03, 2017).

#### 4.2.2 Challenges faced by smallholders

Smallholders in Indonesia face various types of challenges in the aim of pursuing a livelihood that is economically beneficial and productive for them as well as the aim of following international agendas and standards to become more sustainable. Looking at a poverty alleviation perspective, various stakeholders argue for the support of smallholders in terms of improvement in productivity. Almost all the smallholders I met will have to replant their land areas by 2035 if not earlier due to the lifespan of oil palm trees at around 25 years;

Many leave their land to start a new plantation when they must replant their land. It is easier to burn or make way for new areas than to replant their existing land. This is because the process

is time consuming as well as we must buy new seeds and fertilisers, and it is very expensive (Smallholder 2, 07.04.2017).

NGO representatives stated often that this is some of the main issues for the sustainability of the palm oil production. If smallholders grow on declining plantations, replant with low quality and cheap seedlings, it will damage the smallholders themselves in the long run, because the yields and harvest will not be of good quality to sell. The palm oil industry has created jobs for many people in Indonesia, and around 45 % are smallholders. By one or more in the household working as smallholders and owning their own hectares of land, it enables their economy to increase and their children can go to school. In Pekanbaru I met a family where both parents had each some hectares where they grew palm oil. The husband is an independent smallholder, and his wife is a teacher but has inherited some hectares of land from her parents which she and her husband takes care of and sell to various palm oil companies and mills;

Twice a month we travel to Pekanbaru to harvest and sell our FFBs. It is a long 6-hour drive from our home, but it does not matter since the extra income is good for my family. This is why I do not want to sell the land or cultivate something else. I also want to keep the land within the family, so my daughter can benefit from it when she gets older (Independent smallholder 3, 11.4.2017).

They do not supply to the same company for every harvest, but always checks what the companies offer before they sell the FFBs. Hence, by not having contracts with one specific palm oil company, they have the power to choose their buyers and thereby gain the highest profit possible. However, for the processing of their FFBs, smallholders depend on the willingness of local traders or mills to buy their harvest. Some of the independent smallholders said that by not having a contract it can become stressful with payments and predictability;

The prices on the FFBs vary every month, sometimes the payment is okay but other times the payment is low. The palm oil companies tries to push the prices down as much as possible, and they know we must sell to them because we only have hectares of land and not own our own (palm oil) mills and we are not permitted to transport our own fruit to the mills” (Independent smallholder 4, 08.04.2017).

Since the independent smallholders are not tied to specific mills, the sale of their FFBs is organized by cooperatives or middlemen, who then further choose which mill they want to sell to. As told by the smallholders I met, the income for palm oil cultivation was around 9

million Indonesian Rupiah (IDR) (767,69 US Dollar (USD)) per month. This is around double the income than independent smallholders who are not RSPO certified, and much more than the minimum wage in the province which is around 1,3 million IDR (110,89 USD) per month (if other income sources are not considered). In some ways this makes the independent smallholders dependent in the sense that it is both a buyers and a sellers' market in the palm oil industry as well as the dependence on transporters of the large amount of FFBs. Another reason smallholders do not bring their fruit to the mills is because the companies want to make sure the fruit is fresh, so they send out their own workers or middlemen to collect the FFBs in the villages right after harvest. Additionally, not many smallholders own dam trucks for transporting the FFBs In Figure 4.1, an independent smallholder is talking with the FFB collector after they have agreed on a price and loaded the dam truck with the harvest.



**Figure 7:** FFBs being collected in dam trucks. (Source: Author, 2017).

4.2.3 The role of palm oil for the livelihoods of smallholders

The average size of a plantation for smallholders span from 2 to 20 hectares. Based on numbers from smallholders who have been interviewed, the net income per month from oil

palm cultivation has ranged from 1,5 million and 2,0 million IDR which is approximately 127,93 USD and 170 USD respectively. Many of the smallholders and local people I was in contact with, told me that some independent smallholders they knew also grows other food crops than palm oil. Even though there is a higher demand for palm oil, these smallholders still cultivate crops for their own consumption, as well as some areas they have rubber to sell in addition to palm oil. The smallholders stated that they do this to secure their income and livelihood.

Palm oil companies keep the CPO from the FFBs in containers for sale to other companies for the further production process, some have tied contracts with production companies and some sell to the highest bidder. These companies are production companies such as Nestlé and Unilever among others. One smallholder explained;

Plantation owners sell 1 kg palm fruit for 1500 IDR (0,13 USD) to retailers. We receive 130 IDR (0,01 USD) for 1 kg palm fruit harvested. Even though we usually collect 1-1,5 tonnes of palm fruit each time we harvest, the payment is still much lower than what smallholders who are tied to mills or companies get (Smallholder 7, 09.04.2017).

An independent smallholder stated that;

I feel I have more freedom as an independent smallholder since I can choose which company or mill I want to sell to. Especially when I can sell to the highest bidder. One week I might sell my harvest to Musim Mas and the next harvest might be sold to Asian Agri. This provides me with security because I always have companies to sell to (Independent smallholder 6, 10.04.2017).

By not being limited to one buyer, the smallholders state they have more freedom and more control over their own situation in terms of their livelihood. Furthermore, large palm oil companies have their own plantations and multiple smallholders to buy palm fruit from. Palm oil company middlemen drives to collect the FFB in dam trucks as shown in Figure 8 below. When the dam trucks are filled in the villages, they drive to the plantation mills and drive it onto a loading ramp where they weigh the FFBs and empty the fruit in a boiler.



**Figure 8:** Collected FFBs. (Source: Author, 2017).

Most of the smallholders also rely on income from other sources, such as formal employment. The family I met during the fieldwork, where the husband was an independent smallholder and the wife had formal employment as a teacher (in addition to helping with palm oil harvesting), had then a total net income per month around 3,8 million IDR (324,09 USD). Hence, the family had the income above the minimum wage in rural Riau province which (I was told) is around 1,8 million IDR (153,52 USD), and thus a desirable accessible source of income. When discussing the size of hectares (1 hectare equals 10 000 m<sup>2</sup>) the smallholders own, one of the smallholders stated that;

Many of the smallholders like me have palm oil plantations from 2 to 15 hectares. Some smallholders have expanded their land by burning forest for new areas. The high cost of land expansion make them burn the fields illegally. A regular oil palm plantation has a cost between 50 and 150 million IDR (4,264,39 and 12,793,18 USD) per hectare, which is a much higher cost than most smallholders can borrow or pay (Smallholder 3, 09.04.2017).

Not all the money from palm oil cultivation is being outsourced. Of course, a large part is going to big companies who sell their products to all parts over the world, but still a large amount stays within Indonesia. For the independent smallholders the money is used for reinvestments in their plantations, education fees and equipment for their children as well as for consumption activities;

With the earnings, we of course use for food and necessities, but by saving up or with an extra good month of FFB prices, we can buy new equipment, motorbikes, TV, and essential things such as pay for our kids' education and learning materials (Independent smallholder 10, 03.04.2017).

Smallholders sometimes take up informal loans for seeds and fertilisers from the middlemen who buys FFBs from smallholder to company mills, which they pay back in FFB. Most smallholders buy their fertilisers and seeds from local shops or at local markets since it is much cheaper and easily accessible. Most smallholders did not consider this to be a problem, rather that the government or the palm oil companies should provide affordable and quality seeds and fertilisers for them, since they are the main buyers of the palm oil.

In terms of infrastructure development, some of the smallholders stated that both palm oil companies and that they themselves were responsible for the development and maintenance of most of the public roads to plantations in Riau province;

The government has not been involved in creating roads to the plantations, but road networks established by corporate palm oil and petroleum/gas companies have contributed largely to the infrastructure around this area (Smallholder, 4, 08.04.2017).

Most of the roads from plantations to the mills are mud roads which can make the transportation of harvests difficult with the shifting weather conditions such as heavy rains as shown in Figure 9.



**Figure 9:** Slippery mud roads due to heavy rains. (Source: Author, 2017).

#### 4.2.4 NGOs and Public Private Partnerships (PPPs)

After arriving in Jakarta before travelling to Sumatra, I got in touch with Fitriani Ardiansyah,

who is the chairman at the Executive Board of the Sustainable Trade Initiative (IDH). IDH works with enabling a cooperation to solve the issues with the palm oil industry through public private partnerships. Fitriani made time to meet me at the IDH headquarters in Jakarta City to discuss the sustainability aspects of the palm oil industry and explained how the organisation works and what their aims and goals are;

Firstly, the palm oil industry is blamed for many things, ranging from climate change, human rights abuse, loss of biodiversity, forest fires with toxic haze every year and of course deforestation. And all of this is true, but we must not forget about all the people depending on the palm oil industry for a living. It becomes a bit contradictory because the reason the palm oil industry is expanding is because of the increasing demand from all over the world (Fitriani, 29.03.2017).

However, due to campaigning, protests, lawsuits among other both from environmental groups, consumers and buyers, large palm oil companies are willing to change their business as usual mentality. Fitriani further said that;

Surely, companies want to keep their businesses running, since supply and demand runs the show. Some of the biggest oil palm growers have pledged to stop destroying forests for plantations and also encourages smallholders and third-party suppliers to stop as well (Fitriani, 29.03.2017).

In terms of this becoming a reality, Fitriani stated that the ability to control and monitor these statements by big companies and smallholders is very important, especially when they have signed contracts or agreements as well as joined the IDH. We further discussed various barriers towards sustainability such as finance, corruption and participation by stakeholders across various levels. In the year 2015 to 2016 the IDH realised that especially for palm oil commodities in Indonesia, interventions needed to focus on a so-called sourcing area or a change in the supply chain. The IDH introduced the sustainability approach which entails that there is a need to do the same farming practices everywhere, not only in one place as the benefits of good practices will be limited or worse due to negative effects from “bad” practices. Good practices and management must be done at all areas of farming. IDH focus strongly on collaboration between various stakeholders across the supply chain;

We have been able to show the effect of collaboration through sourcing area to various governors in Indonesia in terms of the need and importance of investments needing to be part of a bigger picture. Protection, trade and investment are keywords here (Fitriani, 29.03.2017).

There is an alternative to business as usual, which Fitriani called a sub-landscape development. Sub-landscape development entails a focus on all areas in the forest such as smallholders, palm concessions, peat areas, timber among others;

If we can through IDH get the overall people to sign the agreement to work together towards mutual development goals and to focus on all areas, no deforestation and 100% sustainable, it would create positive changes to the issue of deforestation and sustainable palm oil. We need to have the top investments also as on the ground investments, and this can happen through cooperation of PPPs where companies and organisations work together (Fitriani, 29.03.2017).

Fitriani further explained that the different palm oil concessions work together with different organisations, and that was fine as long as the agreements on the various levels are working towards the same goals. Hence, there is a need for a common idea or plan to be the trajectory. To enable this, IDH facilitates agreements and arrange meetings between the actors involved. He explained;

In January at the World Economic Forum in Davos, Switzerland there was created a Private Public Investment (PPI) fund where Norway and IDH are involved among others. This fund is used to finance smallholders' production such as replanting. In return for financial support, smallholders need to show that they are protecting the environment through farming methods (Fitriani, 29.03.2017).

The IDH does this to continue production, increase protection and improve welfare of smallholders and the inclusion of all actors involved. In terms of the willingness of the palm oil companies to be a part of the IDH and get them onboard with sustainability efforts, he stated;

It has a combination of different factors. Of course, there are challenges, but for example in West Kalimantan the governor is onboard, and it is thus easier to get things done and the companies cannot say no. Also, the notion of moratorium which stops the expansions of areas for palm and many other crops. The companies are now also trying to find solutions themselves (Fitriani, 29.03.2017).

Fitriani further stated that in terms of solutions, the companies must find them quickly but together because if they only protect some areas, such as areas inside or surrounding palm company plantation areas, it will fail;

Some smallholders and local communities think if you do not build these areas for palm, this will be wasteland, so the communities will then put pressure on companies to give the areas to the community for planting oil palm trees (Fitriani, 29.04.2017).



Through the RSPO certification, smallholders and companies need to perform better in terms of sustainability to be able to sell their products. Thus, according to Fitriani, companies do not buy supply from smallholders if they cannot verify that their supply is 100% sustainable and RSPO certified;

Companies are now willing to work together to find solutions because they are facing pressure from the government, from the moratorium, from the market and pressure from communities. It is not easy for companies alone to find solutions. Previously it was not possible to get companies onboard, but now they have limited choices due to the pressure from various actors (Fitriani, 29.03.2017).

In some areas only one company might be 100% sustainable, with surrounding smallholders who are not, so then smallholders are pressured to also be 100% sustainable if they want to sell to companies. However, many smallholders and local communities who do business as usual and who are not interested in becoming 100% sustainable, might sell their supply to independent suppliers in China and India. Even though the RSPO and ISPO are working to make the palm oil industry sustainable through certifications, it does not always seem that simple in practice. It is often difficult to have control over all smallholders and palm oil companies in terms of following the rules of the RSPO and ISPO certifications. This is because palm oil companies buy FFBs from various independent smallholders in addition to the harvests from their own plantations. Many of the smallholders in Riau did not have any certification that their palm oil was sustainably grown in terms of the use of pesticides and herbicides even though they sell it to palm oil companies who are certified as sustainable. One of the independent smallholders explained how the process of selling their harvest to palm oil company works;

We harvest our palm fruit approximately every second or third week and FFB collectors drive around the villages to collect and fill up the dam trucks with FFBs from different smallholders. One dam truck can hold 8-10 tonnes. When we sell to middlemen instead of straight to a mill, we do not know if it is further sold to RSPO certified mills. (Independent smallholder 7, 05.04.2017).

When talking with a respondent from World Wildlife Fund (WWF) Indonesia, said that he palm oil industry and market has created opportunities for many communities to get out of poverty. But there has also emerged conflict regarding land rights, where illegal land grabs are not unfamiliar in the communities, especially the more remote ones and it is affecting the locals and the poorest the most;

These conflicts and illegal land grabbing have led to loss of income for locals and made them dependent on plantations for their livelihood. It has had a large impact on the social welfare on many locals and smallholders (WWF Indonesia respondent, 12.04.2017).

When talking with the smallholders during the fieldwork regarding these issues, they stated that they had not been exposed to any land grabbing or been in conflicts but said they had heard about it and knew that it was happening to some people.

#### **4.3 Environmental Impacts of the Palm Oil Industry**

Many of the respondents said that in terms of their perceptions of climate change and GHG emissions, the forest burning, and haze was the most visible sign of environmental damage. As a result from forest fires, the air becomes smoggy and unbreathable. One of the respondents in Pekanbaru summarised;

In the burning season we try to avoid being outside as much as possible. We know that the palm oil industry is getting much attention as a bad industry because of burning the forest, but many believe that this practice will clear the land and give space to a more fruitful area for planting. Also, the large forest fires are sometimes due to forest clearing getting out of control and sometimes from already degraded land (Respondent 2, 12.04.2017).

Some of the interviewed smallholders were aware of the impacts the palm oil industry has on the environment in terms of forest and biodiversity loss among others. However, most stated that it was difficult to think about the environment at the same time as you are trying to survive and uphold a livelihood. A smallholder said;

I know that the forest gets affected by the industry, but it is difficult when this is where my family gets the income to survive. The reason we started with palm oil was from the demand from my country, and from other countries as well. They want this in their products, so I feel it is not only us who are to blame for this development (Smallholder 2, 09.04.2017).

Furthermore, another smallholder was also agreeing with the statement above, but meant that it was important for the independent smallholders to also pursue a sustainable path for their palm oil. This was because he meant that it would improve his own soil in terms for a better management of the land he owned in addition to being preferable for the palm oil market in terms of better sales. And that this in turn would then benefit the environment and for the species living there such as the orangutan, the smallholder said;

If we learn better practices to manage our land for cultivation, with help from government or NGOs we do not need to burn and clear land because the sustainable practices will keep the land fruitful and maybe give more to produce, and then we don't need to expand to new areas

and destroy the home to the orangutans that you see people talk about in the media very often (Smallholder 10.04.2017).

#### 4.3.1 Transition towards a greener future

When some of the respondents were asked about the CDM in terms of sustainability and to reduce emissions from palm oil production and create renewable energy, some of the respondents from various NGOs stated that;

Even though CDM is supposed to stimulate sustainable development and emission reductions, it is mostly a tool for developed countries to meet their limitation targets or emission reduction. Off course in the broadest sense, CDM can stimulate sustainability in the host country, but it does not make sense that the developed countries can continue industrializing and continue business as usual (Respondents 5, 6, 09.04.2017).

As some of the NGO employees I met with stated, they were at first very positive of the CDM and how it could improve sustainability in the country. But since the fact that the focus is to find cheap places to invest and start up CDM projects, they said it seemed a bit hypocritical from the host countries point of view. One of the NGO employees stated that;

Attempting to create sustainable development in developing countries just so developed countries can industrialise even more, might do little for the sustainable development on a global level (NGO employee 3, 11.04.2017).

Furthermore, a palm oil company employee meant that developed countries are not committed to sustainable development and said that;

The various policies on sustainable development is sugar coated to seem like it was ratified to promote sustainable development in developing countries. Just look at the US not signing the Kyoto Protocol and not joining the rest of the world in the commitment to reduce emissions (Palm oil company worker, 1, 04.04.2017).

Previously, some of the POME to energy systems was implemented to generate compliance or voluntary carbon credits that could be sold under emissions trading programs, such as the CDM, or to offset corporate emissions. However, in recent years, since the prices for carbon credits have basically collapsed, they are not a significant driver of POME to energy systems. The respondent working in the provincial government stated;

Because of the fall in carbon prices, Indonesia only has 12 of 34 registered CDM projects who obtained CERs successfully. Despite this, opportunities for expanded compliance markets in the future might offer potential drivers (Provincial government respondent, 05.04.2017).

In addition to having RSPO certifications, some palm oil companies have installed biogas facilities. Instead of releasing the CH<sub>4</sub> from the palm oil production waste into open lagoons, they have installed CH<sub>4</sub> capture facilities. Here the CH<sub>4</sub> gas is trapped through combustion digesters which transforms the waste into energy. This is a great step towards emission reduction for Indonesia, so the issue is more about the reasons why not all palm oil production mills have installed these facilities. The respondent from the provincial government explained;

Most palm oil refineries in Indonesia are owned by big foreign companies such as Musim Mas and Asian Agri. When it comes to climate change and sustainable development within the industry, many measures have been put in place. Especially within the largest palm oil companies residing in Indonesia, because they have the money to do so (Provincial government respondent, 05.04.2017).

In terms of Riau province being the area in Indonesia with the largest expansion of plantations, mills and refineries, there is still few implementations CH<sub>4</sub> capture facilities. The respondent from the provincial government stated;

In Riau, and other places across Indonesia it is viewed as a high risk for businesses and governments and others. There is a need for large financial investments from outside to be able to implement it (Provincial government respondent, 05.04.2017).

Some of the large companies operating in Indonesia are Asian Agri, Golden Agri, Musim Mas and Sime Darby. When talking to some of the representatives within these companies regarding working towards a sustainable palm oil industry (over skype and email) they stated that;

We have been focusing on how to improve the sustainability of our business for a long time, but it is a large industry with so many people and stakeholders involved which has maybe made it difficult to find proper solutions to fit everyone involved and set a common set of rules or ramifications for the palm oil industry (Palm oil company worker 2, 15.06.2017).

The various factors impacting the industry are many. The climate is an obvious factor, such as drought and rainy seasons. If the soil is not properly managed this will affect the productivity

as well as the quality of the palm oil harvesting. Hence resilience to climate change was a common issue the respondents talked about and meant needed to improve by themselves and by the companies or government. The insecurity of good harvests, and with heavy rain in periods makes it difficult for the smallholders and the palm oil companies because of the bad infrastructure in terms of getting to and from plantations as well as flooding of roads. Another issue that we talked about in terms of a sustainable palm industry, was the implementation of CH<sub>4</sub> capture facilities at palm oil mills.

In Riau I went with my translator to visit a nearby palm oil company mill, PT Kemilau Permata Sawit (Figure 10) to see if I could receive any information regarding their efforts towards sustainability. PT Kemilau Permata Sawit is a private owned palm oil mill facility and was located around 5 km from Pekanbaru. The palm oil mill sources FFBs from smallholders, who are located in both close and remote areas from the mill in addition to harvesting from own plantation. At the palm oil mill facility, I was not allowed to interview workers there, because the boss was not there when me and my interpreter visited the site. However, I had a short interview with one of the assistant managers there, together with my interpreter we tried to discuss the sustainability of the palm oil industry, but he was a bit reluctant to answer my questions. He explained that a large group from an American NGO had been there right before I got there and that they had permission from the government to be there. Since I did not have that kind of permission, the assistant manager said he was afraid to say something wrong or something that could misrepresent the palm oil company. What he could say was that the palm oil company did treat their palm oil mill effluent in open lagoons but did not capture CH<sub>4</sub> for emission reduction or energy generation. The assistant manager also told me that the palm oil mill was newly established, and that this was also a reason he was sceptical to talk to me and did not want to get in trouble for talking to someone from outside with no authorisation. The reason they did not have any CH<sub>4</sub> capture facility was because they were a newly established palm oil mill.

Despite being relatively new, the palm oil mill was certified with RSPO and the employee showed many certificates and diplomas the mill and owners had received for the production of good quality CPO. Figure 10 below shows the FFBs in the boilers and CPO in the making at the site. Questions regarding sustainability and the possibilities for a CH<sub>4</sub> capture facility, he was not able to answer much. Furthermore, when asked about the smallholders being RSPO certified, he stated yes but would not talk any further about how they were able to

check all of this as the mill had middlemen to collect the FFBs for them. This is one of the issues my informants and interpreter talked about;

It is difficult to be certain that the whole supply chain is sustainable, because there are so many stakeholders involved in the industry, from cultivation to harvest to production till it ends up at the consumers table (palm oil mill worker 2, 06.04.2017).



**Figure 10:** CPO in the making at the palm oil mill facility. Source: Author (2017).

#### 4.3.2 Methane capture facility

Neste is an international company from Finland offering clean fuel solutions and applications based on renewable raw materials. Neste is working with ways to contribute to reduce GHG emission from palm oil production. Since emission from palm oil mills account for large amounts of CH<sub>4</sub>, Neste initiated a two-year study project to verify the reduction of CH<sub>4</sub> emissions for a newly applied effluent treatment method in 2015. The project was conducted in collaboration with IDH and the certification system International Sustainability and Carbon Certification (ISCC). Neste's sustainability expert and one of the researchers involved in the project explained;

Our project showed that removing organic matter from the palm oil mill wastewater by a belt press offers great environmental potential. In our study, removal of solid organic matter reduced GHG emissions by a staggering 50% at the POME pond compared to the conventional open pond emissions (Neste sustainability expert, 28.05.2017).

The Musim Mas Group has several palm oil plantations and production facilities spread across Sumatra and Kalimantan in Indonesia. One of the workers from the Musim Mas group provided some information on their CH<sub>4</sub> capture facilities;

We use the technology of composting solid mill by-products mostly together with liquid POME, to produce organic fertiliser instead of chemical fertilisers. This have improved the soil and increased the yields, reduced water pollution and the ability to save money (Palm oil company employee, 21.05.2017).

All the palm oil mills in Indonesia treat their effluent from production, however, the POME is typically treated in large open-air ponds or lagoons before the effluent is released into waterways which produces large amounts of CH<sub>4</sub> and other GHGs. And as a representative from the Musim Mas Group stated;

The technology for CH<sub>4</sub> capture is already proven as effective as more than 30 of the 600 mills in Indonesia have adopted the technology. We are on our way to installing the technology in all of our mills. The only downside to the process is that it is quite expensive to implement. But for us, the high cost at implementation weighs out when we see the positive effects from it and look at the long-term benefits (Palm oil company employee, 21.05.2017).



**Figure 11:** Methane Capture Facility at Pangkalan Lesung in Pekanbaru, Riau. (Source: Musim Mas, 2016).

Figure 11 above shows how the large wastewater lagoon is covered with large plastic membranes for the generation of energy and reduction of GHG emissions. The palm oil company employee further explained;

We replaced the existing open lagoon system with a closed digester system which was achieved by installing floating plastic membranes on the open ponds. For us, it has been imperative that we had the proper skills and technology in place before implementation, and also the financial base has been of high importance (Palm oil company worker, 17.03, 2017).



**Figure 12:** FFBs on the way to palm oil mills. (Source: Author, 2017).

When talking to some of the palm oil company workers in the communities in Riau province, they expressed that there were also other companies considering similar investments such as what The Musim Mas and others have accomplished for methane capture facilities. The reason they want to implement CH<sub>4</sub> capture is not only due to the major reduction of emissions, but also to the ways in which it can power the facilities and provide the excess electricity to surrounding communities at a low cost. Some other palm oil mill company workers expressed that there were many challenges with the CH<sub>4</sub> capture facilities. Some of the challenges were the high costs of implementation as well as the need of outside investment. Furthermore, plant construction was expensive, and there is also required a great amount of knowledge and technical expertise. When discussing the reasons for why CH<sub>4</sub> capture facilities are not installed at all palm oil mills, the palm oil company employee said;

The conversion of CH<sub>4</sub> can add enormous value to the mitigation of climate change. The main driver is incentive such as no or less taxes. Also, there is a need for a good policy to support CH<sub>4</sub> capture and biogas establishment. Another issue would be to loosen up the monopoly of the state electricity company (Palm oil company employee, 21.05.2017).



One of the NGO employee sent an email saying that POME has captured the largest portion of government scrutiny and public attention regarding waste disposal in the palm oil industry. As plantation areas expand and oil palm trees reach their peak production, larger quantities of POME are being produced. For every ton of CPO produced, around 3 tonnes of POME is produced from the palm oil mills across Indonesia. Many palm oil mill facilities do not have CH<sub>4</sub> capture facilities, but as the NGO employee stated;

Reduction technologies for POME is important to reduce the environmental burden of production. The government should be more helpful in terms of installing these facilities since Indonesia have signed agreements to reduce GHG emissions. Instead of using the conventional open ponds for POME treatment, but rather implement CH<sub>4</sub> capture systems (NGO employee, 30.03, 2017).

When asked about why not all palm oil mills have CH<sub>4</sub> capture facilities for GHG emission reduction, the representative from the provincial government in Riau stated that the Indonesian government has considered to require CH<sub>4</sub> capture at all palm oil mills by 2020. However, in the current criteria from both the RSPO and the ISPO standard a focus on methane capture is not included, only that mills must report their GHG emissions to the government.

#### 4.3.3 Palm oil versus other vegetable oils

The debate regarding changing to other vegetable oils than palm oil to reduce deforestation, forest fires and save habitats for endangered species as well as stop biodiversity loss is something that all the respondent has heard a lot about throughout the years. Each of the respondents I met were not against taking care of the environment but they all thought a switch to other vegetable oils is not a very good idea. They stated that this was because all other vegetable oils are in need for much more land area and more work than palm oil. When oil palms are planted, it pretty much does the job by itself. Furthermore, the ability to harvest every second week makes it even more efficient than other vegetable oil crops. One of the independent smallholders I met explained why palm oil is the most effective oil to cultivate when it comes to vegetable oils;

We can harvest the oil palm all year round, and the trees produce around 10 tonnes of fruit per hectare, which is much more than other crops such as sunflower, rapeseed and soya. Cultivating palm oil requires much less land and from the FFB, all parts of the fruit can be

used for something which means if properly managed, palm oil seems like the most sustainable choice of oil with more uses than others (Independent smallholder, 13.04.2017).

The major focus on sustainable palm oil has led to a higher level of transparency, and an industry that is always in the centre of aiming towards improvements compared to other crops. He thought it was ironic that it is not the same thoroughness the soy industry or cattle rearing, which is the biggest driver of deforestation. He stated;

The reporting, verification, and inspections means that the issues are visible, we are not trying to hide them. There are always demands on improvement in the palm oil industry, I do not think the global community will ever be content with the palm oil industry in terms of it being sustainable enough (palm oil company worker 3, 11.04.2017).

One of the respondents from the WWF Indonesia informed me that many environmentalists and even countries (or at least many groups within countries) have been trying to lobby for a boycott of palm oil all together, due to health and environmental concerns. She stated;

The problem with boycotts is that boycotters must think it through properly, because if countries in the western world for example will perform boycotts, I don't think it will protect forests, rather the opposite. Because Asian countries will still use palm oil because it is cheaper, and this may destroy forests even more because it can entail that the sustainable management of forests will fade out (WWF respondent, 12.04.2017).

Further she stated that it is was of course very good that companies and countries focus on the environment and health issues around palm oil. But this will not restore the forests, and boycotts will affect the smallholders the hardest and that they are the least productive elements of the supply chain. She further talked about how a replacement of palm oil would not make the situation any better and that a replacement would be more environmentally damaging. A replacement for palm oil is of course available, but not in terms of a sustainable alternatives. This is because all other vegetable oils would be more destructive for forests and it would need much more land areas to grow similar quantities as palm oil. Furthermore, the oil palm requires significantly fewer pesticides and chemical fertilisers than any other vegetable oil source. NGOs as well as palm oil advocates are trying to convince people that sustainability is future-proofing the palm oil business;

Sustainability has to be a part of everything we do. There is a gap between the producing and the buying countries who say to us that we don't care about orangutans and that we don't care about people. I think there is a need to use data as a more empirical method to tone down this war of words (WWF respondent 12.04.2017).

The provincial government respondent stated;

We need to communicate and spread more of the positive sides of palm oil, how palm oil has contributed to the Sustainable Development Goals. We cannot replace palm oil. We know that, the industry knows it, but not the global citizens. That's the problem (Provincial government respondent, 08.04.2017).

He further stated that;

One of the main focus areas regarding climate agreements on forests is working with districts in terms of developing a green growth vision within communities. However, this is also difficult as there are endless linkages between the Indonesian climate change strategy, green growth visions, economic growth and on top of that the global call for deforestation free commodities (Provincial government respondent, 08.04.2017).

#### 4.3.4 Smallholder Funding and Training

In a community in Riau, I met a group of smallholders who were part of a project where they received support and help to reach RSPO certification. The fund was called Farmers in Transition Fund, and it was a fund where implementing partners informed the smallholders on how to run their plantations and crops in a sustainable manner. Another fund I was informed about by a representative from RSPO informed over email, is a RSPO Smallholder Support Fund (RSSF) of 6 million USD available to assist farmers for converting to more sustainable practices. But even though the fund is there, it seems to remain difficult for the smallholders to understand how to access the funds;

We have heard about these funds, but it is not always easy to be sure how it works in practice, and it is easy to give up when it is a hassle. Information about when we can apply is stressful and sometimes unknown because it is not a year-round open application (Smallholder 9, 08.04.2017).

Another smallholder stated that;

Even though the will is there, but due to already having much to do every day, it is stressful to fill out long forms, and they are very strict with the forms in terms of how they must be very precisely filled out. If they are not, they will not be approved, and we must wait till next time it is open for applying (Smallholder 11, 09.04.2017).

It thus seems as if the smallholders need external parties or middlemen to ensure a knowledge transfer for the help in applying to the RSSF, both in terms of improved communication and

practical assistance. Since smallholders account for more than 40% of Indonesia's palm oil production, it makes the smallholders agents of the nation's natural resources. Because of this, the RSPO have started the Smallholder's Fund Initiative to support smallholders to achieve (sustainable) certification. In this way, smallholders receive information and it spreads awareness among the smallholder community in terms of benefits and advantages of certification such as developing long-term efficiency in production and yields, as well as access to international sustainable palm oil markets and better management of their expenses. This can be seen through the information gathered from many of the independent smallholders, where some of them are members of the Smallholder's Fund Initiative who explained that the fund and certification has helped with training programs on better cultivation practices and has increased the average production per hectare per year. One of the independent smallholders said;

In 2014, the production was 4 tonnes more per hectare than before I joined the training through the RSPO Smallholder's Fund Initiative. This was the first year after becoming a member, so I am looking forward to what more benefits the coming years will bring (Independent smallholder 6, 13.04.2017).

Not all independent smallholders are part of a training or funding projects. A lack of support, such as when it comes to training and information on good agricultural practices and supervision, has thus affected productivity and is a concern for sustainability. Given the lack of support, independent smallholders often purchase cheap, low-yield seedlings and burn land to make way for crops. An independent smallholder who was not a part of any groups stated that;

Replanting means I must buy new seeds and rehabilitate the soil, and this cost a lot of money. That is why sometimes just abandoning old fields and clearing new ones is cheaper and much easier when we do not have the money. I hope to get help with getting a land certificate from the government and assistance in replanting my land area (Independent smallholder 5, 08.04.2017).

The plan was to be able to visit one of Musim Mas plantations and mills, but due to difficulty receiving any clear response from them, I did not manage to do it before my Visa in Indonesia expired. However, my interpreter had a friend working for Musim Mas who provided me with some information, as well as email contact with representatives from Musim Mas when I was in Norway. In addition to methane capture facilities mentioned above, he told me more about how they are contributing towards making the palm oil industry more sustainable;

Musim Mas and the International Finance Corporation (IFC) have a project called the Indonesia Palm Oil Development for Smallholders (IPODS). This is a partnership between palm oil growers and traders, the Musim Mas group and the IFC. The project is currently operating in Riau province and North Sumatra with independent smallholders to improve their yields and assist them in getting certified (Palm oil company worker, 26.04.2017).

Musim Mas and IFC train people from the local communities to become field assistants who can then lead training programs. The idea of the project is to make the local community be the leaders of the change towards a more sustainable agriculture with knowledge that can improve the livelihoods of the community. This can also create positive trickle effects, because the smallholders will spread the knowledge and more people will join when they see the benefits of improved yields from better agricultural practices.

One of the sustainability representatives from one of the large palm oil companies operating in Indonesia, stated that;

Our company is highly focused on sustainable palm oil production, but even though almost all our palm oil is sustainable, we only sell half of our products under that certification because of the unwillingness from businesses to pay extra for sustainability standards. These companies are mostly in European countries that do not want to pay more for sustainable palm oil (Palm oil company employee 14.06.2017).

Furthermore, the sustainability representative stated that the company had a long history of selling to European countries, and that the European consumers are highly aware of the environmental impacts of the palm oil industry and cultivation, but not as aware of the social impacts. He stated that if they were it would be hard to understand that they would try to boycott the industry, but rather look towards other and more reasonable solutions.

#### 4.3.5 Media coverage and public views of the palm oil industry

Palm oil companies are often blamed for the damaging effects on tropical forests. Some of the workers at palm oil companies in Riau expressed their frustration towards the labelling of palm oil always being viewed as negative. One of the palm oil company worker said;

There is no doubt that palm oil is responsible in some part for deforestation or cutting down trees for palm oil plantations in the past or through illegal actions. I think Europe and other countries overseas do not understand how much benefits the palm oil has given our country and local communities (palm oil company worker 3, 11.04.2017).

#### **4.4 What the respondents think can be done better in Riau Province**

Many of the NGO respondent expressed that it is difficult to address the problem with direct action towards a more sustainable future for the palm oil industry if people do not get involved with the initiatives on the ground. They also stated that governments should assist more in the shift towards more sustainable efforts such as focusing on renewable energy, smallholder subsidies for seeds and fertilisers. One of the respondents said that;

The industry is not all bad and walking away from it is not going to help us find solutions. People will still need and buy the oil. We need to find solutions on the ground, not in an office in another countries. We need to have all stakeholders onboard to make a change for the better (NGO respondent, 09.04.2017).

According to many of the independent smallholders and palm oil company workers, they often stated that they meant the buyers of the palm oil or the products the oil would be used for, is the ones that should pay more for making the industry more sustainable, in terms of social, economic and environmental aspects. One of the independent smallholders said that;

The people who buy from us are the ones that should help us if they want the industry more sustainable, they are the ones with the money. There must be a more accessible way to receive training or assistance than it is now (Independent smallholder 8, 07.04.2017).

Since millions of people are dependent on palm oil for a living, it can be highly damaging if people stop buying palm oil. Some of the smallholders said that they think NGOs were the ones who can help them to achieve sustainable certifications through putting pressure on governments, palm oil companies and consumers to make the palm oil industry more sustainable;

The countries that import and use the palm oil, instead of criticising the industry they should rather help to make it more sustainable through paying a better price for sustainable products, and that money can help us with keeping up the sustainability standards (Smallholder 7, 02.03.2017).



**Figure 13:** Harvested FFBs. (Source: Author, 2017).

## CHAPTER 5

### ANALYSIS

#### 5.1 Introduction

This chapter entails an analysis of the data and information received during the fieldwork in Indonesia. The gathered data will be discussed and reflected upon in combination with the literature review and theoretical framework in terms of attempting to answer the research questions for the study as decent as possible. Talking to the various stakeholders within the palm oil industry it gave me a clearer picture on how things are in theory and in practice.

#### 5.2 Sustainable Development

The Brundtland Commission defined sustainable development as “*meeting the needs of the present without compromising the ability of future generations to meet their needs*” (Smukkestad, 2008). However, in this context, it is not a good enough concept since most parts of the world are becoming larger and larger consuming societies, and with the pace the palm oil production is going in, it makes it even more difficult to not compromise the ability for future generations to meet their needs. According to McMichael (2008), the definition of sustainable development has been viewed as too broad even though it implies the importance of intergenerational equity and seeks to internalize the externalities of environmental degradation (McMichael, 2008). The goal of sustainable development is the long-term stability of the economy and the environment, which is only achievable through the acknowledgment and integration of economic, social, political, and environmental concerns in decision-making processes (SIDA, 2008). In terms of looking at sustainable development within the case of the palm oil industry in Riau province, many of the respondents criticised both the RSPO in how the bar has been set too low for what is being considered sustainable and thus easier to receive sustainability certifications, if you have money. Furthermore, many smallholders expressed that they were not participating in any decisions regarding the industry.

In terms of putting this study within the framework of political ecology, it seems appropriate to some extent. According to Øyhus (2011) political ecology is the study of how economic, political and social factors affect environmental issues (Øyhus, 2011). This becomes evident in the ways in which the stakeholders within the palm oil industry indeed has affected the



environment, both negatively and positively. Negatively in the sense of exploiting natural resources for economic growth and personal gains, and positively in the sense that the awareness of the exploitation has gathered societies, businesses and organisations together to influence environmental policies at various levels and to find solutions to create a sustainable palm oil industry.

### **5.3 Socio-Economic Impacts**

The palm oil industry in Riau province, Indonesia shows signs of an industry where not all stakeholders are included in terms of setting common goals and initiatives. Palm oil companies are obliged to get ISPO certification to be allowed to operate in Indonesia, while RSPO certification is something they can apply to voluntarily. ISPO and RSPO certifications for smallholders are voluntary, but by not being certified they most likely miss opportunities to take part in the global market as well as selling their FFBs to nearby mills if they are not RSPO certified. However, in many cases this was not always a problem for independent smallholders when they sold to middlemen who were not that concerned with RSPO certifications, but rather more concerned with buying enough FFBs for further sales. Hence, the various policies put in place in the recent decades can in many ways be viewed as not having the greatest impact for a sustainable palm oil industry as it was hoped for.

The initiatives have been many, but the issue seems to be with how the information gets spread among the smallholders in Riau province. From the findings, the independent smallholders seemed much more unaware of the possibilities existing in terms of increasing their land productivity and enable less environmental destruction than that of other smallholders. By 2017, the smallholders have managed around 4.7 million hectares of oil palm plantations area (both scheme and independent), almost 40% of the total recorded oil palm plantations (Direktorat Jenderal Perkebunan Kementerian Pertanian Indonesia, 2017). With the number of smallholders distributing such large areas of oil palm plantations, it is understandable that someone falls outside the planning and decision-making processes regarding the issue of creating a sustainable palm oil industry. There are many certifications to obtain such as the RSPO and the ISPO, but these require education, investment and knowledge transfers to smallholders. And these smallholders also need a somewhat guarantee that aiming for sustainable practices and certifications will pay off or become rewarding for them in a long-term perspective. The smallholders need a “carrot at the end of the tunnel”, an assurance or something that will inspire them to want to change and to understand that this is

a goal that will benefit them as well, not only the companies, the environment or the conscience of consumers they do not even know in other countries. Many palm oil company owners can be viewed in some sense to be driven by the aim of certification and that the achievement is seen as an end in itself. Even though companies are certified, their license to operate can be threatened by poor performance in terms of social and environmental factors. The main challenge for companies seems to be how they can internalise sustainability as an integral part of their corporate culture and management system. For this to happen, strong and clear commitment from top management of the corporation seems critical and this must be demonstrated through action.

### 5.3.1 Sustainable certifications

A challenge regarding the sustainability of the palm oil industry, is the ability to sell sustainable palm oil. Respondents from various palm oil companies stated that the willingness to pay more for the sustainable palm oil is missing in the market. Providing a supply chain that is 100 % sustainable entails that everyone must join in on making this transition. This will then have an indirect effect of disincentivising smallholder farmers, who stands for around 40% of the world's palm oil production, but with unsustainable and less efficient farming techniques, to get certified. One of the solutions that was said by many of the respondents from the palm oil companies, was that the RSPO needs to create one standard that all palm oil producing companies can operate with.

According to the representatives from NGOs, getting more companies to become RSPO certified is one of the best solutions to protect people living around forests and to protect the forests. However, many do not think the standards of RSPO are not high or strict enough. In this way, it seems as if more companies get certified, the system for sustainable palm oil will become more robust and could be able to make positive changes within the whole supply chain of the industry as well as being able to protect the forests and the people.

The degree of “sustainability” of RSPO certifications has been criticised by some of the NGO respondents, who stated that it is much easier for big companies to obtain certification compared to smaller companies and smallholders. A strength of the RSPO should be the significant engagement by so many large players and various stakeholders within the industry, but at the same time this may be viewed as a reason for setting the bar too low in terms of achieving significant sustainable environmental and social reforms.

Even though some critics think the standards are too low, they can seem too high for independent smallholders, at least in bureaucratic terms because of all the paper work. Many of the independent smallholders without any certification stated that they had sold their FFB to certified mills and companies. This shows that it is extremely difficult to source where all the FFBs and palm oil comes from in terms of knowing if it is sustainable or not. Hence, there seems to be some holes in the RSPO and ISPO systems that needs attention such as monitoring more accurate where the palm oil is sourced from.

### 5.3.2 Challenges for smallholders

When it comes to enabling a sustainable palm oil industry, the main challenge seems to lay in the hands of the smallholders according to many of the industry stakeholders except the smallholders themselves. Since many of the smallholders, especially the independent smallholders, had never heard of RSPO, ISPO or smallholder funding projects, it entails that smallholders are blamed for something they are not fully aware of. Various initiatives have been put in place to make the palm oil industry more sustainable. With regards to the RSPO and ISPO sustainability certifications for palm oil, it seems obvious from the findings that this is a difficult task to accomplish for independent smallholders. Since many of the smallholders had not heard of these certifications, it could entail that the information regarding certifications and awareness regarding sustainable development from palm oil companies, NGOs, and governments are not reaching the smallholders. Thus, there seems to be a need for a better transfer of knowledge to smallholders and enable them to participate in the transformations towards a sustainable palm oil industry. According to the ministry of agriculture the aim is to enforce mandatory ISPO certification by 2022 (UNDP, 2015). The aim is also to help the certified smallholders to gain easier access to the global market.

However, ISPO certification seems difficult for smallholders as their legitimacy and good agricultural practices are questionable in terms of being certified under ISPO. Furthermore, by receiving sustainability certificates, independent smallholders are dependent on much more money since it is expensive to buy the “proper” seeds and fertilisers and to keep up with better farming practices. Some smallholders who had heard of the funding projects, said it was too much work and too costly to implement sustainability standards even if they wanted to in terms of increasing their yields. The smallholders who had joined training programs received support and help in the beginning of the training but were left to themselves after the training.

The RSPO representative stated that the smallholder funding projects helps independent smallholders out of financial barriers to achieve RSPO certification and thus makes it easier for them to join the global market. Many of the interviewed smallholders stated that the certification makes it difficult for them to achieve it due to high cost on the necessary seeds and fertilisers among others.

Representatives from palm oil companies, RSPO and the IDH stated that encouraging smallholders to replant is one key factor for a sustainable palm oil industry in Indonesia. This is because smallholder's palm oil plantations entail around 4,5 million hectares of a total 11,26 million hectares. Approximately 2.5 million hectares of the 4.5 million hectare is managed by independent smallholders (UNDP, 2015). Various solutions have occurred to solve the issue, such as the RSPO and ISPO. However, many of the respondents were not all that positive to the RSPO criteria as well as the RSPO smallholder funding and training programs. One of the reasons for this was that it is very costly for smallholders, especially independent smallholders to be a part of these programs. In terms of only receiving some funding at the start of projects, they cannot afford to keep up with the projects when they must pay for better seeds and fertilisers from their own pockets, without financial support from either the government, NGOs or palm oil companies. Furthermore, the smallholders stated that seeds and fertilisers were not delivered on time, which caused them to buy it at local shops or from the FFB collectors with FFB as payment instead of cash. Hence, the support for independent smallholders by various stakeholders ranging from palm oil companies, NGOs and governmental institutions seems crucial. The support might increase the members by spreading knowledge and information on good agricultural practices in local communities which can increase yields, gain more opportunities and reduce the negative environmental impacts. Through the RSPO and ISPO certification, smallholders and companies need to perform better in terms of sustainability to be able to sell their products. Some of the smallholders were very critical to RSPO certification, because they felt as if it was only a cover up to continue business as usual. The reason they felt this, was because they have sold their FFB to mills and companies that are RSPO certified, even though the FFB from the smallholder was not.

The RSPO have indeed managed to get more palm oil companies and smallholders certified with the label of sustainability as well as gotten a seat at the table in the palm oil industry. However, since palm oil is the cheapest vegetable oil available on the global market, it is of

course the most popular choice for the stakeholders who dominates in the RSPO membership such as the largest palm oil buyers. Thus, it seems obvious that palm oil companies will do what it takes to secure a constant and steady flow of the cheap palm oil also in the future.

Some of the statements from both palm oil company workers and smallholders was that European and other palm oil buyers are the majority of the ones who make demands of making the palm oil industry more sustainable, but at the same time the ones who are hesitant to pay a better price for these products. Some of the respondents stated that it should be the ones who are demanding and consuming most of the palm oil that should participate more in paying for it to become as sustainable as they demand. According to Fitriani from IDH, companies do not buy supply from smallholders if they cannot verify that their supply is 100% sustainable and RSPO certified. In many ways this can have negative socio-economic impacts on the independent smallholders. This is because they are dependent on selling palm oil for their livelihood. When it is too expensive to gain RSPO or ISPO certificates, they are not able to access global markets and will maybe end up selling their palm oil to uncertified companies working in Asian countries or not selling the harvest at all. However, as stated by many of the smallholders, they could sell their palm fruit to companies even if they were not certified. In addition, the use of middlemen by companies to collect FFBs also makes it difficult to guarantee where the palm oil comes from and that the palm oil is certified as sustainable. In terms of an inspection, uncertified palm oil can have been used for a long time prior to inspection of the particular palm oil mill, plantation or company. Thus, the rules for obtaining RSPO certification can be misleading. For example, a palm oil company with many plantations but has only one plantation that meets the sustainability requirements might thus sell all its palm oil under the same RSPO label, even though the other plantations are not sustainable. In this way there is no clear separation of sustainable and non-sustainable palm oil as palm oil from different plantations are often mixed. Therefore, companies are buying what they think are RSPO labelled palm oil but might be conventionally grown palm oil.

Another challenge for smallholders in Indonesia seems to be in raising the productivity of their palm oil cultivation. The challenges are more serious for independent smallholders, because supported or scheme smallholders have to some extent access to financial and technical support from the palm oil companies they are tied to. Hence, there is significant room for improvement and development which is a target set by the Ministry of Agriculture (2015).

## 5.4 Environmental Impacts

The (mis)use of resources has caused environmental damage and climate change throughout the world, it can be viewed as if developing countries must pay the price through limiting their economic growth, obtain various certifications, or implement projects such as the CDM methane capture facilities. CDM was intended to be beneficial for both the host and implementing countries but have shown that due to low prices on the carbon offsets, rather few successes has occurred (UNFCCC, 2015). Consequently, investments in these kinds of projects have stagnated especially in Indonesia. The respondents explained that the lack of financial investments was the main barrier to the decrease in methane capture facilities. This can be viewed as one of the reasons why palm oil companies and NGOs state that the industrialised countries are not that committed to sustainable development when it does not benefit them.

The RAN-GRK was a plan intended to contribute to the global efforts to reduce emissions and to tap international funding for Indonesia. The RAN-GRK is integrated among sectors and support activities that revolve around reducing emissions and strengthen the policy framework (BAPPENAS, 2012). However, through the findings it seems as if the Indonesian government is not doing enough for reducing emissions. The possibilities of a renewable energy source and reducing emission is shown to be very effective through methane capture facilities, but still there is a lack of financial support from both governments and businesses. The respondent from the provincial government stated that by 2020, Indonesia would implement more CH<sub>4</sub> capture facilities at palm oil mills, even though no clear agreements have been made. However, the findings indicate that there is uncertainty about how these will be implemented due to the lack of infrastructure and finance.

### 5.4.1 Methane Capture

From the outside, POME to energy technology implementation seems like a favourable environmental innovation to implement from both economic and government policy perspectives. OECD define environmental innovation as production, assimilation or taking advantage of new products, production processes, services or business methods which hold the goal to protect and reduce environmental risks, pollution, and other negative effects of exploited resources (OECD, 2015). In addition to the positive impact on GHG emission reduction and electricity access, the technology is increasingly understood internationally and has been widely used in other contexts such as in Thailand as was shown in the literature

review. A biogas plant can take advantage of this natural decomposition process and is able to generate energy. In this way the organic liquid waste generated during palm oil production (can) represent a major untapped resource of energy (Rupani et.al, 2010). The findings show that the possibilities and opportunities for GHG emissions are highly present, but it is constrained due to the lack of proper private and public investments. Another challenge of implementing CH<sub>4</sub> capture facilities at palm oil mills, is that the main income source at the mills is the CPO. Some of the residues are used as fertilisers etc. but by having yet another product added to the business, more resources such as increased manpower, technologies, equipment and time is needed. A critical role for policies related to new renewable energy technology has been to reduce costs associated with making these technologies competitive with incumbent technology (Pehnt, 2006). Thailand is a good example on how the support and policy framework can help the industry become more sustainable. Furthermore, Thailand have received assistance from the government to sell the excess energy to the national grid.

Interest for renewable energy has spread across the world in recent times. Various projects indicate the potential for solid financial returns, and capital markets are looking to invest in renewable energy. But so far, the technology is not widely adopted in Indonesia. According to the UNDP CH<sub>4</sub> has long been valued for its clean and efficient combustion properties, and that they support governments in developing on- and off-grids renewable energy technologies (UNDP, 2015). However, In Riau this does not seem to be the case as the main barriers for implementing capture facilities to create energy is the lack of support. Furthermore, from the findings it seems as if the government and businesses in Riau Province are not viewing CH<sub>4</sub> in the same way in terms of renewable energy potential. Palm oil company representatives from Musim Mas stated that it was due to their large initial capital, technology and skilled workers that enabled them to implement CH<sub>4</sub> capture facilities, and that they have now become beneficial for them. Other palm oil company workers said that investments in methane capture facilities to reduce GHG emission as well as being a renewable energy source was too risky for businesses in terms of investments. According to Hanson (2013), it is important to understand how new technologies can improve and become more cost-effective. Much of this improvement is considered to occur through the participation and experimentation in markets (Hanson, 2013). In Riau, it can be viewed as if there have been neither a knowledge transfer of technology for improving cost-effectiveness, nor investments or faith enough to establish the facilities for all palm oil mills. Another barrier for CH<sub>4</sub> capture

facilities in terms of renewable energy, was that the location from the palm oil mills to communities were rather far from each other.

The lack of enough infrastructure and access to power grids, and the long distance between the location of palm oil mills and (local) power grids in the province are significant factors for the low expansion of POME to energy facilities. Furthermore, respondents stated that it is palm oil companies and smallholder who often are the ones responsible for the infrastructure in terms of road to plantations. This can be viewed as a reason for difficulties of connecting to the power grids if the government are not present in the infrastructure development. In other words, the palm oil companies would require greater efforts and funding to invest in the facilities in their mills.

The palm oil companies with CH<sub>4</sub> capture facilities in Indonesia are privately owned by big companies. Since the respondents answered that the reasons for few implementations was due to high costs at implementation, it is much easier for big companies to implement them as they have higher revenues from crude palm oil exports and productions in total. Some other reasons behind low implementations are challenges that complicate policy and project implementation. With developing POME to energy facilities in Riau and Indonesia, there are no clear funding or incentive mechanisms provided by the government. The lack of will, knowledge and realisation of the benefits of this renewable energy source among stakeholders seems apparent, as well as the low degree of focusing on this kind of competence and capacity of the domestic industry sector in the province.

Many of the palm oil companies have the possibility to implement CH<sub>4</sub> capture facilities, but some stated that in addition to being costly to implement, they must have extra resources to manage the facility. Even though a CH<sub>4</sub> capture facility could provide enough energy to power the mills as well as provide excess energy they could sell to the state electricity company, it will mean more work for the company in terms of time and manpower. Over that time, waste by-products such as POME have been largely treated as a cost that must be managed for compliance instead of a potential revenue source. Further, most mills already have functioning POME management systems and energy-production capacity via on-site biomass boilers and diesel generators. As such, new POME-to-energy projects are largely seen as distractions from CPO production.



#### 5.4.2 Boycotting Palm Oil

Palm oil has received a lot of negativity the last decades from public awareness and concerns regarding deforestation, loss of animal habitats and biodiversity loss. Also, the impact on indigenous communities have been the focus. Some NGOs and activists want to boycott palm oil altogether. Palm oil is the most cost-effective crop to date. It is the most efficient and cheapest to grow. It is better than soy and rapeseed for example both for the environment and for smallholders due to the low cost. Palm oil is an extremely resilient crop, and one tree lives up to 25 years if not longer, where smallholders can harvest from the same tree every other week for many years. This is also a reason for big companies to continue producing palm oil since it is the cheapest one to grow and provides high quantities of vegetable oil.

Additionally, palm oil cannot be excluded from the current consumer market, because the worldwide demand for palm oil is expected to further increase to approximately 240 million tons by 2050 (Campbell et al., 2016).

Almost all respondents stated that this negative image of palm oil is highly damaging to their livelihood. As stated above, a boycott could make the industry even more unsustainable. Since independent smallholders have stated that they sell their FFB to both sustainably certified and not certified companies or mills, a boycott could make the palm oil industry worse and smallholders and companies will end up with no aims or need for certifications or proof of a sustainable quality and might sell to Asian markets instead where sustainability criteria are lower. Both India and China each consume more palm oil than the EU (Campbell et al., 2016).

Meeting global demand for oils and fats by replacing palm oil with an alternative oil crop would require a much larger area of land than palm oil cultivation require today (Schmidt, 2010). This was also something the respondents were concerned with. By boycotting the industry, there is a need to produce other food crops or vegetable oil crops which would entail a need for land expansion and cause a larger destruction of the soil. Smallholders who are dependent on palm oil and has it as their only crop is at risk if boycotts would spread across the globe. If all big western companies and manufacturers stopped using palm oil in their products, the problem with unsustainable palm oil would not disappear. It would also not be any good for the environment because a boycott might lead to smallholders having to burn off their palm oil land for new cultivation or to move into new areas which most likely would be forests.

Since nearly half of all palm oil cultivation is provided by smallholders, a large boycott would have major negative impacts on communities and smallholders. Instead of criticising palm oil, a solution might be that palm oil companies and consumers should take a larger part in the financial issues of the industry.

## CHAPTER 6

### CONCLUSION

#### 6.1 Drivers and Barriers of a Sustainable Palm Oil Industry

The palm oil industry has experienced much negative attention over the last decades in terms of environmental destruction of rainforests as well as contributing to GHG emissions and climate change. This research has explored the socio-economic and environmental impacts of the palm oil industry in Riau province in terms of learning about the drivers and barriers for a sustainable palm oil industry. There have been many international agreements and drivers put in place in the attempt to stop this trend, such as certifications of sustainable palm oil through RSPO, and ISPO, as well as CDM projects for methane capture and emission reduction. However, lack of financial investments, awareness, participation in decision-making processes can be viewed as some of the barriers.

##### 6.1.1 Socio-economic impacts

Even though the RSPO and ISPO are working to make the palm oil industry sustainable through certifications, it does not always seem that simple in practice. The main challenges and barriers for smallholders to become RSPO or ISPO certified, was the lack of financial resources, information and time. Since many of the smallholders had not heard of these certifications, there is a lack of knowledge transfers to smallholders which keeps them from participating in the transformations towards cultivating sustainable palm oil. Another challenge of sustainable certifications was that it can be difficult to source where all the FFBs and palm oil comes from in terms of knowing if it is sustainable or not, since all smallholders sell their FFBs to middlemen, as well as large companies owning multiple plantations but might have only one plantation certified. Furthermore, the cost of certifications makes it difficult for the smallholders and can affect their access to global markets.

Barrier towards a sustainable palm industry, is through boycotts. Boycotts might cause the industry to become more unsustainable. This is because if the industry gets neglected, it can continue without having any need or goals for becoming sustainable if no one encourages or demands it. Furthermore, countries and governments expressing that they want to boycott palm oil and rather get their vegetable oil from a different crop, have according to the people working in the industry, not done much research. Switching from palm oil to another

vegetable oil would do more harm and damage to the environment in addition to the millions of smallholders depending on palm oil for their livelihood. Other vegetable oils need much more land than palm oil, and the oil palm trees can be harvested every second to third week of a year. Furthermore, by cultivating palm oil all parts of the fruit can be used for something which means if it is properly managed, palm oil seems like the most sustainable choice of oil with more usage areas than others.

#### 6.1.2 Environmental impact

Even though interest for renewable energy has spread across the world in recent times, in Indonesia the technology is not widely adopted. CDM projects such as CH<sub>4</sub> capture facilities have stagnated due to barriers such as lack of investments. Most of the methane capture facilities operating are installed by privately owned palm oil companies.

In Riau, it can be viewed as if there have been neither a knowledge transfer of technology for improving cost-effectiveness, nor investments or faith enough to establish the facilities for all palm oil mills. Another barrier for CH<sub>4</sub> capture facilities in terms of renewable energy, was that poorly developed infrastructure and the location from the palm oil mills to communities were rather far from each other.

Possibilities and opportunities for creating renewable energy and reducing GHG emissions through CH<sub>4</sub> capture facilities are highly present, but it is constrained due to the lack of proper private and public investments. Furthermore, since the main income source at the mills is the CPO, it is difficult to additionally focus on a CH<sub>4</sub> capture facility without any extra resources such as skilled manpower and knowledge, or investments. Plant construction was also stated to be expensive and requires a large amount of knowledge and technical expertise.

The conversion of CH<sub>4</sub> could add enormous value to the mitigation of climate change. Thus, one main driver could be incentives in terms of no or less taxes. Furthermore, a change in policies that could promote and support CH<sub>4</sub> capture establishment and renewable energy innovation within the palm oil industry.

## **6.2 Concluding remarks**

When it comes to the future of a sustainable palm oil industry, many of the respondents stated that the buyers and consumers of the palm oil should get involved in the palm oil debate to be able to also see the socio-economic benefits for smallholders and not only focus on the negative impacts. Further they said that they wanted consumers and companies to provide financial support to enable the industry to become more sustainable. NGO respondents expressed the importance of not boycotting the palm oil industry, but rather that more people get involved with initiatives on the ground. They also stated the importance of a more visible and engaged government to assist in the transformation of the Indonesian palm oil industry. Due to there being such a large group of smallholders involved in the cultivation of palm oil, they need to be more included and participate in decision-making processes and solutions.

Consequently, it seems that a larger involvement and participation of all stakeholders across the supply chain regarding making changes are needed to be able to achieve a sustainable palm oil industry in the future.

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