Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Social and Educational Sciences
Department of Geography

Chun-Hsiang Wang

Energy transition to palm oil-based biofuel in Indonesia

Internalization of Global Production Network and the impact on different actors

Master's thesis in MSc in Globalisation and Sustainable Development
Supervisor: Alexander Dodge
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Abstract

This thesis uses the development of palm oil-based biofuel production network in Indonesia to demonstrate how state can do to construct and shaped the Global Production Network (GPN) by playing several different actors at the same time. Construction of this production network relies heavily on the state regulations and policies, and the development of this production network is based on domestic raw material supply and domestic market consumption that all managed by state. Furthermore, this thesis also sheds light on the impact of state to GPN when state acts as regulator, investor, lead firm, main customer, retailer, and upgrader through State-Owned Enterprise (SOE) that has not been addressed in the GPN framework. Other than that, in order to understand the power dynamic within Indonesia biofuel production network, this thesis takes a deeper look into who are the actors within this production network, how are they being coupled or decoupled with the production network, and how are they been affected by this coupled or decoupled process. This thesis carried out fieldwork in Indonesia in order to understand how smallholders were infected by the development of this biofuel production network. Furthermore, in order to understand how policies were issued, this thesis uses resources nationalism to explain and understand state's decision for issuing the domestic market-oriented policies with resources nationalism characteristics after the European Union (EU)'s decision to phase out palm oil-based biofuel as a sustainable biofuel. This thesis suggested that state through SOE will have a larger influence on the modern world supply chain and internalized of GPN, and state will be more and more important nowadays in creating and maintaining a new production network.

Preface

I would like to thank my parents and families to support me studying abroad, thank you my father, 王盛中 David Wang, for spending all those money on my education and travel. Thank you my mom, 葉文慧 Judy Yeh, for teaching how to cook and dance. Thank you my parents for always having faith in me and educating me well. 我愛你們。

To MSc in Globalization and Sustainable Development class 2020, we successfully survived COVID and made it through endless quarantine, closed of border, lockdowns, travel restrictions, social distance, and indoor limited guest numbers. What a special time.

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Thank you my classmates and friends for having so many nice hangouts, parties, conversations, and celebrations together. Thank you for the friendship and good time in study room together.

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Thank you Norway for having me although the winter here is horrible.

Table of Contents

List of Figure

List of Table

List of abbreviations

Crude Palm Oil	CPO
Government of Indonesia	GOI
State-owned Enterprise	SOE
Transnational Corporation	TNC
Global Production Network	GPN
Indonesian Oil Palm Estate Fund Agency	BPDPKS
Refining Development Master Plan	RDMP
Fatty Acid Methyl Esters	FAME
Minister of Energy and Mineral Resources	MEMR
National Action Plan for Sustainable Palm oil	NAPSPO
Indonesian Sustainable Palm Oil	ISPO
Global Commodity Chain	GCC
Global Value Chain	GVC
Non-governmental Organization	NGO
Roundtable on Sustainable Palm Oil	RSPO
European Union	EU
Politics and Government	PolGov
Gadjah Mada University	UGM
United States Department of Agriculture Foreign Agricultural Service	USDA FAS
Serikat Petani Kelapa Sawit	SPKS
Research & Development	R&D
Domestic Market Obligation	DMO
World Bank	WB
International Monetary Fund	IMF
Commission for the Supervision of Business Competition	KPPU
Public Service Obligation	PSO

1 Introduction

1.1 Introduction

Government of Indonesia (GOI) started energy transition from fossil fuel to biofuel in 2006, and with more research improvements in palm oil-based biofuel than several different candidate ingredients, palm oil-based biofuel became the main focus in Indonesia's energy transition. Except for biofuel, palm oil plays a significant role in the daily life because its process products cover from cooking and baking oil, cosmetic to biofuel. Another reason why palm oil-based biofuel can gradually supply 273 million domestic needs is because Indonesia is the main exporter and producer which accounted for 45%-50% of global production and 45-60% of global supply. At the same time, palm oil is also a decisive industry in Indonesia because 19 million agricultural population is in palm oil industry, and it contributed to around 13% of Indonesia's annual export revenue in 2021, the second biggest export revenue after coal (Maulia, 2022). However, after the implementation of energy in Indonesia, palm oil is now shifting away from export to domestic used. At the same time, foreign politics also influence the progress of biofuel in Indonesia because palm oil-based biofuel was considered as renewable in European Union (EU) before 2015, but later EU indicated that palm oil caused deforestation, biodiversity destroyed, and increased of Green House Gas (GHG) emission. Because these reasons, EU announced palm oil-based biofuel was not renewable and decided to phase out pam oil imported from Indonesia and Malaysia for producing biofuel from 2015. Therefore, EU's decision became one of the reasons that GOI accelerated palm oil biofuel development in order to increase domestic demand. By doing so, GOI constructed a new production network domestically through policies and regulations, and until now, over 90% of its domestic biofuel production was for domestic used.

Palm oil is playing an important role in Indonesia's biofuel energy transition, and there are 7.8 million tons of Crude Palm Oil (CPO) being used for producing biofuel in Indonesia which accounted for over 16% of Indonesia's annual CPO production. In order to speed up the energy transition process, decrease crude oil reliance, and increase domestic palm oil consumption, GOI issued National blending Policy after 2008 that demands certain percentage of biofuel blended with fossil fuel into its retail fuel that will be distributed within the whole country by state-owned

enterprise (SOE) Pertamina. Also, in order to encourage biofuel domestic development and secure domestic biofuel supply to Pertamina, GOI used policies that regulated 18 biofuel companies to supply certain amount of unblended biofuel to Pertamina in exchange with levy subsidy from government. Therefore, palm oil now plays an important role in decreasing country's expense on importing oil and decreasing oil consumption.

The aim of this paper is to demonstrate how the whole biofuel production network was constructed by GOI due to international situation, economic reason, and political commitments; and in order to do that, this paper will focus on how GOI constructs and shapes the biofuel production network through policies, regulations, Pertamina, and ultimate customer. Also, how, and why palm oil became the main ingredients, and who consisted of palm plantations and biofuel production will be introduced to provide a better demonstration. Besides, this paper will present how different actors in the biofuel production network were decoupled or recoupled and reacted with lead firm. Except that, palm oil is a very unique product that was used mainly for cooking oil and ingredient for processed foods before 2015, but with the construction and development of biofuel industry by GOI, it now been used for both as cooking oil and energy. Therefore, this transformed from lower price cooking oil into higher price biofuel made a shift and value add-up in production, and this paper will also emphasize on how policy maker, companies, and other actors reacts and form a collation to construct the production network and captured value domestically.

1.2 Research Question

This thesis raised several research questions in order to demonstrate how state can do to construct the production network by playing different roles at the same time within the production network, how different actors in the biofuel production network were decoupled or recoupled and reacted with lead firm, and how national blending policy influences small holders in agricultural area which are the most vulnerable in modern globalization society as McMichael (2017) demonstrated.

Furthermore, this thesis aims to bridge the gap of state role in Global Production Networks (GPN) by showing how state can build and shape a whole new production network through playing all different roles within GPN at the same time by SOEs, buyers, policies, and regulations. GPN is a theory that used to explain the growing global production, outsourcing, and division of labor in the early 2000s that based on communication technology improvement. It emphasized on how different actor such as lead firm, strategic partner and generally supplier react to the market and their customers, and it also focused on how different actors add-up and catch value in order to improve its market share. GPN also included different non-from actors such as labor, union and state that was neglected or simply saw as resources factor in previous Global Value Chain (GVC) and Global Commodity Chain (GCC). Furthermore, GPN also demonstrated the power relationship between different actors. Further theory introduction is presented in the literature part. Global palm oil production network was constructed and matured in the past 20 years, but with the new construction of domestic biofuel production network pushed by GOI, it not just affected the existing production network because of the same ingredients but also affected how different actors conducted value add-up and the power relationship within it. This thesis believes that it is therefore suitable to use GPN to understand how different actors are responding because GOI plays an important in the whole production network instead of simple economic reasons. At the same time, it aims to expand GPN by demonstrating state plays different roles at the same time in building a new production network via domestic supply and demand through SOE.

Furthermore, in order to understand why policies that shaped the biofuel development were placed in palm industry, resources nationalism will be used to understand why GOI issued these polices and position toward other governments. Resources nationalism firstly refers to all kind of measures that country and citizens use to renegotiate, nationalized, or take back the control of resources within its territory from Transnational Corporations (TNCs) in late 1990s and early 2000s because of rising market price or domestic needs (Monaldi, 2020). TNCs or other private companies seized the ownership of many resources after the liberalization in late 1980s and 1990s promoted by World Bank (WB) and International Monetary Fund (IMF). The rising of resource nationalism in Indonesia is coupled with president election in 2014 that current

president Jokowi being elected first time because its rival used the takeover oil resources from TNCs to seek support, and the detail elaboration will be in chapter 3.2 and 5.3.

As a result, this paper takes into consideration the specialty of palm industry in Indonesia, and that is: 1. Palm industry is an extremely important national interest that plays a huge role in employment and income, and the presidents of Indonesia keeps defending this national interest abroad. 2: Most palm plantation and productions are controlled by Transnational Corporations (TNCs), large family's business, and smallholders. Therefore, these roles also influence and shape the industry. How these different players under the lead of state being plugged into the production network is the main focus this paper trying to answer. In order to do so, this paper tried to focus on four main questions related to smallholders that previous research didn't cover completely, and they are:

1. How do multinational companies, public authorities, and smallholder farmers develop markets for palm-oil as a biofuel under GPN framework.
2. How does the politics and policies surrounding the palm industry shape the interaction and negotiations between these actors?
3. How does the increasing production and processing of palm oil as a biofuel for energy markets rather than a product for food and grocery-retail markets impact the livelihood of smallholder farmers and the local government surrounding palm oil plantations.

The three questions are linked and can help this thesis have a better understanding on the shift of actors in two different production networks with the same ingredient, palm oil. And further through the interviews and secondary data, we can understand the impact of this shift and recoupled progress to different actors and smallholders. Besides, through answering these 3 questions, it can further shed lights on how the production network was constructed and shaped by state, and these questions can also bridge the gap of how state can do to the production network by acting as all the actors and by SOE in the production network.

1.3 Structure of the paper

This paper will start with background introduction. The background introduced current oil and palm oil biofuel consumption in Indonesia, and then introduce the palm oil development history in Indonesia. It then introduced current plantation situation and main players within the biofuel market domestically, and then the biofuel regulations, progress, and targets in Indonesia. The literature part introduced Global Production Network (GPN) and focused on state roles within the GPN that plays an important role in this production network. Later, this thesis introduced resources nationalism and its influence on government policy to shape a production network. Followed by literature review, methodology chapter focused on research approach, interview choice, building connection, data collection methods via semi structured interview, data analysis and the ethnical consideration. And then analysis chapter demonstrated cooking oil and biofuel production networks, compared the difference between these two, how smallholders were effected with the shift from cooking to biofuel, how international politics, domestic policies and regulation influenced the production network, why those policies with resources nationalism characteristics were issued, how certification influence different actors and production network, and how COVID and war in Ukraine influenced the biofuel program. The analysis will be done through interviews and secondary resources. Discussion chapter focus on demonstrating how much state can influence the production network when acting all roles within the GPN at the same time. The conclusion chapter summarized the findings and potential research aspect related to state role in the GPN.

2 Background

To understand why palm oil being used as the main ingredient, palm plantation history is the main thing that need to be told. The background section will start with current oil consumption in Indonesia, and then connect with the history development of palm oil in Indonesia that plays an important reason for using palm as biofuel. Later it will introduce current crude palm oil production and consumption situation to provide a better understanding of current situation of palm oil industry in Indonesia. And then it will introduce main producers and important roles in the palm oil production in Indonesia. Later, this paper will introduce biofuel production, progress and related regulations that is the main factor shape the production network.

The transition with palm will be incomplete without mentioning oil production and consumption in Indonesia because although its oil production in 2016 was listed 22nd with 945,637 barrels of oil per day, its consumption was listed 14th with 1,623,000 barrels of oil per day. Indonesia has a long history in imported oil and issued subsidy to cover the gap due to relatively lower oil price, but with the price rose sharply from 2009, it caused a huge burden to government budget (Nurshafira & Rahmayani, 2021; Wang & Dodge, 2021), and government tried to decrease this deficit. Therefore, the plan to use palm and jatropha for biodiesel to decrease the oil consumption came into the stage, and it will be further elaborated in the later chapter.

Palm was not the main focus before 2015 because most of its customer was EU who imported 20-29% CPO or other related products from Indonesia before 2015. But EU decided to phase out palm oil-based biofuel after reports pointed out that Indonesian palm oil was related to deforestation and unsustainable factors. EU directive to reduce indirect land use change for biofuels and bioliquids ((EU)2015/1513) [1] and decided to phase out pam oil-based biofuel in 2015, and the price of international CPO dropped 50% dramatically in 2015 due to decrease in demand. Because of the decrease of demand, the original 20-29% palm export to EU ingredients shrank and made it oversupply, so companies that made biofuel and other palm products for

[1] Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources

export stopped buying ingredients and stocked pile all the existing products. It was at this year the GOI increased its blending percentage to 15% with only public transportations, and it then expanded to 20% with all vehicles included in 2018. Current President Jokowi mentioned not just once that the National Blending Policy saved lots of budgets on oil import and increase the domestic palm demand, and the most importantly with the rise of domestic demand "that we can have a good bargaining position, whether with the European Union or other parties that try to weaken our position" (Gorbiano, 2019). Since the phased out of EU and the dropped of CPO price, the construction of whole production network for palm oil as main ingredient for biofuel industry speeded up. It causes the shift and change of different players in production network for cooking oil, and it's also the focus of this paper.

2.1 Indonesia Palm oil Plantation history

Palm oil plantation has a long historic reason in Indonesia under the Dutch colonial administration in 1911. In 1970s because the policy migration encouraged citizens to move from crowded Java to other islands under the new Suharto regime, the plantation area expanded 20 times larger (Watts & Irawan, 2018). Law Number 3 in 1972 entitled at least 2 hectares lands to the transmigrants to be used for productive means of planting agricultural crops, and it's one of the reason the plantation area grew (Lanini, et al., 2021). Later, Presidential Instruction No. 1 in 1986 carried out the Core Estate Policy to increase the total production of commercial crops and the farmer's wealth through "implement plantation development using large plantation as the core that help and guild the surrounding community plantation as plasma,…, and participants farmers obtain a house with their lands as plasma with the land size of 2 hectares" (Arie Yanwar Kapriadi, p.131, 2019); it cooperated with Law Number 3 in 1972 to expand the palm oil plantation and to increase in smallholders' ownership (Lanini, et al., 2021). Kapriadi (p. 130-136, 2019) described how these two laws and their regulations successfully rose the plantation, ownership, and production of palm oil sharply in both private companies and smallholders, and the production even grew from 1 million tons in total in 1980 to over 9 million tons from private companies and 6 million tons from smallholders in 2008, and Kapriadi (2019) believed that it laid the foundation of contemporary biofuel development and policy, but at the same time it pointed out the regulations also made smallholders depend on private companies more.

2.2 Indonesia Crude Palm Oil (CPO) Production, Exportation, and Consumption

In order to understand the whole production shift, it's important to understand the general background and whole picture of palm oil industry. Indonesia is one of the largest palm and CPO producers in the world, accounted for 45-50% of global production, with the final production of CPO in 2021 was 49.71 million tons, and its 2022 production goal is targeted at 51.01 million tons (Abdurrachman, 2021). Obidzinsky et al (p.4, 2014) mentioned that 73% within the total CPO production were exported, 25.7% were used in food or other eatable consumption products, and only 1.3% were used for biodiesel in 2014, but as data shows in 2020, 7.82 million tons of CPO were used for biodiesel (Statista Research Department, 2021) which rose the percentage to 16.1% in 2020 from 1.3% in 2014.

Indonesia is one of the largest palm oil exporters in the world in 2019, and the export was estimated to reach 27.08 million tons in 2022. (Abdurrachman, 2021; Observatory of Economic Complexity (OEC), 2019). Palm oil exportation is considered as an important income for Gross Domestic Products (GDP), and it contributed to $15.3 billion dollar in 2019 that generally accounted for 3.5% of country's GDP (Machud, 7 April 2021). During 2020, palm oil exports still around $22.7 billion, growing with 13.6% from 2019; current price is at $1093.83 dollar per ton, and it can generate $116 dollar revenue per ton. The main export countries are India (28.5%, $5.05 billion) and EU (13.316%, $2.35 billion) in 2011, but with import tax posed by India and phased out by EU, the main export countries are changed to China (17.4%, $2.66 billion) and India (15.04%, $2.34 billion) in 2019 while EU was $2.04 billion left (The Observatory of Economic Complexity (OEC), 2020).

Indonesia is also the largest domestic consumption in the world (Rahmanulloh, 2021), and the domestic consumption of CPO grew steadily from 7.05 million ton in 2014 (Sardjono, 2021; Indoneisan Palm Oil Association , 2021). It's domestic consumption of palm oil in 2020 was 17.35 million tons, 3.6% higher compared to 16.75 million tons in 2019, and furthermore if we only consider the consumption without as an ingredient to biodiesel, it is 11 million tons in 2021, and for 2022 is estimated around 11.4 million tons (Abdurrachman, 2021).

2.3 Indonesia palm oil Planation and Main Players

After reviewing the numbers of palm industry in Indonesia, it's also necessary to understand the plantation areas and the especially the main players in the whole palm production network. Palm oil plantation is in 23 out of 34 provinces in Indonesia. From 2011 to 2018, the number of direct employments from the palm oil industry consistently increase to 12 million, and the number does not include those work indirectly (Musdhalifah Machud, 7 April 2021). Besides, there are another 2.6 million smallholders and 4.3 million indirectly unemployment who were hired by smallholders. It was estimated that in 2018 within it 45 million agricultural workers there are 42% in palm (Shi, 2019).

There are three main plantations actors in Indonesia, private agro companies, smallholders, and state-owned company (Arie Yanwar Kapriadi, p.23, 2019; Musdhalifah Machud, 2021; Airlangga Hartarto, 2021). In 2016, 53% were produced by private large companies, 40% by smallholder, and 7% by state-owned companies (Schleicher, et al., 2019). It is still unknown the exact production percentage in 2021, but 62.08% were produced by private large companies, 28% by smallholders, and 9.92% by state-owned companies for its 48.3 million tons in 2020 (Rahmanulloh, 2021). For the plantation, the total size in Indonesia was around 14.6 million hectares but not fully used, and within 14.6 million, there were currently around 3 to 4 million hectares in forest areas (Sukardiman, 2021; Statista, 2021); for the plantation percentages, around 68.3% of plantations lands were owned by private agro companies, 28.03% by smallholders, and 3.14% by state-owned companies (Rahmawati, 2019; Indonesia Investment , 2017).

GOI acts as an important and active player in the palm industry in Indonesia, and the reasons for that active are because 1. Palm plantation has a long history in Indonesia, and the whole production network is mature and constructed; 2. Palm is an important export income for GOI, and it is also served as a resource that GOI can use to negotiate with other countries; 3. Palm plantation has an extremely large number of rural farmer and workers involve, 19 million approximately, and it provides stable job opportunities (Warburton, 2017; Kharina, Malins, &

Searle, 2016; Rahmanulloh, 2020). GOI also created Indonesian Oil Palm Estate Fund Agency (BPDPKS) under the ministry of Finance to collect palm oil export levy and to allocate the Palm Oil Fund to subsidy biofuel companies and replanting. Furthermore, GOI through BPDPKS also selected and appointed qualified biofuel companies as the legitimate biofuel suppliers to Pertamina that will further blend biofuel with fossil fuel into B30 and then distribute to the public.

Except for the plantation and GOI, there is also a very important mediator between harvest and extraction, and that is middleman. Middleman can then be divided into private and cooperative, and cooperative is registered under the eligible organizations to government while private is not registered to government as an organization. As we can see from the structure in Figure 4 noted as Tengkuluk, middleman plays a role between farmers and biofuel companies.

Pertamina is the main fuel distributers and retailers in Indonesia. Pertamina is the state-owned oil and gas companies, and it's also the largest business group in Indonesia. The reason that it can dominated the retail market is because it was the only legal sole subsidized fossil fuel distributor domestically back in 1970s, and now it has more than 5 thousand fuel stations in the whole Indonesia; besides, it is the only company owns refineries, biofuel included, in the country due to previous regulations. Furthermore, because other private biofuel companies are not allowed to blended biofuel with fossil fuel and only fossil fuel companies are allowed to do it, and other foreign oil companies such as Shell or Chevron don't have any refinery and retail stations in Indonesia, so only Pertamina is legit to blend the retail biofuel. Furthermore, with the President Instruction No. 1 (2006) that mentioned clearly "To encourage state-owned enterprise in the energy business to use biofuel as an alternative fuel" (Instruction 10, Point d), Pertamina, the only stated-owned company that operating in fuel, became the main and the sole player in blending and distributing biofuel in Indonesia (Arie Yanwar Kapriadi, p.181, 2019Naimah & Morgunova., 2017). Therefore, Pertamina in 2017 was holding at least "80% of Indonesia's biodiesel market and plans to boost output by another 15% before 2024" (Jibiki & Maulia, 2017).

Without a doubt that the real actors and situation involve are more complicated in the whole palm industry in Indonesia, and it can't be fully showed in Figure 4 in page 40 and appendix D, but it serves to provide a brief understanding of the power dynamic, goods or and products flow, and labors within this industry.

2.4 Biofuel production, consumption, and target in Indonesia

In 2021, the total biodiesel production is 8.9 million kiloliters, and 8.4 million kiloliters were distributed domestically (Indonesia's Biofuel Producers Association (APROBI), 2021). For 2022, the target biodiesel production was set to 10.15 million kiloliters and consumption is set to over 10 million kiloliters in 2022 (Abdurrachman, 2021). For the refinery, there were 31 biofuel refineries to produce unblended biodiesel with the total capacity of 11.5 million liters annually in 2018 (Silalahi, Simatunpang, & Siallagan, 2020; Rahmanulloh, 2020). With B30 mandatory blending that rise the demand of biofuel, but refineries are not over capacity, and it is around 80% capacity usage. However, except for the existing 31 refineries that owned by 18 companies in Indonesia, Pertamina is also upgrading its Refining Development Master Plan (RDMP)[2] in upgrading existing oil refineries capacity and adding 2 new biofuel refineries plants that are estimated capable of 466,000 barrel of oil per day (Brelsford, 2020; Oil & GAS Journal, 2020). Besides that, another refinery owned by Cargill is also under construction, and it is estimated to increase the production of palm oil and usage of CPO domestically.

2.5 Indonesia Biofuel Progress, Mandatory blending, and Regulations

Under Jokowi regime, biofuel is considered as an important path to increase domestic demand and save palm oil industry after import duties imposed by top buyer India and phased out from EU because of deforestation and unsustainable (Nangoy & Munthe, 2019; Maskun et al., 2021). Currently, the mandatory blending regulation after 2020 for biofuel in retail market in Indonesia

[2] Pertamina carried out this plan in respond to National energy shortage crisis mentioned by GOI, and it is aiming for 5 existing refineries in Cilacap, Central Java; Balongan, West Java; Dumai, Riau; Balikpapan, East Kalimantan; and Plaju, South Sumatra

is B30 after it passed the 50,000 km of road tests on various vehicle types (Rahmanulloh, 2020), and it means the fuel is blended with 30% Fatty Acid Methyl Esters (FAME) from palm oil. The distribution amount of B30 in 2020 is 13.3 million liters to its 5,518 petrol stations within the nation.

Mandatory blending was first carried out in 2008 under Minister of Energy and Mineral Resources (MEMR) Regulation No.32/2008, with 2.5% blend, and then it increased to 7.5% in 2010. Later between 2011 to 2015, the blending technologies improved, and regulations raised to 15% under MEMR Regulation 12/2015. Next in 2016, 20% was implemented due to breakthrough of technologies and road experiments (Ministry of Energy and Mineral Resources, 2019). Worth mentioning is that MEMR Regulation also directly requested biodiesel producers to sell certain amount of biodiesel to specific oil blender, which mostly is Pertamina. Cooperated with the levy provided by BPDPKS based on the assigned amount, MEMR regulations secured domestic supply to Pertamina. For example, “MEMR Regulation No. 258/2015, which requires 1.6 million kiloliters of unblended biodiesel sold by the designated biodiesel producers to be blended with subsidized diesel fuel and shipped to end users by the designated distributors from May to October 2016” (p.10, Kharina, Malins, & Searle, 2016). Currently the latest MEMR Regulation 252/2020 for 2021, Pertamina will be provided 7.81 million liters (Pertamina, 2021).

Pertamina was reported ready to switch to B40 in July 2021 after success in road experiment (Pertamina, 2020). It was supposed to move to B40 in 2021, but due to higher price in CPO, this plan has been postponed by President Jokowi. Furthermore, B30 biodiesel is already over 20% more expensive than regular fuel without subsidies, but retail price of B30 does not reflect on the retail price due to subsidized by levy and low-price policy raised by President Jokowi. Pertamina in February 2021 reported a 20% declined in revenue compared to previous year to $20.4 billion for the six months through June (Jibiki & Maulia, 2017). However, current President Jokowi planned the goal is to reach B100 or 100% biofuel by 2030, and that is believed can save up to $16 billion USD while Pertamina is struggling to maintain the low fuel price and trying to find a way to reduce it biofuel production cost to make it more competitive (Indonesian Palm Oil Association , 2021).

Palm oil as biofuel is used as a potential way to reduce cost on fossil fuels subsidies due to the sharply rose in crude oil price from 2004 to 2010. It now reduces Indonesian's reliance on diesel import for consumption in transportation sector because of Mandatory Blending policy. 30-32% of total fuel consumption are from transportation, and it consumed up to 32 billion liters in 2020, which means the daily oil production is around 887,000 barrels per day while the consumption is 1,600,000 barrels per day in 2020 (Adminstration, 2021); therefore, with B30 mandatory blending, it is estimated that "will save the country around Rp 110 trillion ($8 billion) per year" (Adminstration, 2021) in import, and it can also decrease its oil consumption and reliance (Nathalia, 2020). Oil subsidy is a huge burden to GOI, it was US$21.9 billion in 2010, equal to 15% of total government spending, but cancelled oil subsidy will further weight the burden of poor people because overall transportation cost will increase and will gradually increase in goods and transportation fees, and it then became a political commodity during national election where resource nationalism came to the stage in several elections in the last years (Arie Yanwar Kapriadi, p.22, 2019). Oil subsidies was abolished in 2015 by President Jokowi in order to fulfill his political campaign policy, and since then, the duty to remain relatively low oil price vowed by President Jokowi was on Pertamina. It further caused a huge revenue lost to Pertamina due to international oil price went high in 2015, it was reported that only Jan to July caused Rp 12.5 trillion, which is 30% of its upstream budget in 2015.

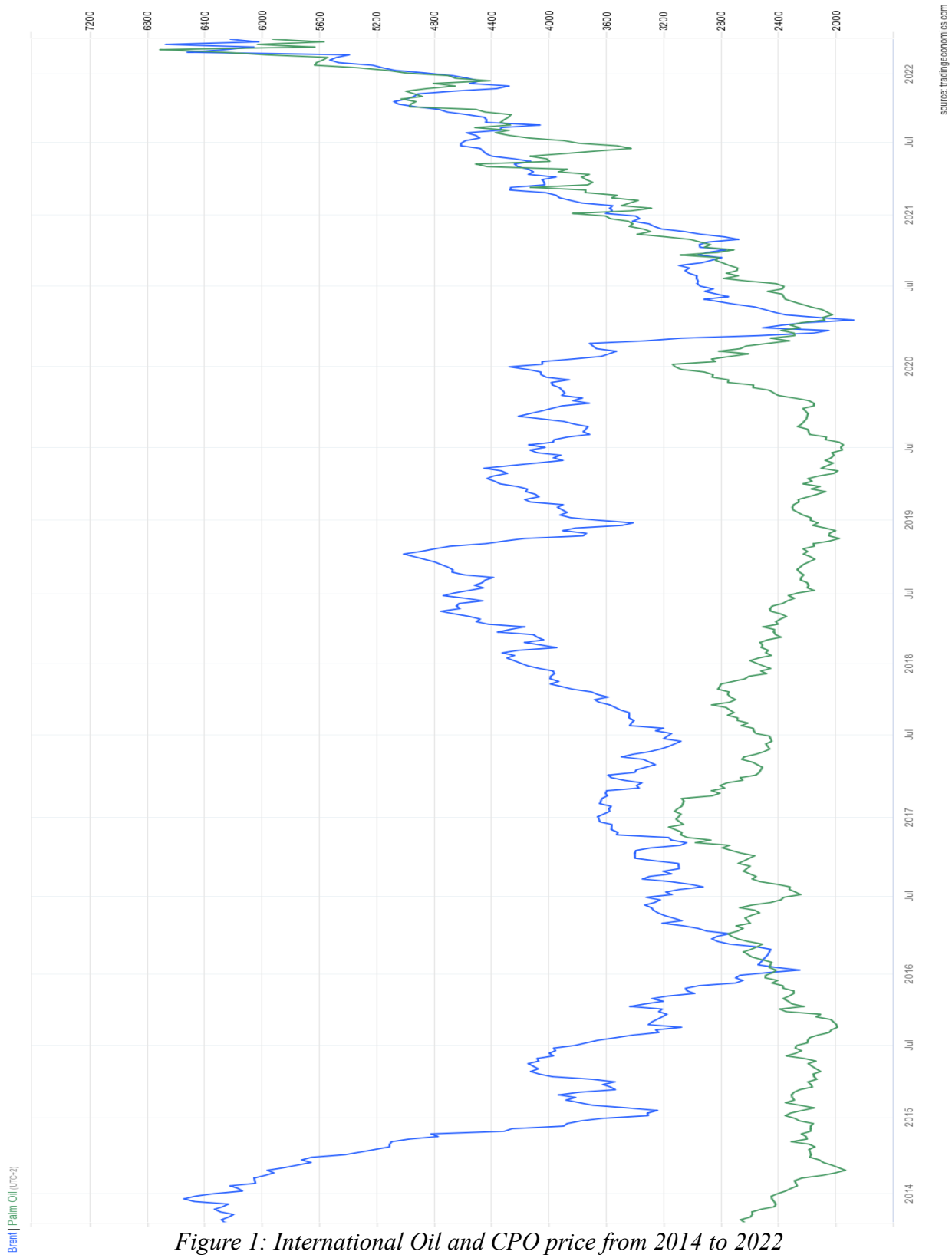


Figure 1: International Oil and CPO price from 2014 to 2022
Sources: TradingEconomic.com

Biofuel was also used as a way to gain more income for Indonesia in order to make GDP ratio more evenly instead of heavily rely on oil and gas sector that made US$19.2 billion profit annually, accounted for 24% of its GDP income in 2005 (Obidzinsky, Andriani, Komarudin, & Andrianto, p.4, 2012). GOI described biofuel as bringing a triple economic benefit from using palm oil as biofuel because it can reduce the tax burden on imported oil subsidies, can improve rural farmer and smallholders' income, and it also can reduce the county's carbon emission. It was reported by Musdhalifah Machud, Coordination ministry for Economic Affairs Deputy Minister for Food and Agribusiness, that palm oil industry already helped 10 million Indonesian leave poverty and also 1.3 million from rural areas by Musdhalifah Machud on International Webinar Sustainable Palm Oil Development in Indonesia on 7 April 2021 (Mol, p. 300, 2007; Ministry of Finance, 2013; Arie Yanwar Kapriadi, p.23, 2019;Machud, 2021).

After phased out decision from EU and several reports indicated that palm oil from Indonesia caused deforestation and other unsustainable issue (Jong, 2022; The Sustainable Palm Choice , 2021; Petrenko, Paltseva, & Searle, 2016), the palm oil industry became top priority under GOI's commitment to implementing sustainable development plan that specially regulated in Indonesia's medium-term development plan 2020-2024 during Jokowi regime (Airlangga Hartarto April 7, 2021). GOI issued National Action Plan for Sustainable Palm oil (NAPSPO) through Presidential Instruction No. 6 of 2019, stated that there must be increased in labor rights and protections, improve compliance with labor regulations, and it also included the following main 5 sections:

1. Strengthening data, coordination, and infrastructure; 2. Improving and increasing the capacity and capability smallholders; 3. Environmental management and monitoring; 4. Plantation governance and dispute resolution; 5. Support to accelerate the implementation of Indonesian Sustainable Palm Oil (ISPO) and increase the market access of palm oil productions. ISPO was a certification issued by GOI in 2011 that aimed to address the environment issues, plantation efficiency, and better management.

ISPO then being further strengthened through Presidential Regulation No.44 of 2020, with more credible certification governance and smallholders’ inclusion into the certification framework. In

order to make the whole certification more complete, Ministry of Agriculture issued Minister Regulation No. 38 of 2020 regarding ISPO certification. It's now as a mandatory regulatory, and from the view of large agroindustry, it's on the benefit side because if the company followed the regulatory and the SOPs insides, it could receive the certification and will have a better business position. Joko Supriyono, vice President Director of PT Astra Agro Lestari, pointed out that this ISPO will help the GOI achieve a more sustainable commitment on palm oil industry, and "companies that implement ISPO's sustainability standard and regulations will have a better recognition in the global market" (April 7, 2021).

However, it might be a both benefits and huge burden to rural farmer and smallholders. From the perspective of smallholders, according to Pak Sutiana, the head of Subur Farmer Village Cooperative Unit from West Kotawaringin, Central Kalimantan, ISPO, provides many trainings for them to understand the plantation of pam with the assistance of nearby companies, and also the ISPO provided a legality to their products. It can also attribute to the environment by keeping a good river condition, fertilizer usage, and using seeds and goods properly (April 7, 2021). But he also pointed out that "the price basically remains the same after getting the certification, and it makes no difference here with or without certification." Besides the price, it is also pretty difficult to get the certification, and they need assistance in education related to the rules and SOP and assistance in financing, and "the hope that according to president's mandatory certification up to 2024, if there is no assistance from existing stakeholders, it will be very difficult to achieve" (April 7, 2021).

Except for assigned quota, mandatory blending through Pertamina and ISPO, there is also export levy on palm oil after 2015. The levy will only be triggered if the international price is high enough to a level; after the past of Presidential Regulation No.61 and Ministry of Finance Regulation No.114 in 2015, revenue collected from the export levy between 2015 and 2020 is estimated at "$3.52 billion, with the spending for biodiesel producer subsidies to meet domestic demand at $2.58 billion" (Rahmanulloh, Biofuels Annual, p. 7, 2020). Detailed biofuel law timeline can be found in Appendix A.

3 Literature review

This chapter starts with an overview of GPN, and then what roles and functions state can act within the GPN will be introduced. The subsequent part will introduce previous research on how SOE engaged in different situation in order to provide a better understanding of state role and SOE within the GPN that will be directly relevance to this study. Later on, resources nationalism will be introduced and it will be used to analyze country's behavior and decision. After, summary of this chapter will be presented.

3.1 Global Production Network (GPN)

GPN can be considered as the snapshot of actors from different locations cooperate and compromise for the markets, and within this network there are many different firm and non-firm actors, and power dynamic between each actor influences GPN in different level. According to Coe (2021), GPN can be defined as "organizational arrangement, comprising the interconnected firm and non-firm actors, coordinated by a lead firm, and producing goods or services across multiple geographical locations or a worldwide market" (Coe, 2021, p.1). GPN was inspired by the Global Commodity Chain (GCC) and earlier Global Value Chain (GVC) in the early 2000, and it focused more on the complexity dynamic of intra, inter and extra firm networks. Furthermore, GPN also took account and had a deeper look into how non-firm actors such as government, labors, Non-governmental Organizations (NGOs) and International Organizations shape the production network (Coe, 2021). The reason for using GPN to understand the biofuel production is because it allows the researcher to analysis the commercial dynamic with all the actors including non-firm actors; furthermore, biofuel production in Indonesia is a special case that state internalized and transformed the original cooking oil GPN to purely domestic biofuel market through political commitments and regulations. Through GPN framework, it can help this thesis explain how the biofuel industry was constructed and shaped.

GPN is considered as a more complex network that included non-directed production actors and power relationship such as policies, regulations and labors compared to GVC. Coe, Dicken, & Hess (2008, p.272) pointed out that GVC is more linearly connection that focused on production

and value capture and distribute, and GVC simplified the power interaction with non-firm actors. Because of that, GVC fell short to present the complexity of production network under modern globalization world. For instance, in this case, state plays an extraordinary role in creating the demand with SOE, and then shape and boost the development and consumption through government regulations instead of lead firm. Under GPN framework, how GOI shaped and maintained a new production network can be presented and explained more completely because it can involve government dynamic and regulations that created the need.

However, this internalization of GPN through domestic market has not been studies detailly as Yang (2014) pointed out that GPN research has been neglecting the rise of domestic market for intermediate and finished goods in their producing host countries or regions. Yang (2014) used the case of China as an example, urging that TNCs were trying to recouple with domestic market and decouple from external market, pointing out the emergence of huge domestic market in China had driven strategic supplier into inland China in order to recouple with market and lower price. Yang (2014) also pointed out that little attention had been put on the localization of GPN as the production networks are shifting from global north to emerging global south market, and this shift represented the "end era of Washington consensus of 2008" (Yang, 2014, p.131). Also, Coe (2021) suggested that there is far little research on how commodity producers and state work together to decouple from GPN by developing domestic market for the commodities they produced as. Furthermore, GPN focuses mainly on how different actors react with other actors from different countries or geographically locations, but it rarely focused on whole production network based in only one country, from raw material production to final consumption (Yang 2014; Coe, 2021). This thesis aimed to bridge this gap by demonstrating how GOI and biofuel producers to decouple by developing domestic market.

At the same time, GPN research mainly focusses on industrial and international companies' relationships but less focus on the interaction and dynamic between local farmer and agricultural except agricultural TNC. Krauss and Krishnan (2021) provided a similar approach by analyzing the sustainability standard, priority, upgrading dynamic, and the conflict between local farmers in Kenya and Nicaragua and the norther lead firms. However, GPN still haven't been used to analyze the shift and change of production network with the same ingredient transforms from

food into energy, and this thesis tries to provide this view to GPN framework and to expand the understanding of GPN in this sort of transformation.

3.1.1 State role in GPN

In this case, state is playing an extremely role in developing and promoting the palm oil-based biofuel domestically, and state as a non-firm actor under the GPN has multiple roles. It's crucial to understand what roles and function state can be within the GPN, and this thesis will use these different roles mentioned in GPN to analysis state's policies and behaviors.

State in GPN is considered as non-firm actors that can influence the production network through several different roles. Except the regulator, state can act as a facilitator, producer/investor, and buyer (Coe, 2021, p.40-42). When acts as facilitator, State tends to introduce or support specific firms through tax, loans, industry policies, or specifical grants. And there are three further observations related to this kind of interventions from Coe (2021). First, this support is usually only to specific industry in the GPN through negotiating a financial package with specific lead firms or strategic partner within industry in order to attract investment. Second, these methods state uses will be different from country to country or even within vary within a country, for instance, the setting of Special Economic Zones in costal China cities for the purpose of increasing job opportunities and labor quality or to connect its regional center with lead firm in GPN. Third, in some countries, state will actively to initiate or support domestic firms or industries to be plugged into GPN.

When State as a producer/investor, state have a huge impact on GPN by holding equity positions mostly within a lead firm. This role mostly happened firstly in companies that need a huge fund and legal support in the initial stage, mostly oil and mining sector, but recently it occurs in so many different areas through SOE (Coe 2021, p.41). Also, by holding certain number of shareholdings through sovereign fund, pension and central bank or direct ownership by the state, State can control and configuration the GPN, such as Saudi Aramco to Saudi Arabia, Pertamina to Indonesia or Volkswagen to Germany, and it happens not only in developing countries but also all around the world. Coe (2021) pointed out that these companies together are considered as

“state capital hybrid”, and the number and scale of these companies are growing significantly under global economy development. Worth noticing that these state capital hybrid companies, most of the time, are not mainly profit or market and economic efficiency oriented but geopolitical motivation of different reasons such as energy security or national interest matters. Foreign investments or GPN related decisions or activities are made based on national interest and politics such as national companies invest abroad under Belt and Road (Zhang & Yin, 2019).

The third role is buyer, and when it acts as buyer, State became customer through large scale public procurement. However, this role hasn’t been really studied detailly although public procurement may constitute 20% of GDP Coe (2021, p.42). Coe noticed during the outbroke of COVID in early 2020, state act actively in this role for medical and related material such as facemask or rapid tests. Coe use face mask case in Taiwan during COVID as example (Coe, 2021, p.42), mentioning Government of Taiwan posed facemask export restrictions in early 2020 when the COVID pandemic about to started, and as a buyer, it directly involved in procurement and distribution in order to make sure the weekly quota and national storage were enough for its citizens. The procurement of state is also being influenced by not only economic reasons but also geopolitical reasons that can shaped the GPN largely (Coe, 2021). Under the case of Indonesia, GOI is also indirectly acting as buyer through its department and state-owned Pertamina, assigning quota amount for pointed producer for Pertamina.

Although State is a part of GPN theory, most studies don’t focus on state as lead firm but rarely a factor in extra-firm relationship that has three main roles as introduced above. Nelson, Pritchard, & Yeung (2014, p. 3) pointed out that “State action and inaction is often a key aspect of GNC/GPN research narratives (about firms, regions, nations), but is rarely placed in the foreground, and even more rarely, given due theoretical consideration.” With the same view, Lim (2018) pointed out that state driven SOEs require more research in order to understand how state will react when it's in the lead firm role, and how state through SOEs to conduct time-space compression and further shape the production network. Besides Lim (2018) further suggested to have more study to understand how different actors react when the lead firms are SOEs, and he also suggested to use lens of politics to look detailly in order to understand how SOEs, as lead firms or strategic partner, coupling with different regions and what are the reasons behind. With

the similar view, Neilson et al. (2014, p. 3) indicated that “explicit theorization of Sate’s role has been somewhat lacking in the GVC and GPN literatures.” Smith (2015, p. 290) also pointed out that “understanding of the relations between state action and the changing geographies of the production network remain in its infancy.” McGregor & Coe (2021) demonstrated the case of how state actively involved to shape Singapore’s position in upstream, midstream, and downstream oil production network in different time through negotiations with TNCs, SOEs, regulations, policies, acquisition and indirectly owned private company. In the same article, it also showed how state actively coupling, decoupling, and upgrading via policies and SOEs in Singapore in order to catch higher value and fulfill the biggest benefits for the state. Little literatures related to state as different active role in participating and developing SOE’s role within GPN can be found, and there is still little to be studied in state via SOE as a lead firm and State plays different roles at the same time as Lim (2018) suggested.

3.2 Resources Nationalism

Resources nationalism is used in this thesis to understand state’s behavior and decision. From the previous background chapter, we can understand that the whole palm oil biofuel progress is promoted strongly by government after the EU announced palm oil is unsustainable in 2015 and decided not considered it as renewable, and later in 2018 EU decided to phase out to 0 percentage by 2030 (Jong, 2019). Since then, under the current Indonesia president Jokowi, palm oil issue was increased to nationalism level that will be demonstrated in later chapter, and Resources nationalism is suitable to explain decisions made by country rich in nature resources.

Resources nationalism was originally used to describe the power relationship and policies between host state and International Oil companies (IOCs). Viboda (2009) pointed out that IOCs gained more negotiation power than host state during late 1980s and 1990s due to the lower oil price, but after millennium, host state gained more power due to the high price. Also, except for the price, Viboda (2009) mentioned that indusrtry competitoin, the expertise of IOCs and host state, and experience to deal with IOCs of host state also affects the degree of resources nationalsim policies and attitude toward IOCs. Arbatli (2018, p.102) further used the cases of conflict between IOCs and nation states to refer resources nationalism to “the complete set of

strategies that a host state uses to increase control over natural resource wealth at the expense of foreign participation and investment". From this concept are two important notes, the first is the increasing role of host state controls over domestic resources extraction, and the second is the decreasing role of foreign companies' participants in resources extraction. Monaldi (2020) also supports this statement and describe resources nationalism as a way for host state to gain a larger share of revenue, participation, or control in domestic resource extraction. Furthermore, World Bank reseach carried out by Chang, Hevia, & Loayza (2009) pointed out that states rich in resources tend to used resources nationalism in order to privitatize extraction industry, and with the model they created, it indicated that the price of resources will highly affect to what extend is resources nationoalism being raised. The model pointed out that the higher the price in nature resources, the higher the chance resource nationalism will be raised and used. Other researchers provide further understanding based on Latin America countries with oil, and they pointed out that resources nationalism is being used as a way to nationalize extraction industry no matter what political label the government or candidate has on political ideology (Berrios, Marak, & Morgenstern, 2011). Stevens (2008, p.26) further pointed out that resources natioalism in some host state are being translated and used as "an anti-Western IOC campaign", and different host state but with similar political perspective tends to collaborate with each other to develop a joint programe than with IOCs.

Wilson (1987) firstly used market cycle model to explain resources nationalism in oil industry, and within it, the cyclical production boom and bust of world market will decide the result of state and firm bargain power and position (Wilson J. D., 2017; Haslam & Heidrich, 2016, p.36). Several research based on this path also pointed at the same direction that resources nationalism is a "cyclical phenomenon" (Stevens, 2008, p. 27; Vivoda, 2009; Monaldi, 2020) that rise and drop of resources nationalism is coupled with the rise and drop of extraction resources price. The higher the price for the resources, the higher the bargain power the host state has, and host state also tends to review the current contracts and ask for higher taxes, investments, or royalties when the resource price is higher. (Stevens, 2008; Vivoda, 2009; Bremmer & Johnston, 2009; Haslam & Heidrich, 2016, p.54; Monaldi, 2020).

However, market cycle can only explain a part of government decisions with recourses nationalism characteristics. Wilson J. D. (2017) pointed out that the boom and bust of market can't fully explain the government's behavior and decision toward nationalsit or resources natioalims policies, and instead, it's only just one of the many factors that trigger resources nationalism. Wilson J.D. (2017) further pointed out that this cycle model can't explain why resources nationalsim have different influence and outcome for different government by demonstrating the difference between Chinese's state direct ownership in oil company and Brazal's regulation to regulate private firm in mininig industry.

There is still continuedly debate in how resources nationalism affects different type of countries and governments regime (Haslam & Heidrich, 2016; Wilson J. D., 2017). What level is resources nationalism on the basis of country interest? Resources nationalism in different discipline and lens can have different view. Political based resources nationalism criticized economic based that view state as a stable and fixed actor that use resources nationalism as a rational decision to "reassert its autonomy and express its capacity to nationalize and regulate in giving pressure force" to international companies (Nurshafira, 2021, p. 20). On the other hand, political based was criticized for oversimplified resources nationalism into a liner approach in which considered resources as only an instruction subjected "merely for development or economic development ends" (Nurshafira, 2021, p. 26). Therefore, currently there is no clear definition on resources nationalism and when will resources nationalism happen, but Wilson (2015) managed 4 core concepts within polices that can be considered as policies with resources nationalism characteristics:

1. Policies aim at the ownership of resources, including some level of local or state ownership and nationalization.
2. Policies limit the operations of TNCs or IOCs, including Domestic Market Obligation (DMO) or subsidized price to locals.
3. Policies designed to collect rents that increase the share or revenues from resource production, including taxation.
4. Policies established to have a better bargain position.

Haslam & Heidrich (2016, p.36) also pointed out similar concepts for resources nationalsim policies. At the same time, Stevens (2008, p.27) believed that resources nationalism is not just a

way host state used to nationalized resources, but it is also a tool for host state to seek for more local investments or technologies investments during the higher price.

Government officials and candidates will tend to raise policies that is linked with economy growth or other economic development such as employment in order to get a better election outcome and support (Howe, Szöcsik, & Zuber, 2021). While at the same time, voters expected a more beneficial economic policies or aid packages from the government or candidate during the election (V. O. Key, 1966; Joseph E. Harrington, 1993; Hall, 2021; Wilson, 2015; Howe et al., 2021). This kind of mutual expectation from voters and candidates lead to that when party came with resources nationalism policies, it caused much more attentions and success under "globalization, automation, economic and financial crises" (Howe et al., 2021, p.858). Wilson (2015, p. 400) described it as "a strategy where governments use economic nationalist policies to improve local returns from resource industries". However, the more development of global oil and gas industry which known for high profits and high investments, the more interest conflicts happened between TNCs and host countries (Nurshafira, 2021). As Nurshafira (2021) demonstrated the conflicts between IOCs and GOI, the higher the profits within the industry, the more incidents happened because of resources nationalism policies and decisions.

3.2.1 Resources nationalsim in Indonesia

In the case of Indonesia, resources nationalism can be traced back to Soeharto regime in 1970s when government takeover profitable industries into government control, but it went down when the government changed and the outbreak of Asia Economic Crisis (Warburton 2017; Nurshafira & Rahmayani, 2021; Nurshafira, 2021). However, Wilson J. D. (2017) pointed out that resources nationalism has increased within Asia in recent years. Resources nationalism was also used to seek stronger political support in 2014 and 2019 presidential election in Indonesia. In 2014, candidates addressed more on anti-foreign narratives, and it successfully acquired voter's support. Resources nationalism was an "efficient and useful weapon in policy debates and rallies, and political leaders were releasing public policy that matched the nationalist mood" (Wang C. H., 2021) in the presidential election between Prabowo Subianto and Jokowi Widodo. The former one is a retired general during Soeharto regime who accused foreign actors and

companies are using domestic resources and people's wealth to fulfill their pocket. As for Jokowi Widodo, although he has less nationalism trend, he was still in a pro nationalism position because of his rival. From his respond in TV debate in 2014 related to nationalist issue. He said that: "If it is clearly our possession then we would have to do anything, if it concerns our sovereignty, yeah, we'll make trouble. Don't think I can't be tough. I am tough and bold in making decisions and taking risks!" (Tribunnews.com, 2014; Aspinall, 2015). During the next election in 2019, resources nationalism for nationalization were being used as a way to gain support and made promises. From the campaign statement, Jokowi mentioned on 15 February 2019 (Malik & Siswoyo, 2019):

> In 2015, the Mahakam block, which was managed by Japan and France, was more than 50 years old. We have taken it and handed it over to Pertamina… the Rokan Block has been managed by America Chevron for 90 years. But in 2018 yesterday, Pertamina won 100 percent.

Resources nationalism policies and statements were used widely within the two elections. After these two campaign elections, the concern on resources nationalism back to Indonesia was raised (Warburton, 2017; Warwick, 2022). It also happened in palm oil industry in Indonesia from 1990s that foreign companies or investors were banned to invest in Palm plantation or related industry in order to protest domestic industry, and Warburton (2017, p.301) mentioned that "local companies with connections to the president and his inner circle sought protection from foreign competition". And Warburton (2017) further pointed out that althogh that banned was lifted due to Asia Economic Crisis in late 1990s, resources nationoalsim still existes in palm oil industry in Indonesia. It was transfromed into antoher form that political elites have a share or joint adventure with foreign companies, mostly based in Singapore and Malaysia, and that is "the largest conglomerates in the palm oil sector have a close relationship with government elites at every level" (Warburton, 2017, p.302). At the same time, Warburton (2017) urges that the ownership difference between foreign and domestic is another reason caused resources nationalism in Indonesia that "who owns what, how much, and in what sub-sectors" (Warburton, 2017, p.286), and resources nationalism is just a method that GOI or politics elites used to nationalized those industries or simply expand their businese and be monopoly.

3.3 Delamination of conceptual framework

This chapter has introduced GPN, state role within GPN, and resources nationalism for the analytical chapter of this thesis. GPN is a framework that built on GCC and GVC, and it added non-firm actors in order to provide a better understanding on how different companies and actors in different locations react to each other within a single production network. It provides a snapshot of the cooperation and competition between different actors in modern world, and it further provides a framework that is capable to add different political administrations, labors, and other non-firm reasons that will also influence the production network.

Within the GPN part, this chapter specially introduced the 3 different roles of state under GPN framework. Except state as a regulator, it can be facilitator, producer/investor, and buyer within GPN. The chapter also introduced these roles in different functions and what behaviors state will conduct, and these roles let this thesis to annualize how GOI constructed a production network based on domestic needs. At the same time, this chapter also pointed out that GPN hasn't included state's role and behavior, through SOEs, as a lead firm and other 3 non-firm roles at the same time.

Resources nationalism has also been introduced in this chapter. Although there is no clear definition that to what degree a policy should be considered as resources nationalism, it provided 4 core characteristics of resources nationalism policy, and this chapter also introduced the cycle relationship between resources nationalism and resources price. Besides that, it also demonstrates how election and politics can trigger policies related to resources nationalism.

Altogether, the concept and framework mentioned above consisted of the literature review and theory chapter that is aimed to help to analyze and understand how state can construct and shape a production network as a lead firm through SOE based on domestic demands. Furthermore, they can assist this thesis to demonstrate how different actors being decoupled or recoupled to this biofuel production network. They can also help this thesis to analyze the decisions and policies behind the government better through resource nationalism.

This thesis aimed at bridging the gap of state role as a lead firm in GPN, and also how resources nationalism policies can reshape and construct the GPN. Although state and SOEs are playing a more and more important role within the GPN framework, how resources nationalism impact state and SOE on GPN not very well-studies. Resources nationalism grows dramatically within resources export countries in recent years (Howe et al., 2021), and more and more conflicts are affecting resources and goods production within the GPN; for instance, Russian and Ukraine war has significant impacts on global food security on wheat and the supply of sunflower as biofuel development in Europe, and there are not many studies on how resources nationalism integrated with state policies can affect GPN and to what extent. This thesis urged that resources nationalism policies to the GPN and this unique internalized transform of palm oil-based biofuel through state and SOE can be very fruitful on widening GPN theory.

4 Methodology

4.1 Research approach

This research is carried out by a qualitative empirical study based on interviews with small holders, NGOs, and other actors because it provides a deeper understanding to the topic based on different individual's experience instead of quantitative research that aims to find the general trend or regression from the big data. Furthermore, qualitative research allows the research to put emphasize on the interaction between interviewees and incidents that research is focusing on (Newman, 2003). In other words, qualitative research can help the thesis to have a better understanding on how it happened and what's the impact of the incident to different individual and actors (Su & Lo, 2019). However, it's also very important for researchers who conduct qualitative research try to keep neutral because the interview target and questions can lead to manipulated outcomes (Newman, 2003). According to Wen et al., (1989), it is inevitably that during interview the content will be very subjective because human being is taking the interview instead of analyzing numbers. In order to do that, researcher should collect and understand opinions and views in both side before the interview in order to make the interview questions more objective for an objective outcome (Rich Knowledge Bank , 2021).

This research also uses triangulation measure that means using more than one data collection way or source on one case in order to examine the result researcher collected. It allows researcher to further understand different aspect and have a more complete case study for the purpose of increasing reliability and credibility. Furthermore, triangulation helps the researcher to decrease the biased from the interview or data from single source (National Taiwan Normal University, 2012). This paper used triangulated semi-conducted interview with secondary resources data collected from different government white papers and data, and by doing that, it improved the reliability and validly of this paper.

4.2 Choice of interview Firm and establishing contacts

This thesis chooses the interview participants from the Bina Baru province of Riau because firstly, the connection this thesis has is in Bina Baru, and second is because it is where the whole

village heavily relies on palm plantation and related economies activities. Furthermore, Riau are also where most smallholders located according to Musin Mas (2021). After deciding the interview region, this thesis set the standard for choosing interviewees as following:

1. The farmers in the province of Riau.
2. He/ She has their own lands that are used for palm oil plantation, and it's no larger than 25 hectares which is not considered as smallholders, or
3. He/ She has no land but work as a worker for other farmers, or
4. He/ She has no land but has been working in palm / biofuel industries.

Eventually, total interviewees are 6 farmers, 2 indirectly related workers, 1 NGO in Jakarta, 1 regional cooperative leader, and 1 local government level consultant.

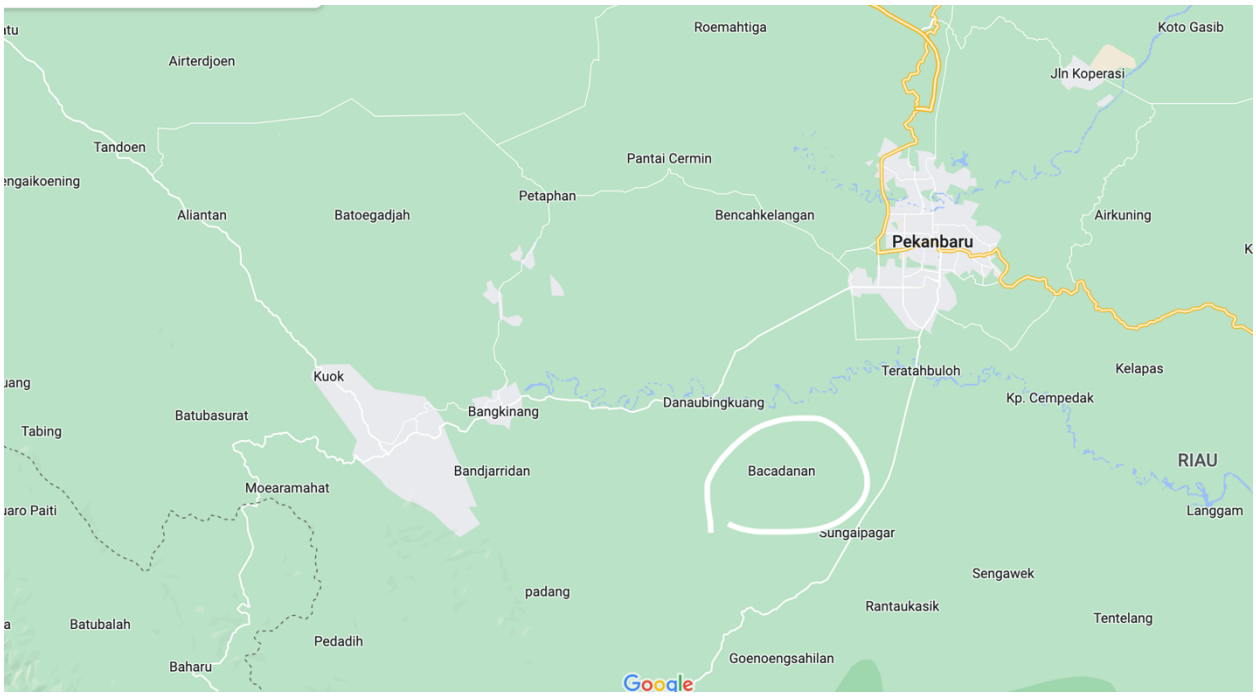


Figure 2: Research field on google map
Source: Google map

To have contacts with smallholders or related workers are important for this paper to conduct interview because the cultural in Indonesia is that it is much more polite and will be easier to have some connections before approaching the target groups; furthermore, conducting an interview in Indonesia will require the approval of the village, and it will be a lot easier to be introduced and get approval because of the connection.

It's harder to find the target groups through LinkedIn or email since most smallholders have limited internet and basically zero English knowledge. After sending mails and fax to several biofuel providers without hearing them back for almost a month, this thesis decided to use "Sawit" and "Riau", means palm oil in Indonesian Bahasa and the Riau Region, on Facebook to search for the target groups. Although this thesis found the smallholders in Riau, they all refused to have interview online because they don't have enough internet data or smartphone. Even with smartphone, some of them don't know how to do the interview online. As for the biofuel companies who responded inquiry mail, they rejected my interview invitation after declaring my intension and showed them research questions and approval.

Therefore, after arriving Yogyakarta, Indonesia, I contacted previous internship host university Organization, Research Center for Politics and Government (PolGov) in Gadjah Mada University (UGM) for assistance. After discussion, we found out one secretary works in the PolGov whose family is smallholders within the region, and their relatives are also either smallholders or work in this industry. After having their permission to have interview, they promised to help us find more connection within the village to have interview with. Therefore, PolGov and I decided to have a fieldtrip for a week there in order to conduct the interview.

4.3 Data collection

This research used Semi-structured Interview, and predetermined interview questions to smallholders and local government officials can be found in the Appendix E. The following section will introduce the main way to collect data for this research.

Interview and secondary data play an important role within this paper, and the reason is because the roadmap of palm industry is not that complete and transparent online. Therefore, in order to present the change and development of biofuel program, total domestic production and consumption data is essential. For production and consumption data, this paper collected them from websites of government departments within GOI and presentations delivered by GOI officials in the web seminar. However, in order to exam the accuracy of the data, this paper also

collected the same data from Biofuel Annual Report Indonesia released by United States Department of Agriculture Foreign Agricultural Service (USDA FAS).

The amount of appointed biofuel for each companies, which companies were assigned, and refineries number from 2012 to 2020 was collected through USDA FAS and compared with data released by Minister of Energy and Mineral Resources of the Republic of Indonesia no.3756 k/10/MEM/2017 (2017) *Determination of biodiesel biofuel business entity and volume volume allocation for the procurement of biodiesel biofuel in Pertamina and PT Corporate Corporations* (Minister of Energy and Mineral Resource of the Republic of Indonesia , 2017). However, this document is not in English, and the latest version stopped update in 2019, but it can still tell the name of companies and their assigned amount. Furthermore, in order to make the data about biofuel assigned amount more completed and precise, this paper also collects related data from Serikat Petani Kelapa Sawit (SPKS), palm oil smallholder association, and then present related data in Table 1 in page 45.

Except from the secondary data collected from government websites, white papers, scientific thesis and news, the firsthand data is collected through Semi-structured interviews. Interview is the most common way to collect data in qualitative research because it is the easiest way to understand individual's opinion and impacts to the incident, and it allows the researcher to have a direct contact with the interviewees to understand the credibility through in person observation (Wen et al., 1989). According to Rubin & Rubin (1995), qualitative interview design and conduct is flexible and repeatly, and the interview questions can be changed and imporved again and again during the research. Wen et al., (1989) also indicated that interview can be carried out based on the original questions, or researcher can raise more questions based on the ongoing interview in order to make the research more complete. Furthermore, interview can allow researcher to raise more complex and abstract questions that are hard to ask or answer through questionaires, and at the same time interview allows researchers can observe interviewees body languages or emotions more easily Wen et al., (1989).

However, Wen et al., (1989) also pointed out that several shortages that interview will face and researchers need to take them into consideration while conducting interviews. The first thing

needs to be aware is that interview relies heavily on the ability and quality of interviewees, and if the quality of interviewee varies, then the results will be also varies. Second is that samples might be limited to a lower amount due to time, energy, manpower and budget, unlike experiements or data crawler that can have larger samples. Third is that because sample is limited, the result might be biased that might lead to misuderstanding conclusion. Except for biased, subjective opinions or incorrect memories might also lead to misunderstanding conclusion, and interviewees might not be aware of this behavior. Fifth and last is that different socail value, status or socail experience are different, so it's harer to be in others boots, and the interview result will be affected because of that.

As for Semi-structured interview, it allows the researcher to ask the same and specific quesitons related to the research while at the same time it also has room for following questions or perspectives. It allows the researchers not just receive the answer from the questions but has muhc more flexibilty to ask more in-depth questions triggered during the interview. Furthermore, semi-structured interview allows reserchers to look deeper into different induvidual, and to use data collected from different interviews to raise another questions in order compare the difference among others. Therefore, semi-structured interview was carried out for this research in order to understand what other impact of a new production network from the same ingredient can bring to the smllholders except increase of income (George, 2022; Pollock, 2020).

4.4 Data analysis

This thesis is based on triangulated research approach that consists semi-structured interviews and secondary data from different government websites, reports, SOEs' website and press, or white papers. Being awareness of the credibility of analysis of data collected, this paper used documents from governments and international organizations, and it's essential to use data with credibility and authenticity in order to increase the credibility of this thesis (Wen et al., 1989).

The analysis will use Thematic analysis. It's a common method of analyzing qualitative data or documents such as but not limited to interview or transcripts, and this way allows researcher to identify common or repeatedly topic, opinion, and perspective more easily (Caulfield, 2019).

Thematic analysis has 6 steps according to Braun & Clarke (2008): Familiarization, Coding, Generating themes, Reviewing themes, defining, and naming themes, and writing up. After reviewing, coding, and generating theme, this paper used 4 main themes that will later being used to analysis the result; Income; Policy and Politics; ISPO Certification; Production network. These four themes provided a very useful angle to understand how policies constructs the biofuel production network by state, what's the impact of shifting production network from cooking oil to biofuel for actors, and they also allow this paper to demonstrated how the biofuel production network was shaped by politics, SOE, international situations, and State-business Relations. Furthermore, these four themes identify the main actors in the biofuel production network, and also demonstrated the roles of state within the biofuel production network.

4.5 Ethical Consideration

It's important for researchers to present the collected data accurately and objectively, and another important thing is to let the interviewees understand how the data collected will be used, presented, storage, and deleted after. In this research it was informed before and during to interviewees that it will be anonymous, but their province name and how many hectares of lands will be reveal in the report to show a more objectively and completely data. Also, the interviewees were also being informed and awarded that it will be impossible to know who they are based on the hectares, province name, income, and revenue written in this paper, because there are many farmers holing similar hectares of lands with similar income within the same province, and this thesis also won't show their exact location. Research questions also been approved by Norwegian Centre for Research Data on 23 November 2021.

Since this research was introduced by close connection to the village and with the famous UGM in Indonesia, plus it will be impossible to know who the interviewees are, the interviewees can fully explain and described the real thoughts in their mind, and they can also show the reality without concern in criticizes about policies and related interest groups. However, it's extremely important to explain to the interviewees the contents that will be published in this thesis, and the data collected from them will be destroyed after the end of this research.

5 Analysis

This chapter will present the findings from the semi-structured interviews and secondary resources. These findings will be presented within several dimensions that can be further detailed into several different categories; Indonesia Palm oil; politics and regulations; resources nationalism effects; ISPO; COVID and War. Although it was separated into several dimensions, they all connected together and affected each other which constructed a whole production network. This part will focus on revealing this complex production. In order to demonstrate how GOI constructed and shaped the production network of domestic biofuel market, how and why related regulations were issued, how politics shaped the production network, and to identify the impact of energy transition by palm oil and resources nationalism on smallholders and other actors, the following analysis will focus on revealing the main drivers and reasons connected to the transition from government level to smallholder level. By doing so, this analysis provides an important understanding into the domestic and foreign politics surrounded the palm oil industry, which can further be used to understand how this industry and production network was organized and formed between different actors, and how it impacts the smallholder from shifting as cooking oil provider to energy.

5.1 Indonesia Palm Oil

In this section, it will focus on the two production networks built on palm oil. The first part will be the production network of cooking oil, and then the second part will be the production network of biofuel. This order can provide a better understanding for the production shift from cooking oil to biofuel. Later this paper will address on difference between these two productions, and what's the impact of shifting from cooking oil to biofuel to production. Later on, it will address on how policy and regulations shaped the production network in order to answer research. In order to further shed light on how policy effect the biofuel production network and the politics surrounded the biofuel production, this section will also address ISPO and international politics that affected palm oil as ingredient for biofuel.

5.1.1 The production networks and cooperation in cooking oil

The production network for cooking oil is controlled by several main producers. There are four main producers controlled 46.5% of cooking production domestically and dominated the price and exports (Sulistiyono, 2022), and within that, the largest one is also an integrated group covered from upstream palm plantation, midstream CPO extraction and processing, to downstream cooking oil producing. With top 10 market share cooking oil producers, there are also several same companies within the biofuel supplier list in Appendix B, for instance Sinar Mas, Wilmar International Ltd and PT Smart TBK. Furthermore, according to several investigation, the majority of the palm plantations are owned by "a few people, maybe 20 at most, and they also own the entire industry infrastructure such as the factories and everything else. So, they have a monopoly on the industry and a monopoly on the price of palm oil" said Uli Arta Siagian, a forestry and plantations campaigner at environmental non-profit WALHI (Llewellyn, 2022).

Production network of cooking oil was relatively simple and dominated by private agricultural companies. The plantation is controlled by several main plantations such as Provident Agro (No cooking oil products), Astra Agro Lestari (No cooking oil products), Sawit Sumberamas Sarana (No cooking oil products), Dharma Satya Nusantara (No cooking oil products), Salim Ivomas Pratama, Golden Agri (Sinar Mas), Musin Mas, Wilmar, Permata, and Korindo Group (No cooking oil products), but because some are not listed on Indonesia stock market, so this thesis can only list out companies have open data. Furthermore, the retail market is also controlling by those plantation companies with their own cooking oil brand because these companies at the same time are also the main cooking oil brands in Indonesia. The main cooking oil brands are Bimoli by Salim Ivomas Pratama, Sania by Wilmar, Filma by Sinar Mas (Smart), and Sunco by Musin Mas (Eiela, 2021;Nurshafira, 2021). Besides that, as interviewee 3 and 5 indicated, and secondary data also indicated that the purchase habit of cooking oil also is affecting the production network because main citizens tend to buy cooking oil products with famous brands, so unknown or unbranded cooking oil are usually sold to the poor with lower price. Another reason is that the profits margin for cooking oil is relatively low, and most plantation would rather to sell its harvest abroad, to processer or exporters. Therefore, with these 2 reasons,

cooking market and production network are controlling by the main palm plantations with their own cooking oil brands.

However, as the largest palm oil producer in the world, Indonesia is now experiencing cooking oil crisis. According to last year and latest CPO production data (Indonesian Palm Oil Assocaition , 2021), there's no shortage of palm supply in both years. But with the international CPO price going up due to COVID, price for cooking oil started going up in some regions last year, and it even caused a shortage in cooking oil from October 2021. After this, GOI issued the Maximum Retail Prices (HET) for cooking oil in February 2022, and the price was set the same within the whole country with a price capped of 11,500 IDR per liter for unrefined non-brand bulk cooking oil, 13,500 IDR for small-brand, and 14,000 IDR per liter for supermarket and premium package. However, after the war in Ukraine broke up in late February 2022 that led to palm oil price skyrocketing again, a short for cooking oil in the market reemerged and people started lining up get to buy cooking oil although there was no report on low harvest (Nugroho, 2022). However, the price was still controlled by GOI. Furthermore, with current ongoing cooking oil shortage crisis, GOI decided to place additional DMO forcing the palm oil companies to sell 20% of their production in January 2022. Considering the situation is getting worse and worse, GOI increased DMO to 30% of in March 2022, and GOI also removed price caps on packaged cooking oil in March (Siregar, 2022). The price for bulk oil then doubled to 26,000 IDR in late April (France 24, 2022). However, a week later, the Trade Minister Muhammad Lutfi mentioned in the parliament hearing that DMO will be lifted and replaced with increased export levy and tax "from a combined maximum of US$375 per tonne to US$675 per tonne. The maximum CPO tax would be applied when prices reach US$1,500 per tonne." (CNA, 2022), but the policy shifting back and forth and the export ban was reissued on 22 April 2022 after President Jokowi announced an export ban on all cooking oil and palm oil ingredients for cooking oil (Llewellyn, 2021; Nugroho, 2022; France 24, 2022).

It is also being considered that biofuel took away some of the CPO supply from cooking oil and caused this cooking oil crisis (Llewellyn, 2022). It was reported that around 0.8-1.42 million tons of CPO supply were shifted from cooking oil while the supply for biofuel increased about 0.8 tons from 2019 to 2020. It's believed that the reason behinds that is the profit for biofuel is better

than for cooking oil (Jong, 2020). However, it is also generally believed that the price gap is the main reason why there's a scarcity of cooking oil domestically because the "producers who are reluctant to sell at home because high international prices have made exports more profitable" (France 24, 2022) , and similar comment were made after the investigation of Commission for the Supervision of Business Competition (KPPU). Furthermore, after India, the main export market, reduced its import tax on Indonesia's cooking oil for the important elections (Reuters , 2022) and the record high of international palm oil price in 1,600 USD per ton due to war in Ukraine, it's considered more profitable to export their products abroad (France 24, 2022). Some conglomerates such as Salim Group, one of the largest retailers in Indonesia, were found out stockpiled more than 71,000 liters of cooking oil in one of their warehouses (Jong, 2022; VOI, 2022).

With small number of conglomerates controlling from production to retail, it had given rise to indications of cartel practices within which producers cooperate to fix prices and limit competition. It also made GOI harder to deal with the cooking oil crisis although GOI issued DMO and export restrictions (Jong, 2022). Furthermore, the current regulations, according to Mulyanto, a member of parliament, are preventing entry into the market and competition (Jong, 2022), and it also made the cooking production network controlled by companies monopoly.

As for smallholders, their role in this production network is simple, providing their harvest to the cooperative and middleman, and before the implementation of B30, the price for the harvest is almost 1/3 lower than the current price. But according to interviewee 6, that low price is normal to them. They don't decide who to sell their harvest to in what price, and they also don't produce cooking oil. When asking why they don't produce the cooking oil and try to upgrade it, interviewee 1 and 5 responded that there is no need because "there is already a mill company within the region, and there is no profit to invest more money for that; besides, the regulations are strict and troublesome". But they did mention that because the price for cooking oil is rising, and they are expecting to have an even higher purchase price than now according to interviewee.

5.1.2 The production networks and cooperation in biofuel

This section will focus on the production network of biofuel, and it will also focus on how different actor acts within the network. Also, it will introduce how this production works and how it was shaped with state and cooperation, and it urged at the end that stallholders, although have another path to provide their harvests from cooking oil, are not really actively coupled with the production network.

Biofuel production network is controlled by state and SOE. GOI established a complete production network in biofuel with the existing Research & Development (R&D) in biofuel lead by GOI, SOE, joint research between major biofuel companies and several universities institutes. Main cooking oil companies mentioned in cooking oil production network also play the main part in biofuel production network because they are selected as biofuel supplier to SOE. Besides, village cooperative plays a mediate role between state and producers. For smallholders in the interview region, except interviewee 1 due to personal reason didn't join the cooperative, the rest are all part of the cooperative, and they will sell their harvest from the lands registered under cooperative to the cooperative. Cooperative covers from collecting and selling harvest to selling daily necessities. After collecting harvests from smallholders, cooperative will then sell it to biofuel companies. When we asked why farmers can't sell the harvest directly in the interview, the answer from the Consultant of palm Oil Plantation is that,

> because each farmer must have a delivery order and that is determined by the quota when delivering harvest, and harvest amount from each farmer are too little to reach the quota, so the delivery order won't be issued to single smallholders. Furthermore, if the smallholder really reaches the quota and can be issued a delivery order, the smallholder have to hire loader and truck drivers to deliver the harvest, and the cost will be super huge that revenue can't cover.

Interviewees also indicated the similar situation and said that's why they have formed a cooperative to sell their products together or sell it to the middleman who will then collect all the harvest and then sell it together.

Cooperative collects the harvests from the members and separate the revenue based on their harvest weight proportion. As mentioned by interviewee 7 that cooperative will then sell unqualified fruits to the private middleman and let middleman to sell the rest fruits back to the Mills or biofuel companies in a lower price. Except for the unqualified fruits from cooperative, private middleman also acquires harvests from the lands that is not registered to the cooperative, and it can be deeper in the forests or outside the community region. It's very interesting to look deeper into the private middleman in the whole production network because these private middlemen allocate not qualified and unregistered harvests into the production network. With a lower purchased price, private middleman will pay cash directly to the smallholders after the harvest was weighted and loaded to their own truck or truck drivers they hired. And then this harvest will be sold to a larger middleman who will then sell the unqualified and unregistered harvest together to the Mills or biofuel companies with a relatively lower price. By this process, it not only created more related jobs but also allocated harvests into the production network with a lower cost for the biofuel companies.

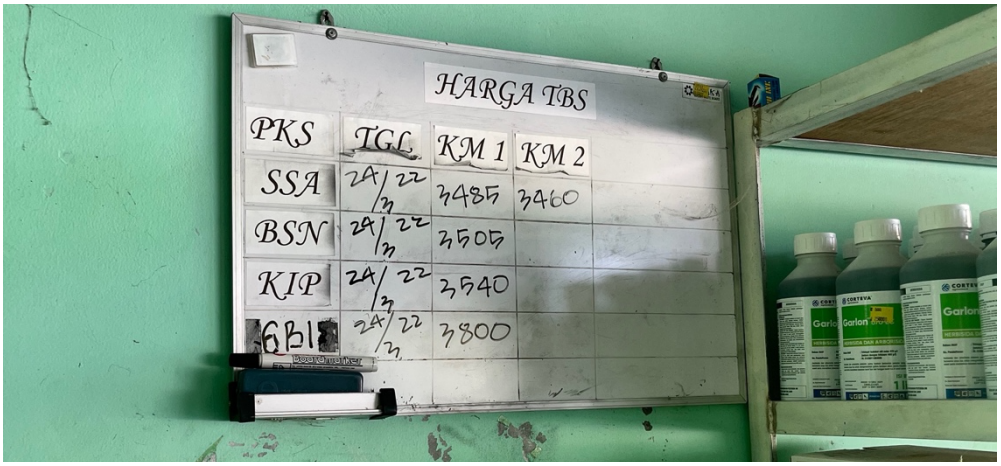


Figure 3: Purchase Price from mills and biofuel companies on 24 March 2022
Source: Self took

How smallholders were coupled with biofuel production network is managed by state and cooperative. Cooperative acts as the mediator between GOI and companies and smallholders, it distributed the related information from GOI and companies to its members. Interviewee 2

mentioned that in 2015 cooperative told their members on the half year meeting that their harvest, due to the National blending program, "would be the shift from export to biofuel blending policy". And also, interview 2 mentioned that cooperative told its member about ISPO was "to use proper fertilizer in proper times to get better quality instead of other sustainable related issues". According to Interviewee 2 about the ISPO informed by cooperative, he mentioned that

> Cooperative told us that it believes ISPO doesn't really matter to smallholders, but the government will send some standards and regulations to the company, and company will ask for several better fruits standard to the cooperative or will suggest most about how to fertilizer for a good quality, and it can increase 20% CPO production that 1KG CPO can produce 20% more oil.

Unfortunately, the interview can't include the perspective from the Mills, biofuel companies or Pertamina because they refused to have an interview. But from the interviews and secondary data, it is still enough to analyst how and what is the production network happening. Most of the large agricultural companies such as Wilmar, Sinar Mas and Musin Mas have their own extraction and refinery facilities that allow them to supply their biofuel production (Jong, 2020). After the harvest, these biofuel companies have the obligation to supply certain amount of biofuel to Pertamina in order to stay in the inclusive supplier list and receive BPDPKS subsidy. The biofuel companies provide assigned amount of biofuel made by palm to Pertamina for

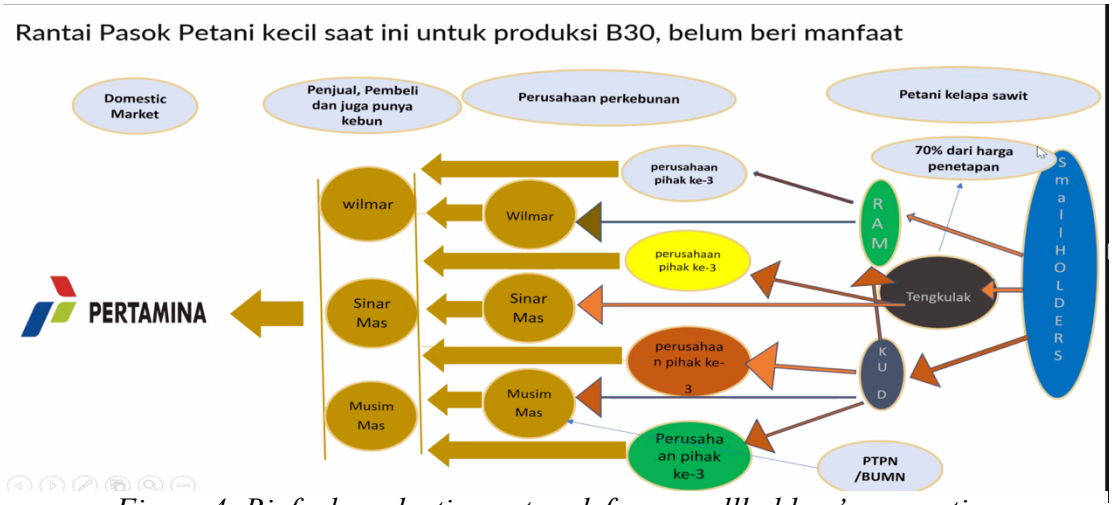


Figure 4: Biofuel production network from smallholders' perspective
Source: SPKS presentation, March 2022

Row Labels	Sum of Yearly Assigned amount (Million Kilo)
Wilmar International Limited (Martua Sitorus (IN) and Kuok Khoon Hong (SG))	33.76%
Karim Family (IN)	15.52%
MR. Sukanto Tanoto (IN)	10.11%
MR .Robert Wijaya (IN)	9.16%
Widjaja Family (IN)	7.97%
MR. Suryadi Darmadi (IN)	5.39%
MRS. Louis-Dreyfus Margarita Olegovna (Swiss)	4.20%
MR. Martua Sitorus (IN)	3.91%
PT. Tunas Baru Lampung TBK	3.74%
Tjajadi Family (IN)	2.97%
MR. Kooi Ong Tong (MA)	2.82%
MR. Haji Andi Syamsudin Arsyad (IN)	0.43%
Grand Total	**100.00%**

Figure 5: Percentage of total yearly assigned amount in Million Kilo by Global Ultimate Owner in Name
Source: Self made

blending, and then BPDPKS will provide subsidy to biofuel companies based on the price gap between deiseal market index price published by Directorate General of Oil and Gas and biodiesel index market price published by Directorate New and Renewable Energy that both directorates are under MEMR. However, with increasing CPO price, the price gap between biofuel and deiseal is increasing, and it posed a huge burden to the fund.

As mentioned in several chapters, GOI plays an important and active role in creating the supply and demand in biofuel production network, and it works as a regulator, investor, facilitator, buyer, and lead firm under the GPN by actively creating industry strategy. Because the whole National Blending policy was created by GOI regulations; the main R&D is carrying out by Pertamina and public universities; the ISPO certificate was issued, reformed, and conducted by government; the qualified and legitimate biofuel suppliers are appointed by government; the subsidy was allocated and distributed by BPDPKS; the main fuel retailer is Pertamina.

In 2015, GOI announced a new funding mechanism supported by the new export levy collected from palm oil export when the government reference palm oil price was over 750 USD per ton. The revenue from the levy will be used to bridge the price gap between biodiesel and deiseal due to lower oil price. At thew same year, GOI announced to raise biofuel subsidies from IDR 1,500 per liter to IDR 4,000 per liter to protect domestic biofuel producers due to lower oil price, and

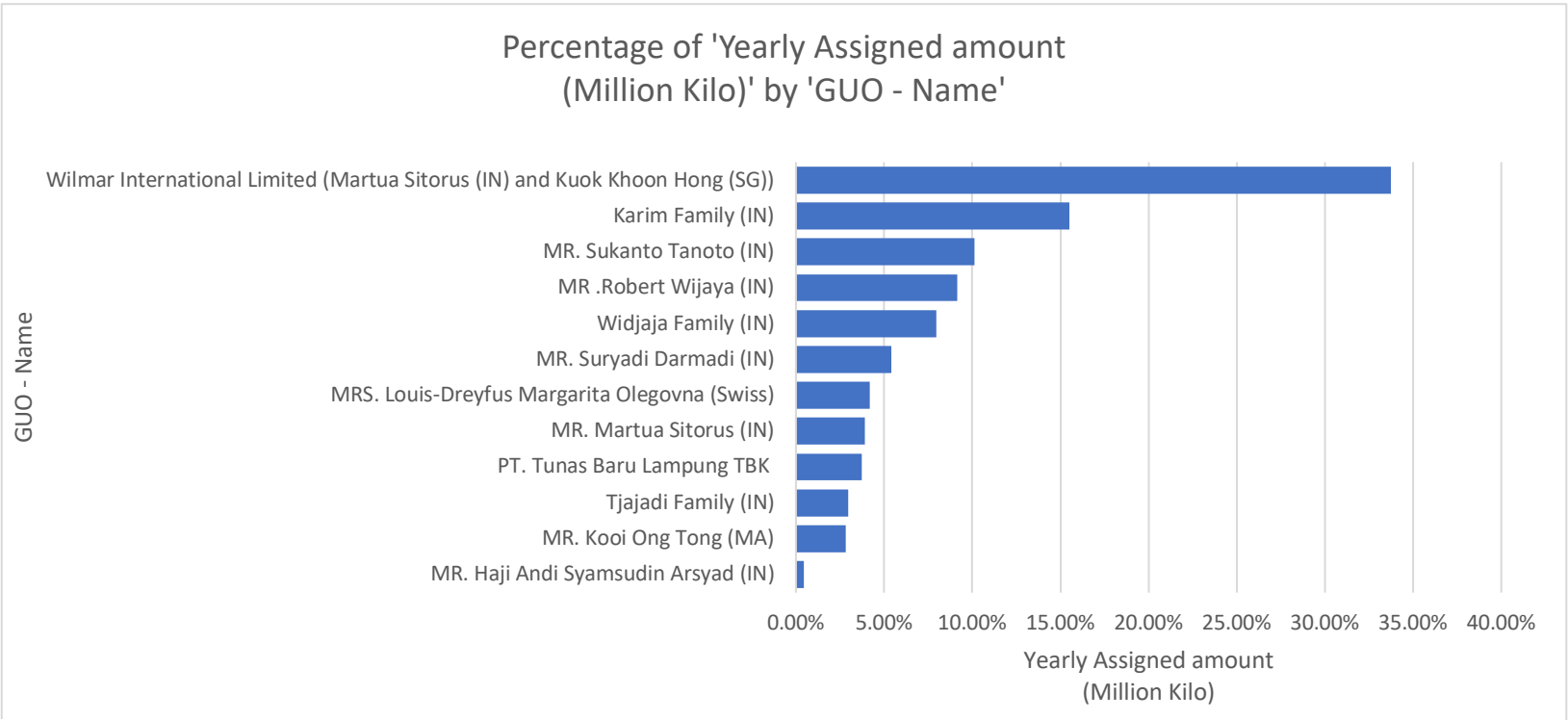


Figure 6:Percentage of total yearly assigned amount in Million Kilo by Global Ultimate Owner in Name in Bar
Source: Self made

fund will come from levy (Silalahi, Simatunpang, & Siallagan, 2020; Naimah & Morgunova., 2017; China, et al., 2019; Indonesia, 2015; Rahmanulloh, 2020).

As mentioned in the previous chapter, there are 18 companies appointed by GOI to be the legitimate suppliers to Pertamina as showed in Appendix B, but interview 5 mentioned that few of the companies didn't have any capacity to produce as shown in Appendix B; and instead, those companies bought biofuel from other companies and then use the subsidy to build the capacity. In order to understand the ownership of these 18 companies and understand who are controlling the whole biofuel production network, this thesis use Orbis provided by NTNU. After reviewing the companies on Orbis, this thesis managed the data and present the ownership results in figure 5 and 6 above, and the detail data is in Appendix B. There are 18 companies are selected as main suppliers, but as shown in figure 5 and 6, they are mainly controlled by 12 people or corporations, for instance, Wilmar, listed in 1st in the figure 5 and 6 is a Singapore based international agricultural group. Furthermore, this thesis found out these 12 people or families are all on the top 40 wealthy list in Indonesia, and some are listed in Forbes 500. There

is also close connection between President Jokowi and those main owners, or those owners are also political elites, for instance, owner of PT. Jhonlin Agro Raya, who is Deputy Treasurer of the Jokowi-Amin Team in the 2019. Jokowi attended inaugurate of its biofuel, cooking oil, and sugar cane factory constructions; or Widjaja Family in local elections. And this ownership structure allows this thesis to have a better understanding on who is controlling and shaping the biofuel production network.

As this thesis demonstrated from this chapter, large agricultural companies and biofuel companies benefited from the construction of biofuel production network based on Indonesia domestic market. GOI created a new path by regulations and policies for selected supplier to be plugged into the biofuel production by providing biofuel to SOE in exchange for subsidy collected from levy by state. Furthermore, the main producers in both cooking oil and biofuel are generally the same actor, and they gained the opportunity to upgrade and move to higher value capture position. However, smallholders didn't have much power on deciding who to cooperative with for catching a higher value, and smallholders are not really actively trying to plug into the whole production network. But instead, they were being plugged in by GOI through cooperative that informed them their harvest will be used for biofuel.

5.1.3 The vary between these two networks

Within these two production networks, one very specific difference is that biofuel have more government direct involvement. GOI directly created the whole industry and production network of biofuel through GOI regulations and policies, and they were developed and improved through R&D financed by GOI, SOE and universities. GOI created a large domestic demand with mandatory blending policy, filled up the price gap between biofuel and normal fossil fuel by government subsidy to refineries, and distributed and sold through SOE to fulfill domestic needs. GOI acts as buyer indirectly through assigning selected suppliers for Pertamina, but at the same time, GOI is very directly as upgrader, regulator, and investor with policies.

As for the cooking oil production network, GOI is not in an active position. GOI is trying to solve the crisis by several industrial strategies such as DMO, tax and export ban. GOI in cooking

production network has less influence because most of the production, distribution and retails are controlled by conglomerates or few limited related companies. From the Appendix B, 13 out of 18 biofuel providers also produce cooking oil products.

Without a doubt, these two production networks are affecting each other because they have to use the same ingredients. The goal of biofuel production was to increase domestic consumption and decrease export amount so that international price will be higher. With the rising price of this ingredient internationally, it's inevitable that the price for cooking oil and biofuel rose dramatically. If the blending policy further advanced to B40 as planned, more CPO will have to be provided to biofuel and that will suppress the supply for cooking oil even more, and cooking oil crisis might happen again. Furthermore, there is already a over 20% price gap, how can GOI deal with the subsidy to promote B40 nationwide while dealing with cooking oil issue at the same time is still unknown, but this thesis still demonstrated how an industry can be developed with state actively involves.

However, this thesis also showed that smallholders didn't really directly benefits to the transform except for the increase of purchase price because they still supply to the same cooperative or middleman. The production share by smallholders is decreasing to around 28% in 2020 from 40% in 2016, but the production from private agricultural companies rose to around 60% from 53%. Furthermore, from the interview, this thesis demonstrated that smallholders were just being informed by the cooperative that their harvest will be shifted to biofuel instead export. They do have higher income with higher price and a more stable demand because of blending policy, while at the same time they are still live as a consumer who has to pay higher price for cooking oil. This thesis urges that it is the selling system and related regulations are the main obstacles that keep smallholders in the same position.

5.2 Politics and Regulations, how a new production network was shaped?

After demonstrating the difference actors and shape in two production networks, this section focuses on how politics and regulations shaped a new production network. It will use production data and timeline of regulations to present the construction of biofuel production network in

Indonesia. Policies and regulations are an important factor in the construction of this production network because the supply and demand of biofuel are based on policies and regulations.

From the section 1.7 and 5.1.1, we can find out that GOI created the whole industry heavily relied on domestic needs based on policies and regulations. Detailed timeline can be found in Appendix A. The regulation started in 2008 with 2.5% blending, and B10 was issued in 2014 to public transportation. At that time, the whole production network is still CPO export oriented (OECD, 2012, p.14; Suwastoyo, 2019). But with the phased out of EU in 2015 caused oversupply that further caused extremely low price on palm, it also experienced high oil price in the same year. Therefore, GOI issued MEMR No.12 to implement B15 to public transportation and introduce Presidential Regulation No. 61 to establish BPDPKS to collect and manage levy to support the develop of National Blending policy. The biofuel consumption rose dramatically from 860 million liter in 2015 to 3,008 million liter in 2016.

	Biodiesel in million liters								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	2,270	2,950	3,500	1,200	3,500	2,800	5,600	7,700	8,500
Export	1,608	1,942	1,569	343	476	187	1,772	1,721	39
Consumption	869	1,084	1,845	860	3,008	2,572	3,750	6,983	8,426
	Production capacity in million liters								
Number of biorefineries	22	26	26	27	30	32	31	31	31
Capacity	4,881	5,670	5,670	6,887	10,898	11,547	11,357	11,357	11,357
Biorefineries Capacity use	46.5%	52%	61.7%	17.4%	32.1%	24.2%	49.3%	67.8%	74.8%
	CPO used for biodiesel in million tons								
CPO	2.088	2.714	3.220	1.104	3.220	2.576	5.152	7.084	7.820

Table 1: Production, Capacity and Supply Statistics from 2012 to 2020

Source: USDA FAS and self-made

In 2018 with relatively higher oil price, Presidential Regulation No.66 was issued, and it required to cover the production cost difference between biodiesel and diesel for the non-Public Service Obligation (PSO) sector that secured domestic demand and encouraged the production of biofuel in 2018. Later on, in order to support Presidential Regulation No.66, MEMR No. 41 was issued, and the regulation expanded the B20 to all vehicles, and there's a gigantic rose in domestic biofuel consumption to 3,750 million liters. In 2019, when B30 was implemented by MEMR No.227, domestic consumption doubled to 6,393 million liters, and in 2020 it reached 8,426 million liters. Furthermore, we can see the impact of levy in 2015 and 2020 that due to relatively higher price that triggered the levy, the export dropped sharply; since the levy will be triggered by the market index price set by the government, therefore although the levy still existed in 2018 and 2019, the relatively lower price didn't trigger the levy (Rahmanulloh, 2021).

The biofuel production grew steadily although it dropped in 2017 due to lower oil price in that year, the production, biorefinery capacity and CPO used for biofuel were all increased in 2018. With the implementation of B30 in 2020, there's another obvious increase in production, consumption, biorefinery capacity usage and CPO supply for biofuel, and the percentage of CPO used for biofuel rose to 16% in 2020 from 1.4% in 2014. Besides that, the number of refineries are also increasing as showed in Table 1, and the main reason is refineries upgraded carried out by Pertamina. This investment was carried out because the GOI noticed the existing refineries are below current and future domestic fuel consumption that will pose energy crisis, so it aims to upgrade the capacity of both biofuel and fossil fuel within the existing 5 refineries (The Committee for Acceleration of Priority Infrastructure Delivery, 2018; Wang & Dodge, 2021).

From table 1 presented above, it's positive that the biofuel production network and industry is getting more and more mature domestically by government policies and regulations. The blending policy also effectively consume the 15-20% oversupply caused by EU. However, the rising CPO price in 2020 and 2021 already postponed the implementation of B40 in 2021, and with the current price, B30 already costs already 20% more than normal diesel fuel. Therefore, how will the government implement B40 in order to reach its energy mix target while tackling cooking oil crisis under this high oil and CPO price is still an unknown and worth researching issue. However, through regulations and subsidies, GOI created and maintained a production

network based on domestic consumption, and it also successfully helped the biofuel companies internalized its capacity through domestic market and government subsidies.

5.3 How policies influenced by recourses nationalism affected palm industry?

In order to further demonstrate why policies and regulations were issued in the previous chapter, it's important to understand why GOI announced them. Resources nationalism provides a good foundation to understand GOI's decision, and it will be widely in this chapter. Except domestic regulations and politics that affected the whole development of biofuel production networks, foreign politics also impacts the development of biofuel in Indonesia and the rise of resources nationalism in Indonesia. The decision of EU to phase out palm oil-based biofuel decreased the demand abroad, and palm price dropped sharply. In order to tackle the issue, GOI decided to expand B15 to public vehicles in 2015 and then in 2018 expanded it to all private vehicles. The following chapter will introduce how foreign politics and policies issued by GOI affected palm industry policies with resources nationalism characteristics.

As mentioned in Chapter 1, palm oil is an important resource for Indonesia, and presidents of Indonesia always defend its interest in palm oil. In November 2014, former President Yudhoyono pledged to "ensure that there is no barrier against Indonesian products abroad" and his successor President Widodo demanded they stop discriminatory measures against Indonesian palm oil when having a meeting with US President Barack Obama and European Council President Herman Van Rompuy later in the same year (Choiruzzad, 2019). Later when EU decided to phase out import palm for biofuel in 2018, Jokowi mentioned in the 14th Indonesian Palm Oil Conference that if more palm oil used for biodiesel blending under the B20 program, then it will automatically increase the price of crude palm oil on 29 October 2018, saying "We should pursue this kind of trading strategy. Otherwise, we'll be always under pressures. It won't happen if the B20 works well". Similar statement happened in 2019 that when attending the B30 road test, mentioning "We need to anticipate any pressure on CPO domestic demand and so that we can have a good bargaining position, whether with the European Union or other parties that try to weaken our position" (Gorbiano, 2019), and these speeches reflected the core characteristics of resource nationalism that polices established to have a better bargain position. In the same year,

Jokowi further expressed it during interview with Bloomberg, “For me, if there is discrimination like that, I will fight because of the 16 million farmers and workers in this business”. And later in another interview, he mentioned that “Palm oil is a strategic commodity for Indonesia. I know better the problems, because this is my last term, so I have no burden. I have nothing to lose” (AFP, 2019). It was getting clearer that from 2019, President Jokowi relying on National blending policy in order to increase the price of palm internationally and to have a better negation position “Why not use it for ourselves? Why do we have to go through fighting with the European Union with the CPO bans and discrimination” (Nugraha, 2019).

At the same time, President Jokowi also pushed industry upgrading and down streaming development policy in order to increase its product value during this period. As he mentioned “We can't keep exporting crude palm oil, we have to process it first into at least a half-finished product” when delivered a speech related to transform its economy by increasing export and reducing import (Nathalia, 2020). With the effort of GOI to expand its palm oil downstream industry such export levy in 2015, the export percentage of palm related goods had changed from 58% CPO in 2008 to only 24% CPO in 2018, and with the successful development of National Blending policy, Darmin Nasution, Coordinating Economic Affairs Minister, said “it illustrates that the added value of the palm oil industry can be maintained domestically through palm oil derivative products” (Dua, 2018). It’s expected to increase its domestic CPO supply for other downstream add-up value industry, for instance, President Jokowi mentioned “I heard CPO can be converted into avtur. Let’s conduct more comprehensive study on this matter” (Sawit , 2019). Also, with while President Jokowi inaugurating new biofuel factory of PT. Jhonlin Agro Raya “We must carry out down streaming and industrialization. The Government must force its implementation”. President Jokowi also mentioned that GOI will “at some point ban CPO exports so that the commodity could be processed into higher-value derivatives, such as cosmetics, food products and biodiesel for both domestic use and export” (Karyza, 2021). One of the several efforts GOI did is through Pertamina, a SOE, and its legal demand for certain amount of biofuel from different biofuel companies. By doing so, GOI increased the domestic biofuel demand and helped biofuel companies establish and expand their business domestically through levy provided by BPDPKS. Its behavior reflects the state roles under GPN as buyer, investor, and facilitator, and it shaped the production network of biofuel and shift the market domestication.

However, these statements and behavior are not enough to be considered as policies with resources nationalism but simply that state tried to upgrade its industry into higher value as it reflected in core characteristics mentioned by Wilson (2015).

However, President Jokowi increased the whole palm issue into another higher level aligned with resources nationalism from 2019 because of the presidential election (Laurance & Oosterzee, 2019), and it reflects Howe et al. (2021) that pointed out that parties with resources nationalsim policies tend to have a higher support for the election. Attending the EU-ASEAN business council, President Jokowi further pointed out that "Indonesia will not keep silent about the EU's discrimination". On 11 January 2020, President Jokowi tweeted that "The EU has been saying that Indonesian palm oil is not environmentally friendly. This is essentially trade war because Indonesian palm oil can be cheaper than their sunflower oil". Later On 13 October 2021, Jokowi mentioned that Indonesia is not afraid to be sued by other government in WTO for stopping exporting unprocessed CPO and nickel, and GOI will keeps assisting in developing palm oil downstream industries in order to absorb of the domestic CPO as a raw material to produce with higher value "such as cosmetic, margarine, biodiesel and other derivative products" (Investor Daily, 2021). Furthermore, President Jokowi posed ban on CPO and cooking oil in order to solve the domestic cooking oil crisis in April 2022 (Fitch Ratings, 2022). From the previous statements and the policies Jokowi used, the whole palm issue was then raised to another altitude with resources nationalism (Herrera-Lim, 2022; Ningrum, 2020).

Mentioned in the theory chapter, resources nationalism is a cycle that tends to be at the highest point when that nature resources price in the highest. With the recent skyrocketing price, GOI reissued an export ban on cooking oil and CPO in late April while before, GOI issued DMO by 20% in late January 2022 and increased it to 30% in March 2022 in respond to another skyrocketing price due to war in Ukraine. It then further posed all palm products for cooking oil export restriction in late March due to domestic cooking oil crisis, but it was lifted after several days. Indonesia under the Jokowi regime is growing in resources nationalism, from the oil and gas takeover and used it as political policy to nickel and palm export restriction. As reflected in resources nationalism theory chapter that it has several characteristics, and two of them are policies designed to collect rents that increase the share or revenues from resource production,

including taxation, and Policies established to have a better bargain position. From his speeches in the previous section, they reflect the core characteristics of resources nationalism although they are not ownership issue or nationalization (Herrera-Lim, 2022).

Policies and regulations with resources nationalism characteristics issued by GOI had a major impact to the development of domestic biofuel production network. They were issued in order to have lower export amount so that the international price can rise, and then GOI can have a better negotiation position with foreign governments. But with the increasing price, it not only caused a huge burden on export levy, but it also caused unexpected outcome that cooking oil crisis. Resources nationalism policies also posed another sky rocking to the global cooking oil market with the export ban. This thesis believes that under the current GPN that the whole world is connected and relies on each other, resources nationalism policies will have a higher impact to the GPN as it demonstrated in palm oil export ban. With more and more international conflicts or crisis, resources nationalism will become more and more common. It was reported that after COVID and war in Ukraine happened, many countries encountered shortage of weed, sunflower oil or gas supply, and countries posed export restrictions in several different items in order to secure its own interest (University of Birmingham, 2020). Unexpected incidents and resources nationalism are now posing a huge burden on nowadays GPN.

5.4 ISPO and National blending to in different scale. How smallholders are being plugged into the production network?

After demonstrating how policies and regulations influenced by resources nationalism can do to GPN and biofuel production network in Indonesia, this thesis will then focus on the certification promoted by GOI for a more sustainable and environment friendly palm products.

With ISPO certification, the smallholders also didn’t get affected at all according to interviews. The first reason is the purchase price from the Pertamina and biofuel companies is the same no matter if they have ISPO or not. As shown in the Figure 3 that the price is the same to all purchase from the biofuel companies, and the levy provided by BPDPKS to biofuel providers are not affected by ISPO but by proportion and price Index. Second is that there are no active

policies from the government side to promote ISPO to smallholders as showed from the interview that all interviewees indicated that they know nothing about ISPO, and smallholders were just being informed that biofuel companies suggested the cooperative to use a better fertilizer and the timing of using it. Furthermore, there was no regulation that asked for biofuel suppliers to use CPO from smallholders or plantation companies have ISPO, and without this related regulation, it then lacks motivations and necessity for both biofuel companies and smallholder or plantations to acquire ISPO. Although Presidential Regulation No.44 requires all smallholders and companies adopt ISPO by 2025, there is currently no active or solid measures to promote and ask stallholder to have ISPO as it shown in interview 7. Third is that there's no ISPO requirement for domestic used, and it is only used for exporter as a prove that the company has an environmentally friendly and sustainable growth because of ISPO, there is no strong pressure from the biofuel buyer, Pertamina, to the biofuel producers.

It shows that with or without ISPO doesn't really matter for smallholders to being plugged into the production network or not. But it does help exporters and other palm plantation companies to being plugged into GPN with ISPO with a higher price, quality, and less environment damage compared to companies without globally (Rodhiah et al., 2019). Kenzhegaliyeva (2017) demonstrated how standard and certification can affect companies' behavior and products within the production network, and ISPO is a type of certification set by the state that allowed biofuel and palm products companies have a better position within the GPN. However, ISPO at the same time is very hard to acquire for smallholders as it shown in interviews because it cost lots of funds and time to pass. But at the same time, ISPO allows private companies and private plantations have more competitive ability in the international market, and the secondary data also showed that ISPO has been used for the GOI to persuade international communities to use palm oil for biofuel or to resolve the import regulations toward palm oil.

For the National Blending Policy, according to interview and secondary resources, it does increase domestic demand and consumption as showed in Table 1 and interviews. Because the domestic consumption increased dramatically after 2020 due to implementation of B30, export amount of biofuel and CPO were all decreased that at the same time increased the price of international CPO price. With the increased of international CPO price, the biofuel index market

price set by Directorate New and Renewable Energy was also increased, and it then increased the purchase price from the biofuel companies to the cooperative and middleman. The increased of purchase price made smallholders have higher income price, but it didn't increase the other things such as negotiation power.

Although National Blending Policy increased smallholders' income, this increased in smallholder's income is constructed upon government control. In other words, the increased of revenue is because government policy to boost domestic needs, and the system is supported by export levy and domestic demand. Therefore, instead of new technologies implementation, move to higher value role within GPN or being plugged into GPN with new foreign markets, the increased of smallholders' revenue is rely on the increased of domestic demand and levy, and it can't really reflect their value add-up progress. As introduced in the previous chapter, levy won't be activated if the international CPO price is lower than an amount, and when the international Crude Oil price is lower than CPO price while at the same time CPO price is in a lower place that won't trigger the levy, the whole Blending policy will be extremely challenging to keep going or upgrading as the postpone of B40 earlier in 2021. However, for those selected biofuel suppliers, National Blending Policy provided them another opportunity to upgrade into higher value products with guaranteed demand and income, and those suppliers are all controlled by private companies, TNCs, local elite families, or political elites as demonstrated in Appendix B.

5.5 COVID and War

After reviewing the impact of ISPO and National Blending Policy to different actors, this section will be focus on the impact of COVID and war to the biofuel production network.

In 2020 COVID hit the whole world and shut down so many industries and production, and in 2022 another war broke up between Ukraine and Russia that increased price of food and cooking oil sharply. But within the interview area, COVID doesn't really affect the production at all, but the war affected more directly. From the interviews interviewees all responded that there is no COVID here, and the production didn't shutdown due to COVID. However, they did mention that two things that connected to COVID and war. First is the rising price of the fertilizer. With

this respond, we then asked the head of cooperative, and they responded that because for imported fertilizer, the shipment fee from abroad increased and lack of labor resulted in labor price increased also. Besides, interviewee 1 mentioned that because of current Russia and Ukraine war, the main imported fertilizer has to stopped imported from Russia but then change to Canada, and this change caused another huge rose in the imported fertilizer. As for domestic subsidized fertilizers were being affected in production and transportation because of COVID lockdown in Indonesia, so that's why the price for fertilizer is going up every week.

The second effect is the rising price for purchase palm, and every smallholder in the interview mentioned that their income increased dramatically after COVID started. For the rising price of palm, there are many reasons involved, and it demonstrated how well connected the whole palm oil global production network is. The first reason is because global palm oil price setting is based in Malaysia, and after the COVID started in 2020, several lockdown and border restrictions made it harder to hire foreign labors to conduct palm plantation that sharpened the price of labor. It was reported the labor gap was over 80 thousand in plantation (Huan, 2022). With the lack of labor, the production of palm in Malaysia decreased dramatically in 2020 and dropped to even lower in 2021 than the lowest point in 2017. Therefore, this short in production and higher wage in labor caused the Malaysia palm price rise to over 40% from 600 USD per ton in 2020 to over 1,300 USD per ton in 2022 which hit the record high (Huang & Chang, 2022). Second reason is that Malaysia announced to restart its biofuel program that will based on palm oil in mid 2020, and Indonesia was also expanding its biofuel distribution and consumption to the whole nation that further increase the demand (100ppi, 2020). Third is drought weather during summer in 2020 and flood in 2021 in Malaysia and Indonesia decreased the production, and plus palm trees were having trek season that production will be lower than usual (Llewellyn, 2022). Forth is the lack of transportation ability on land and sea due to COVID from 2020 that devastated the fundament of the whole global production network. This lack of transportation ability further increases the price (Huan, 2022). Fifth is the Unlimited Quality Easing in US from 2020 that resulted inflation. And inflation further leads the price of palm increasing (Wang M. , 2021). Sixth is that although three main cooking and eatable oil which are palm, sunflower seed and soy can cover each other before; however war in Ukraine affected the sunflower seed, and high temperature and drought affected soy from South America and Canada, so the whole main three are having shortage at the

same time that made the price of palm further increased (Sina Finance, 2022; Wang , 2021). The last reason is that GOI decided to increase DMO in March 2022 to 30% from 20% in January 2022 and export ban in April 2022 in order to solve domestic cooking oil shortage crisis domestically. This crisis happened because the war in Ukraine led to low supply of sunflower oil that increased the price of sunflower oil. The lack of sunflower oil further caused the rose of international CPO price, but the current cooking oil price in Indonesia is too low to earn more profits, so many cooking oil producer stocked the oil in the warehouse that led the shortage of cooking oil in the market. DMO further decreased the export amount to international market that caused another new wave increased in international palm oil price (Xia, 2022; Llewellyn, 2022).

With all these reasons, the price of palm oil increased sharply from 2020, and for the smallholders the rise of purchase price increased their income directly, and the price is so high that they will pick up and collect the palm fruits dropped on the ground in another bag to sell when harvest. But before 2020, that they don’t even bother to pick them up before due to low price. However, this thesis demonstrates that it’s not just Blending policy that increase the income, but it also shows how complex and fragile the global production network is.

6 Discussion

This chapter will present the discussion and answer the 3 research questions. It started with a short answer to the question and then followed with elaborations for each answer. This thesis aims to answer 3 main research questions through GPN framework and to use resources nationalism to further explain GOI's policies and decisions. These 3 questions are:
1. How do multinational companies, public authorities, and smallholder farmers develop markets for palm-oil as a biofuel under GPN framework.
2. How does the politics surrounding resources nationalism shape the interaction and negotiations between these actors?
3. How does the increasing production and processing of palm oil as a biofuel for energy markets rather than a product for food and grocery-retail markets impact the livelihood of smallholder farmers and the local government surrounding palm oil plantations.

For the first question, this thesis uses state roles under GPN to demonstrate how GOI created and shaped the biofuel production network. GOI, under biofuel production network, plays regulator, facilitator, producer/investor, buyer, upgrader, and lead firm at the same time. Through regulations, GOI then further assigned 18 biofuel companies who were the main and only biofuel suppliers, and these companies provide biofuel to SOE Pertamina for levy subsidy based on quota assigned by GOI. Smallholders are passively coupled with the biofuel production network from cooking oil production network through cooperative and state decision, but at the same time, it's the National Blending Policy created by GOI that allows smallholders to keep engaging their palm oil plantation business.

As a Regulator, State created the National Blending policy that ask for mandatory blending with certain percentage of biofuel for only public transportation at first and then expended to all vehicles domestically. With this policy, GOI successfully created a large amount of demand for biofuel and its ingredient, CPO, because of the massive population in Indonesia. It further coupled midstream and downstream biofuel industry within Indonesia where most palm plantations are located. Later, GOI posed levies on palm products and then export restrictions for CPO in order to prioritized domestic supply and collect fund for the development of biofuel

program. Other than that, state controls the price of domestic CPO, regular fossil fuel price and final blended fuel retail price from Pertamina, and by doing this, GOI keeps biofuel in a relatively compatible price by force regardless of rising international CPO price.

As a facilitator, GOI created BPDPKS as the direct organization to decide and distribute quota and permission for specialized supplier to provide biofuel for Pertamina to blend, and BPDPKS will provide subsidies for those specialized suppliers. By doing so, GOI secures the midstream biofuel refinery industries that has stable demand from downstream retailer, Pertamina. Other than that, GOI also fund public universities and Pertamina to conduct R&D into higher percentage blending and biofuel for other purposes such as jet fuel mentioned above.

As for producer/investor, GOI directly owns the lead firm Pertamina that is the main fuel retailer without competition domestically, and GOI also plays an extremely important role in the investments of Pertamina and its subsidiaries. It's obvious to see how GOI influences the investments decision through its role as an investor in Pertamina with statement made by Pertamina that "As part of the National Strategic Project (PSN), PT KPI's Biorefinery program is in line with the Regulation of the Minister of Energy and Mineral Resources (ESDM) of the Republic of Indonesia No. 12 of 2015" (Pertamina , 2021). Furthermore, Coe (2021) mentioned that these SOEs investments are politically sensitive and not just driven by economic, and it can also be spotted in Pertamina's future plans as mentioned in the previous chapters. With several investments carried by Pertamina in biofuel refineries plants near major plantations, Pertamina is going to couple with its suppliers even more and have a higher impact to the production network.

As a buyer, GOI involved through Pertamina as the ultimate buyer of biofuel that is prepared for blending. As Neil (2020) mentioned that most of SOEs or indirectly owned enterprises are not profit driven but other reason such as geopolitical motivation such as energy security, the case of Pertamina is the same that not driven by profits but national policy and energy security. Pertamina, as mentioned in the last chapter, will still buy the biofuel from its suppliers no matter what the price is and the current loss from biofuel.

As lead firm, GOI decided who will be its supplier through BPDPKS instead of market competition. Furthermore, products design and upgraded is also being influenced by government decision instead of revenue and technology innovation, as this paper mentioned earlier that the postpone of B40 implementation was decided by President Jokowi. Furthermore, State also plays as Upgrading leader in this case by conducting research and road experiment with SOE Pertamina and public universities. Those experiments are financed by government budget. Through upgrading, GOI and Pertamina can increased the blended percentage of biofuel, and it can further increase domestic demand of biofuel.

For the second question, resources nationalism was used to understand GOI's decision and policies, and it demonstrated that a large portion of National Blending Policy was firstly created to solve the extra supply problem and lower price caused by EU phase out decision. But this policy was then used by President Jokowi to increase bargain power with foreign countries. Then through assigned quota, GOI assists those 18 biofuel companies expand their business and technique based on domestic market. And in order to answer the research question better, this paper also carried out ownership behind those 18 companies, and it shows that those companies are wither owned by local elites, politics leader or famous business group within Indonesia and Singapore those were also the main supplier and retailer of cooking oil.

Resources nationalism generally indicated that country through policies to gain more ownership, revenue, or benefits from extraction companies to the host state, but Indonesia palm industry has its own specialty and characteristics that it involves many agricultural labors, and most palm plantation and biofuel are controlled by local elites, politics elites, well-known local business or joint company between local elites or regional economic elites as demonstrated in Figure 5, 6, and Appendix B. So, policies issued by GOI and Jokowi are not aimed to nationalized the biofuel industry or planation nor to increase its taxation for higher revenue as Wilson (2015) reflected, but those policies were created to increase GOI's negotiation position toward other governments by increasing the international price through increase domestic demand. Guild, (2021) also pointed out that GOI in recent years are getting more and more aggressive about using export restrictions to achieve its political targets or interests such as nickel and coal. Also, EU's decision to phase out the usage of palm oil-based biofuel is an important reason that Jokowi shift to

deliver speeches or policies with resources nationalism as Wilson (2015) mentioned that one of core characteristics is to use resources to have a better negotiation position.

The phoneme of resource nationalism polices and domesticalization of GPN in palm oil-based biofuel in Indonesia caused unintentional effects to GPN and society around the world. The increased in domestic pam oil caused the rose the international and domestic price, and the international price rose another 6% in April 2022 that is getting closer to record high price in March 2022 (Llewellyn, 2021). However, because of this record high price, it was unprofitable for cooking oil companies to sell its products domestically because the price was limited by GOI. Then it caused a cooking oil crisis and shortage in Indonesia since November 2021 until now. Although GOI issued ban on cooking oil and its ingredient in order to solve this crisis, the outcome is relatively low, and it further pushed the international price higher that posed another big threat to international supplies that "are already under strain due to poor harvests, the Ukraine war, and labor shortages caused by the COVID-19 pandemic" (Llewellyn, 2021). During the research field work, the interviewees, taxi driver and street vendor also complained to me how hard it is to purchase the cooking oil, and there were even citizens died while waiting too long in line for cooking oil (Llewellyn & Naem, 2022).

For the third question, according to interviews with smallholders within the research area, it showed that except for the revenue increased, there is not many differences for them. However, because this new demand created and maintained by GOI, smallholders were coupled as a supplier, and they are able to keep their plantation business without being decoupled.

From the interviews this thesis conducted, all interviewees reported an increase of their income because the price of CPO was also increased, but they don't have other benefits. They were just being informed by the cooperative that a part of their harvest will be sold to make biofuel, and when asking this to the leader of cooperative, the answer is that local government suggested them to do so because GOI is pushing the program and the purchase price will be better. Therefore, on the base of interviews, this thesis suggested that smallholders were been coupled with the biofuel industry and National Blending Policy although these smallholders don't have decision power.

State under GPN framework is generally considered as Non-firm actors that have 3 different roles beside regulator, as Facilitator, Producer/Investor and Buyer. Within the case of energy transition biofuel in Indonesia, GOI plays not just as regulator but all three roles at the same time. Besides these 4 roles, state also acts as a lead firm that coordinated and controlled other actors within the biofuel production network domestically. Furthermore, state acts as the main upgrader in this biofuel industry, and it fully controlled the timing of implementation and development process of biofuel. The reason here used domestically instead of globally is because that current final blended biofuel is only provided for domestic use without exporting into global or nearby market, and GOI is internalizing the GPN based on domestic supply and demand. Therefore, this paper urges that within this case, state is playing the most important factor for the establishment and promotion of this production network, and the future development of biofuel is also counting on state. This kind of full-scale management by state decreases the competition, and at the same time, it also decreases upgrading or value add-up chance for general raw material supplier, which is smallholders in this case. By controlling the whole production from raw material supply, specialized supplier, lead firm to customer, GOI demonstrates how state can do to build and construct the whole GPN through SOE and policies, and although this network is all based on domestic demand, it still demonstrates how influential state can be within the GPN.

7 Conclusion

This thesis aims to understand how a new production network can be made and shaped by the state and how state, smallholders and TNCs influences each other. At the same time, it also focuses on what government can do to the production network by acting not only a regulator and extra-firm actor that include 3 different roles but also as lead firm, upgrading leader, and main buyer through SOE at the same time. Furthermore, it demonstrated the politics surrounded the shift of production network from cooking oil to biofuel that all made from palm oil, and how resources nationalism policies can influence the production network locally and globally.

In order to understand what impact the shift can bring to the smallholders, this thesis conducted qualitative interview study with face-to-face interviews with smallholders, middleman, cooperative representative, and local government level consultant. Furthermore, in order to provide a better understanding and accurate numbers, this paper also uses secondary data from government reports and statements, white papers from different governments, thesis research, and news article. This thesis further used Orbis provided by NTNU and company certifications issued by GOI to figure out the ultimate ownership and shareholders of those 18 appointed biofuel suppliers. These data and interviews allow this thesis to understand how state can create and shape this biofuel production network and to identify different actors involved. Besides, this paper also aimed to bridge the gap of state roles in GPN theory and what state can do to GPN through SOE by demonstrating how GOI constructs and shapes the biofuel production network based on domestic supply and demand. State can be extremely powerful by playing all these roles within the production network at the same time, and sate can make even more impacts to the production network through SOE.

This thesis based on the findings suggested that state not just has the ability to build the production network, but it also has the ability to shape and driven the development of a production network through regulations, policies, investments, and SOE as the main buyers at the same time. And the whole development of biofuel production network is pushed by the state in order to consume its extra supply caused by foreign politics and to upgrade its industry in order to catch higher value. However, it also demonstrated that those 18 biofuel suppliers,

assigned by government, are mostly owned by local elite families, politics elites, and foreign companies owned by the other riches, and the value add-up is not coupled with smallholders.

Furthermore, this paper also shed lights on the important impact of resources nationalism to the production network. As it was revealed, resources nationalism related policies had been used in palm oil industry to boost the development of downstream industry. We can tell from the statements and speeches delivered by the president Jokowi that it's important to increase domestic CPO consumption by developing downstream industries, so GOI will have a better control on the international CPO price and a better negotiation position with other states. However, there still needs further research on the negotiation power GOI gained from these downstream industries because these industries are either being constructed or mostly for domestic supply.

This thesis has some limitations. The first is that interviews were only carried out to smallholders, and it would have a better understanding if we can interview people in mill and refinery or managers from those 18 biofuel suppliers. Second is that the research area is limited in a single village due to time and connections because the time we have is a week, and we only have one connection. The third is that I don't understand Indonesian and have to rely on my coworkers as a translator. Although they did a great job to help me translate and understand the statements, it would be nicer if I can understand the language, and then I can have more questions to raised and discussed with the interviews during the interview.

Further research may explore how smallholders can upgrade and plug into the production network under this state control production network. Further research can also focus on how state developed production network abroad through SOEs because this biofuel industry is currently happened only in domestic level, and SOE and GOI haven't really start negotiating with different actors in order to sell the products abroad. Also, further research may put emphasis on understanding the impact of internalization of GPN, supply chain and distribution or similar policies.

Appendix

Appendix A Table 2: Main regulations and their contents

Source: Self made

Year	Policy Name	Main contents
2006	Presidential Instruction No.1	Encourage utilization of biofuel as another fuel options
2006	Presidential Regulation No.5	Set 5% biodiesel and ethanol in energy consumption by 2025
2008	Minister of Energy and Mineral Resources Regulation No.32	Mandatory blending 2.5% biofuel in utilization in transportation, industrial, and electricity generation
2011	Minister of Agricultural No.19	Founded the Indonesian Sustainable Palm Oil (ISPO) certification scheme
2013	Minister of Energy and Mineral Resources Regulation No.25	Set target for public transportation obligation to mix 10% of palm oil biodiesel (B10) in January 2014, then B15 in 2015, B20 in 2016 and B30 in 2020
2014	Government Regulation No.79	Set Renewable Energy target in energy mix to 23% in 2025, and biofuel targeted at 26% within Renewable Energy
2015	Minister of Energy and Mineral Resources Regulation No.12	Mandatory blending 15% biofuel in utilization in 2015, and plan 20% in 2016
2015	Presidential Regulation No. 61	Established Indonesian Oil Palm Estate Fund Agency (BPDPKS), that charged levies on per ton of palm oil export
2015	Ministry of Finance Regulation No.114	BPDPKS collects $50 per ton levy to palm oil products and CPO export
2018	Presidential Regulation No.66	Instruct Indonesia Oil Palm Estate Fund collected by BPDPKS to be used to cover the production cost difference between biodiesel and diesel for the non-Public Service Obligation (PSO) sector

2018	Minister of Energy and Mineral Resources Regulation No.41	Provision and utilization of biodiesel fuel under financing by the Indonesia Oil Palm Estate Fund, and expand B20 to all non-public transportation
2019	Presidential Instruction No.6	Support to accelerate the implementation of Indonesian Sustainable Palm Oil (ISPO) and issued National Action Plan for Sustainable Palm oil (NAPSPO)
2019	Minister of Energy and Mineral Resources Regulation No.227	Mix 30% biodiesel (B30) biofuel into diesel fuel
2020	Presidential Regulation No.44	Request credible certification governance and smallholders' inclusion into ISPO
2020	Ministry of Agriculture Minister Regulation No. 38	Follow Presidential Regulation No.44 to Reform ISPO, and to change it into mandatory for all producers
2020	Ministry of Finance Regulation No.57	Levy changed to flat rate, increase it to $55 per ton, and expand it to 24 categories including palm oil biodiesel
2020	Job Creation Law 11 (Omnibus Law)	Aimed to increase investment by canceled laws or regulations that are considered as hinder investments such as Maskun et al (2021): (1) "the forest area minimum limit in each province is 30% that regulated under Article 18 section 2 of the Forestry Law" (2) Complicated and time consuming Regional Spatial Plan to change land use or prevent natural disasters under Article 20 section 5 Spatial Planning Law (3) Environmental permit norms to environmental approval that remains in line with environmental sustainability and does not pollute the environment under Article 36 of the Protection and Management of the Environment Law

		(4) Eliminate Environmental Impact Assessment (EIA)'s permit for plantation business under Article 67 Section 3 and 4 of Plantation Law

Appendix B Table 3: Assigned biofuel providers and their Global Ultimate Owner, Country, Domestic Ultimate owners, Shareholders, Assigned Quota, Delivered Amount, Realization rate, cooking oil products and palm plantation situation.
Source: Self made

	Company name Latin alphabet	GUO - Name	Country ISO code	DUO - Name	Shareholders	Shareholder - Country ISO code	Cooking oil buisinese	Palm plantation	Yearly Assigned amount (Million Kilo)	Delivered amount til September (Million Kilo)	Realization rate
1	Pt. Wilmar Nabati Indonesia	Wilmar International Limited (Martua Sitorus (IN) and Kuok Khoon Hong (SG))	ID	Wilmar Nabati Indonesia, Pt	Wilmar International Limited	SG	YES	YES	1,375,486.000	985,503.022	71.65%
2	Pt. Wilmar Bioenergi Indonesia	Wilmar International Limited (Martua Sitorus (IN) and Kuok Khoon Hong (SG))	ID	Wilmar Nabati Indonesia, Pt	Wilmar International Limited	SG	NO	YES	1,324,226.000	1,026,249.306	77.50%
3	Pt. Musim Mas	Karim Family (IN)	SG	Musim Mas Holdings Pte. Ltd. (Karim Family)	Musim Mas International Pte. Ltd.	SG	YES	YES	881,030.000	602,810.775	68.42%
4	Pt Cemerlang Energi Perkasa (Apical Group Limited)	MR. Sukanto Tanoto (IN)	SG	Royal Golden Eagle Pte. Ltd.	Peregrine Holdings Limited	BM	NO	YES	483,263.000	366,941.882	75.93%
5	Pt. Pelita Agung Agrindustri	MR. Robert Wijaya (IN)	ID	Permata Hijau Group (Robert Wijaya)			NO	YES	446,333.000	318,415.489	69.58%
6	Pt. Multi Nabati Sulawesi	Wilmar International Limited (Martua Sitorus (IN) and Kuok Khoon Hong (SG))	ID	Wilmar Nabati Indonesia, Pt	Wilmar International Limited	SG	YES	YES	406,196.000	260,518.644	74.92%
7	Pt. Kutai Refinery Nusantara (Apical Group Limited)	MR. Sukanto Tanoto (IN)	SG	Royal Golden Eagle Pte. Ltd.	Peregrine Holdings Limited	BM	YES	NO	397,029.000	275,055.023	75.07%
8	Pt. Permata Hijau Palm Oleo	MR.Robert Wijaya (IN)	ID	Permata Hijau Group (Robert Wijaya)			NO	YES	396,793.000	273,209.467	68.85%
9	Pt. Ldc Indonesia	MRS. Louis-Dreyfus Margarita Olegovna (Swiss)	ID	Pt Ldc Indonesia	Louis Dreyfus Holding B.V.	NL	YES	NO	386,610.000	268,991.413	64.14%
10	Pt. Smart Tbk	Widjaja Family (IN)	SG	Purimas Sasmita, Pt	Pt Sinar Mas Agro Resources & Technology Tbk	ID	YES	YES	372,482.000	279,064.433	78.92%
11	Pt. Sinarmas Bio Energy	Widjaja Family (IN)	SG	Purimas Sasmita, Pt	Pt Sinar Mas Agro Resources & Technology Tbk Golden Agri-Resources Ltd Tapian Nadenggan, Pt	ID MU ID	NO	YES	360,450.000	270,573.802	57.79%
12	Pt. Energi Unggul Persada	Martua Sitorus (IN)	ID	Kpn Corps			NO	YES	359,771.000	279,124.674	69.28%
13	Pt. Bayas Biofuels	MR. Suryadi Darmadi (IN)	ID	Darmex Agro Group			YES	YES	349,180.000	201,803.144	65.78%
14	Pt. Tunas Baru Lampung	PT. Tunas Baru Lampung TBK	ID	Pt Tunas Baru Lampung Tbk	Sungai Budi, Pt Budi Delta Swakarya, Pt Self Owned Santoso Winata Widarto	ID ID - ID ID	YES	YES	343,811.000	257,496.707	74.89%
15	Pt. Intibenua Perkasatama	Karim Family (IN)	SG	Musim Mas Holdings Pte. Ltd. (Karim Family)	Musim Mas International Pte. Ltd.	SG	YES	YES	287,944.000	227,232.193	72.28%
16	Pt. Batara Elok Semesta Terpadu	Tjajadi Family (IN)	ID	Best Industry Group			YES	YES	273,274.000	197,524.210	78.60%
17	Pt. Ciliandra Perkasa	MR. Kooi Ong Tong (MA)	ID	Ciliandra Perkasa, Pt	First Resources Limited	SG	NO	YES	259,882.000	204,263.621	71.34%
18	Pt. Sukajadi Sawit Mekar	Karim Family (IN)	SG	Pt Agrowiratama	Musim Mas International Pte. Ltd.	SG	NO	YES	259,117.000	170,442.119	82.68%
19	Pt. Darmex Biofuels	MR. Suryadi Darmadi (IN)	ID	Darmex Agro Group			YES	YES	116,517.000	96,335.136	100%
20	Pt Sari Dumai Oleo (Apical Group Limited)	MR. Sukanto Tanoto (IN)	SG	Royal Golden Eagle Pte. Ltd.	Peregrine Holdings Limited	BM	YES	YES	50,000.000	9,980.458	19.96%
21	Pt. Jhonlin Agro Mandiri	MR. Haji Andi Syamsudin Arsyad (IN)	ID	Jhonlin Agro Mandiri, Pt			YES	YES	40,000.000	9,897.012	24.74%
22	Pt. Dabi Biofuels	MR. Suryadi Darmadi (IN)	ID	Darmex Agro Group			NO	YES	30,606.000	30,605.973	77.58%
	Total								9,200,000.000	6,612,038.503	71.87%

Appendix C summary of interviews

Interview 1: Palm oil smallholder A

He is a transmigrant in 1997 under the policy of Suharto regime, and he had been planting palm for over 20 years with 2 hectares of lands. His general net income this year, due to the higher CPO price, will be 43 million IDR (equal to 2990 USD) with current price, and the current rising price in his thought it's related to COVID and National blending policy that increase the demand domestically. However, the lower CPO price in the past 20 years can't cover daily cost, he has two jobs, in blending factory and as a palm farmer, but later he got fired by the previous company in Siak, so he got another job in the current blending company while planting at the same time in Riau. The revenue from these two was enough to cover his daily cost and supported 3 children to finish bachelor's degree.

He sells his harvest to private middleman because he is not participating in cooperative, and the reason is that although the price will be lower, the quality demand is also lower; another reason is that he wants to used organic fertilizer from his chicken's poop instead of subsidized fertilizer provided by government and cooperative because the organic one can harvest 4 tons per hectares per month, but the subsidized one can only harvest 1.5-2 tons every per hectares per month. And if he were in the cooperative but not taking the subsidized fertilizer, there would a large social pressure from the whole village. He doesn't have thought to expand his plantation area because the existing lands are already distributed by the whole village, and there's no more available lands. He also doesn't want to expand into wetlands because the soil is not right, and the production and quality will be very low that can't cover the expense. Besides, it will need another loan from the bank or other place, and it will be a huge burden again. He never heard about ISPO just sold the harvest to the middleman and let them take care the rest.

Interview 2: Palm oil smallholders B

He is a transmigrant under the policy of Suharto regime in 1984 from Siak, and he had been planting palm for over 20 years with 4 hectares in total while 2.75 hectares for palm and 1.25

hectares in rubber. He didn't mention how's his revenue is, but he mentioned National blending policy is beneficial to him because it boosted the production and allow them to get higher price on selling palm after 2015; the reason he knew the blending policy was that he was informed by the cooperative during the annual meeting that their harvests will then be shifted to blending policy from export, and the price will be 10 or 20 IDR more per kilo. The revenue from rubber and palm can support his daily expense and raised a family with 3 members.

He sells his harvests to cooperative, and except from the original lands received from government because of migrant program, he also expanded his plantation area by loan from the bank every two years. After the phased out from EU, the price dropped 50% down to 450 IDR per kilo, and the revenue was too low that he couldn't pay the harvesters since the only revenue could cover only fertilizer and new seeds, but the price went up to 900 IDR per kilo after that year. He knew little about the ISPO from the cooperative, and what it said is to use proper fertilizer in proper times to get better quality. "Doesn't really matter to them, but the government sent some standards to the company, and company asked for several better fruits standard to the cooperative; most are about how to fertilizer for a good quality, and it can increase 20% CPO production (1KG CPO can produce 20% more oil)". While at the same time, theirs is not price different with ISPO or without.

Interview 3: Palm oil small holder C

He is more likely to be called as businessman instead of smallholders although his plantation for palm is 6 hectares, and he had experience over 15 years. Within the 6 hectares, 2 were registered under cooperative and the 4 are not, and because of that, he sold harvest from 2 hectares to cooperative while 4 to the private middleman. He mentioned that the price for CPO is increasing because of blending policy while the price for fertilizers also increasing, so his revenue remains similar before the blending policy. He didn't reveal his revenue, but he said it's enough raised the family with 6 children with his other side jobs; he has several different kinds of job at the same time including Coconut plantation, 10 hectares for Cassava for flower, one coffee shop in city center, 1 supervisor of new established organ, leader in National Indonesian farmer organization Riau Chapter, and also helping establishing organizations.

He already expanded his plantation in palm through purchased from transmigrant, purchasing 2 hectares with 270 trees in 3 years old in 2005, and 4 in 2006 with 600 trees in 1.5 years near the city (Siak Hulu). In his opinion, ISPO is “a bullshit!” A lot of small holders’ land are located in forest area, and it’s not supposed to be in the forest, so when it comes to ISPO they will never pass while at the same time most farmers are in forest. But companies will still buy it no matter they have the certification or not, and the purchase price is the same. But most mill companies have ISPO, so those products were ISPO certified when the products are produced from them. He also thinks that big companies produce biofuels to Pertamina benefited a lot because they can get subsidies from levy from BPDPKS, and the amount will be around 16 trillion IDR in 3-4 years for one company; the leader of those companies can influence the policy making with their political relationship, and there also some “protection and privilege” from the government, for instance, get the license to make biofuel; it’s pretty hard for normal framer to level up. Besides, those who produce CPO and other related products from CPO will also get lots of benefits from the regulations and policies.

Interview 4: Palm oil smallholders D

He is a transmigrant under the Suharto regime in 1997, and also acquire 2 hectares of lands from the government, and now he had 5.5 hectares of lands while 4.5 hectares within them are for palm plantation and the rest fir rubber and crops. He cleared the lands in 1997 and 1998, and the first harvest was in 2001, and then at the same year he used the loans from the bank with his lands and harvests to buy new lands from other transmigrants. 1.5 hectares were registered to cooperative, so he just sells harvests from the 1.5 to cooperative and let them do the rest which he means specially that the cooperative bought them all no matter what the quality was, shipped to biofuel companies, and then shipped unqualified fruits picked up by the companies to private middleman. But for the 3 hectares that is not registered under cooperative, he sold the harvests to private middleman and let them do the rest. He is cooperating with other 50 farmers and related people together to plant 60 hectares in total. The revenue after his harvest was enough to cover his daily expense and to cover 2 children’s education fee to finish their undergraduate degree, and since the first harvest he didn’t use his previous saving to cover the expense. Furthermore, he

has around 150-200kg of rubber harvest per month, and it can bring extra 1.5-2 million IDR income per month which became an important income to cover their daily expense when EU posted amendment in 2015.

When mentioning the national blending policy, he mentioned that although his production is the same, but the purchasing price is increasing but at the same time the price for fertilizer is also increasing, and he refused to tell us his net revenue. He also worked for other farmers just to earn more saving, so he mentioned it's not because he has to do it to keep life going but just to have more saving. He never heard about ISPO, but he did hear about suggestions from the cooperative about certain planting ways in order to have a better quality. However, in his opinion, more regulations mean he has to pay more money for those regulations, and those fees for the regulations will just benefit corruption people.

Interview 5: Serikat Petani Kelapa Sawit (SPKS)- Palm Oil Farmer Union

The SPKS showed several important things, and the first is that since their investigation after 2015, they found out that most smallholder are not directly included into the supply chain of biofuel blending policy, and government didn't really care and tackle this supply chain issue with smallholders as long as the blending percentage and distribution targets were met. Second is that the big companies control everything related to the palm oil industries, such as policies and subsidies, through its political influence, and for instance, levy, that was aimed to support smallholders development and replant and development of biofuel, collected from palm oil industry in 2021 was 137 trillion IDR, and 110.5 trillion was used to subsidy biofuel, and that was 80% of total levy while only 6.59 trillion, 4.8% of the total levy, was used for smallholders related programs. Furthermore, biofuel companies can get subsidies from levy collected by BPDPKS by providing regulated amount to government pointed 2 blending companies, Pertamina and AKR. Third is that there is a 30% price gap existing between smallholders sell CPO to middleman and then middleman to biofuel companies, and smallholders have stable and long-term contracts with biofuel companies. Fourth is that ISPO doesn't increase the selling price of CPO for smallholders, and it is a huge burden since according to their calculation, it would cost up to 5oo USD and 5 years to get the first stage of ISPO certificate because the

applicant needs to pay for the supervision fees and training course and lessons fees, but most biofuel companies won’t ask for the ISPO from the middleman, and hence middleman won’t ask for farmers to acquire ISPO.

At the same time SPKS also believes that blending policy successfully absorbs this massive production domestically, and if it issued it earlier then it might be preventing the oversupply and dropping price happened in 2015 and 2017. In these two years were oversupply and the price dropped very bad that there's no profit for biofuel companies to buy the fruit to make biofuel and other products because companies didn't want to lose more money by selling the existing products, so they just were stocked pile before making new products. In their opinion and observation, private companies with good political relationship received the most benefits, because with the mandatory blending, it became a monopoly situation since government will appointed who can and what amount of biofuel these companies should sell to the only 2 downstream companies, Pertamina and AKR; besides, there were only 18 upstream companies received the "appointed" amount and permission to sell it to those 2 because "they are experienced or already had the technique and machines", but after he checked the list, he found out that there are several companies don't even has real machine and production, and they just buy from other companies or communities with lower price, sell to those 2 blender, and then use the levy from the government to build the factory or machines.

Interview 6: Harvester

He started as a harvester in 2012 when the price for harvester was 100,000 IDR per ton, and then in order to gain more experience, he worked as a loader for the private middleman while also as a harvester at the same time from 2016. Later because the pay for loader was too little and with personal health issues, he then decided to work as a free-lance full-time harvesters for all actors. The income for harvester is enough for him to form a family with 1 child so far, and the pay for harvester one ton is always quite stable in 1500,000 to 250, 000 IDR, and it have to split with people work on harvest at the same time, usually 1 hectare can harvest 800 kg to 1 ton. 1 to 2 hectares he can work on himself, but if the land is bigger, he then has to find someone work together, and although the price for harvester per ton is the same no matter how many people

work together, the owner sometime will add some tips. Normally according to his schedule, he got 2,000,000 to 2,300,000 IDR per month, but the CPO price will directly influence his payment. The price for workers remains stable while smallholders will be infected if the price went down, but if the price went up, workers would receive more. But there is no price standard nationwide, and the price can be different from village to village. Furthermore, within the same village there is no standard price, it's all bargained and then they told each other ear by ear.

He mentioned that when the blending policy started, the demand and price for harvesting increased gradually, and with B30 launched 2 years ago, his income also increase because the rise in demand caused the rise palm purchase price. For him, the price for purchase palm price is abnormally high, and even if the price goes down to 100,000 to 120,000 IDR per ton as before he will still stay in this industry because that is the normal price he used to. He also had a side job but is to help family business that his parent has a tent rental business, and he would get paid if he worked for it, and the paid depends on the size of activity; it's not stable, and the normal price for him is 50,000 within town and 100,000 outside the town.

Interview 7: Leader of the cooperative

He is a transmigrant who has 8 hectares of lands, but he stopped planting after 2008 as the secretary. He rents most lands to the cooperative, and then the cooperative will rent them to others. Working as the leader of the cooperative after 2018, he worked as the secretary of the cooperative from 2008. The income of planting, renting and as the secretary was enough to form a family with 3 members in total.

He mentioned the form of the cooperative was formed in 1985. It was not established by government but by the transmigrant community. When transmigrants moved to this region to plant, government not just gave each of them 2 hectares of lands and loan from the national bank, but it also provided them salty fried fish, a common dish served with rice in Indonesia, every day. The community one day couldn't stand with eating this every day because it's too boring, so they gathered all the fried salty fish provided by government and then sell them to nearby villages or regions, and then used that money to buy other things. Until 1985, they

decided to use the revenue to form the cooperative and registered to government, so it can be a legal cooperative representative that can work directly with government, which means receive and inform information, receive subsidized fertilizer, seeking loan with its own lands, and represent the community on price or negotiation uniformly. Now there are 1476 members on paper while only 500 in active planting. It will hold regular meeting once every half year, announcing government policies and regulations related to palm, price floating reasons, future pricing, and demand report, and wishes or demands from the purchase companies and cooperative members.

For the income of cooperative, he mentioned that cooperative will cut 150 IDR per kilo, from the smallholders from purchase price that provided by the four biofuel companies listed in the below picture. The price will be updated per week. And with all those incomes and revenues, the cooperative further expanded its main business into selling seeds, fertilizers and pesticide, daily groceries and necessities included snacks and beverages, construction and repair, home appliances, and replanting and cleaning lands services. By providing all these services and goods, cooperative gradually became the center of community.

Cooperative will only purchase the harvests from lands registered to the cooperative, and he mentioned that no matter what quality the harvest is, the cooperative will purchase it. After collecting and recording harvest weight from each smallholder, the harvests will sell to Mills or biofuel companies all together. And after companies picking up the harvest meet standard by weights per fruit, the cooperative will then sell the unqualify fruits to the larger middleman with lower price who will then sell it back to the biofuel companies with lower price. Later, the cooperative will spit the general revenue based on the harvest weight proportion to smallholders no matter what their quality. Plus, the cooperative also plays as a mediator or arbiter role to the purchase price in order to prevent too high or low price, and the price it sets will also influence the price for private middleman that can further prevent the price provides by middleman was too low.

As for the blending policy, he mentioned it does make the price going up steadily, and the total purchasing capacity and demands from the companies is also increasing from 700 tons to 1100

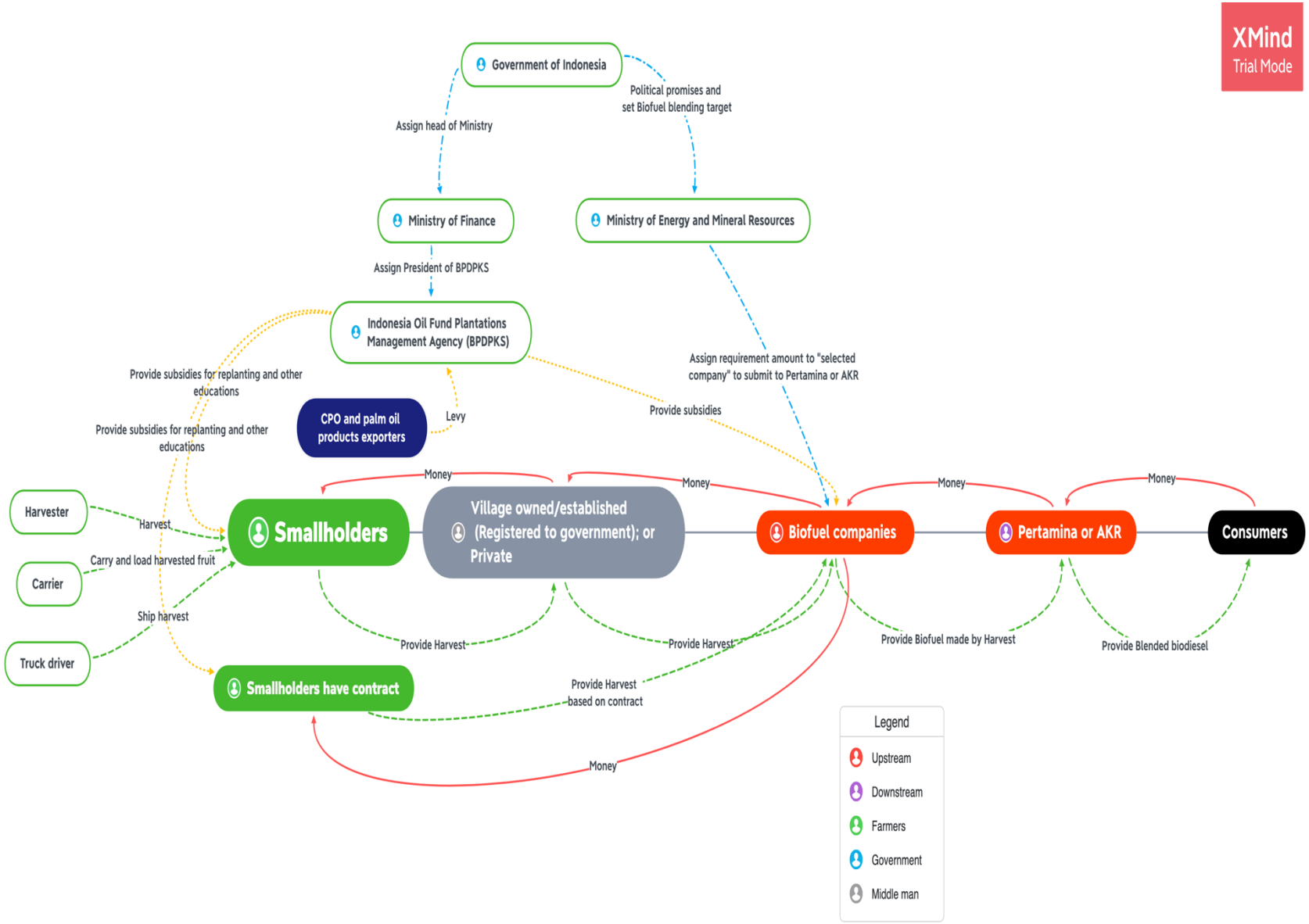
tons per day in the last 5 years. For the ISPO, he mentioned that the cooperative had been informed by government and knew how to get it, but they don't know what's the difference because the price is the same and companies will still buy it. Even more, companies also didn't ask for it. Government said it will provide a 750,000,000 IDR to award farmers or cooperative who acquire it, but there's no further information on how the award will be given and no further detail.

Interview 8: Middleman

He is a transmigrant with his parents arrived in 1984. His parents had 2 hectares of lands and used 1 hectare for crops until 1994 which then changed into rubber. He then later inherited lands from his parents, and in 1997 he bought 1 extra hectare and then another 1 hectare in 2019, and all 4 hectares are now for palm plantation. He also worked as a private middleman after 2000, and the reason for working as a middleman was because he started as an illegal timber in the forests, and that job has to leave family for a month or even longer each time, and after doing it for 10 years, he thought he need to change the job in order to have more time with family, and his wife kept complaining about it. So, since 2000 he started with bicycle buying palm fruits for larger middleman within the community since the plantation is not that massive as nowadays, but in 2003 he bought his small truck to run the business that keep using till now. Now because he is both middleman and smallholders, he hired workers to take care of his lands.

He can buy 30 tons per month in 3000 IDR per kilo and sell them to bigger middleman for 3300 IDR per kilo, and the bigger middleman will sell harvests he bought from smaller middlemen to the biofuel companies for 3480 IDR per kilo or lower price than provided to cooperative, but if the quality is really low, the price will be half. The blending policy affects the price a lot according to him because the price buy from farmers is 200 IDR per kilo, and he sought 250 IDR to another bigger middleman, and it kept going to 2018. He described the blending policy and palm help him a lot because he can even afford buying another private car in 2015 and decorate a nice house, and all of these are a dream came true.

Appendix D Figure 7: Production Network from smallholder perspective
Source: Self made



Appendix E Interview Questions

Interview questions for local farmers and smallholders:

1. What is your name (Will be anonymous)?
2. Do you have a family? If yes, how many members in your family?
3. How many acters of lands do you have? (Small holders should below__)
4. How many acters do you use to plant palm tree?
5. How many years have you been planting palm tree?
6. What products do you have? Only Palm seeds, Crude Palm Oil (CPO) or?
7. What's your expense on palm annually? Do you have to pay Levy?
8. How's the revenue annually? Is it better after National biodiesel blending policy?
9. Can your revenue from Crude Palm oil or palm oil products cover your daily cost?
10. Who do you sell your harvest to?
11. Did you sell palm seeds or CPO to EU before? If yes, who're your customers now after EU banned the importation from Indonesia? Did government help anything?
12. Is the price to your customer now better or worse than the price before embargo of EU?
13. Now with banned on export of CPO in Indonesia, what is the impact to you?
14. Does biodiesel policy issue by government benefited your business? How? (EX. Increased in revenue, more stable customers…etc.)
15. Are subsidies issued by both regional and national governments after 2015 helping? (According to ABC 2021 video, these subsidies are not really helping)
16. Do you have other business or part-time jobs to cover your daily? If yes, is it related to palm oil industry? If also yes, what the working condition and protection? (According to ABC 2021 video, most small holders have no choice but to have a part-time job either for large companies or other medium farmers)
17. Have you considered to expand your land? If yes, through what? (According to ABC 2021 video, most small holders expand their land illegally by burned forests deep in the forests or preservation areas)

18. Have you considered to invest in extraction machines and equipment? If yes, what stopped you except lack of fund?
19. If the situation remained like today, will you consider changing your business?
20. Overall, what do you think the government should change or issues immediately?
21. What's the impact of COVID to your business?
22. Compared with large agro companies, what are the pros and cons you have? (Price, long-term contract, quality, or certification)
23. With the ISPO certification, what's the effects of it? (heavier burdens? More expense? Better price? More guarantees?)
24. Overall, considering policies and regulations related to palm oil in Indonesia, do you think they are more favor to anyone or group?
25. With the pass of Job Creation Law 2020 (Omnibus law), what are possible impacts to you and industry in your opinion.
26. Why farmers want to sell products to middle-man? What's the benefit of selling CPO to middle-man?

Interview questions for regional government officials or plantation worker

1. What is your name (Will be anonymous)?
2. What is your job? What position are you in now?
3. How many years have you been working in government? How many years in energy related department?
4. Have you experienced or handled biodiesel related policies?
5. If yes, what are the main obstacles to increase demand of biodiesel? If no, what directions might be a better way to increase demand of biodiesel for the benefits of smallholders?
6. Any interest conflict happened between regional and central government?
7. What had local government done to promoted biodiesel blending policies?
8. What had local government done to help or assist smallholders and local producers to overcome the embargo from EU?
9. Are those assistance enough? Are them worked in the right way to the right people and right place?
10. What had local government done to promoted biodiesel blending policies? For instance, bargained with PT Pertamina to increase purchased from smallholders. Or persuade government and council to decrease the subsidies for PT Pertamina to purchase and import oil.
11. What had central government done to increase biodiesel demand? For instance, regulate mandatory biodiesel engines for vehicles or public transportation.
12. What had central government done to help or assist smallholders and local producers to overcome the embargo from EU?
13. Are those assistance enough? Are them worked in the right way to the right people and right place?
14. What could both regional and local government do to accelerate the demand of local CPO in biodiesel mixture policy in order to reach the target set years ago?
15. In your opinion, is the law related to biodiesel blended policies stuffiest and high enough to give proper authority to local government in order to reach the target set years ago? If not enough, what should the president or council do in your opinion?

16. Will you consider subsidies to import oil for PT Pertamina from government as one of the main setbacks that makes PT Pertamina unwilling to prompt biodiesel?
17. Is public awareness or attention to use a cleaner biodiesel high enough? If not, then, did government do anything to increase it? Or what can governments do more about it?
18. What are the main setbacks for promotion biodiesel in your opinion?
19. What's the impact of COVID to biodiesel blending?
20. In your opinion, what are effects on banned CPO exportation?
21. Overall, considering policies and regulations related to palm oil in Indonesia, do you think they are more favor to anyone or group?
22. With the pass of Job Creation Law 2020 (Omnibus law), what are possible impacts to you and industry in your opinion.

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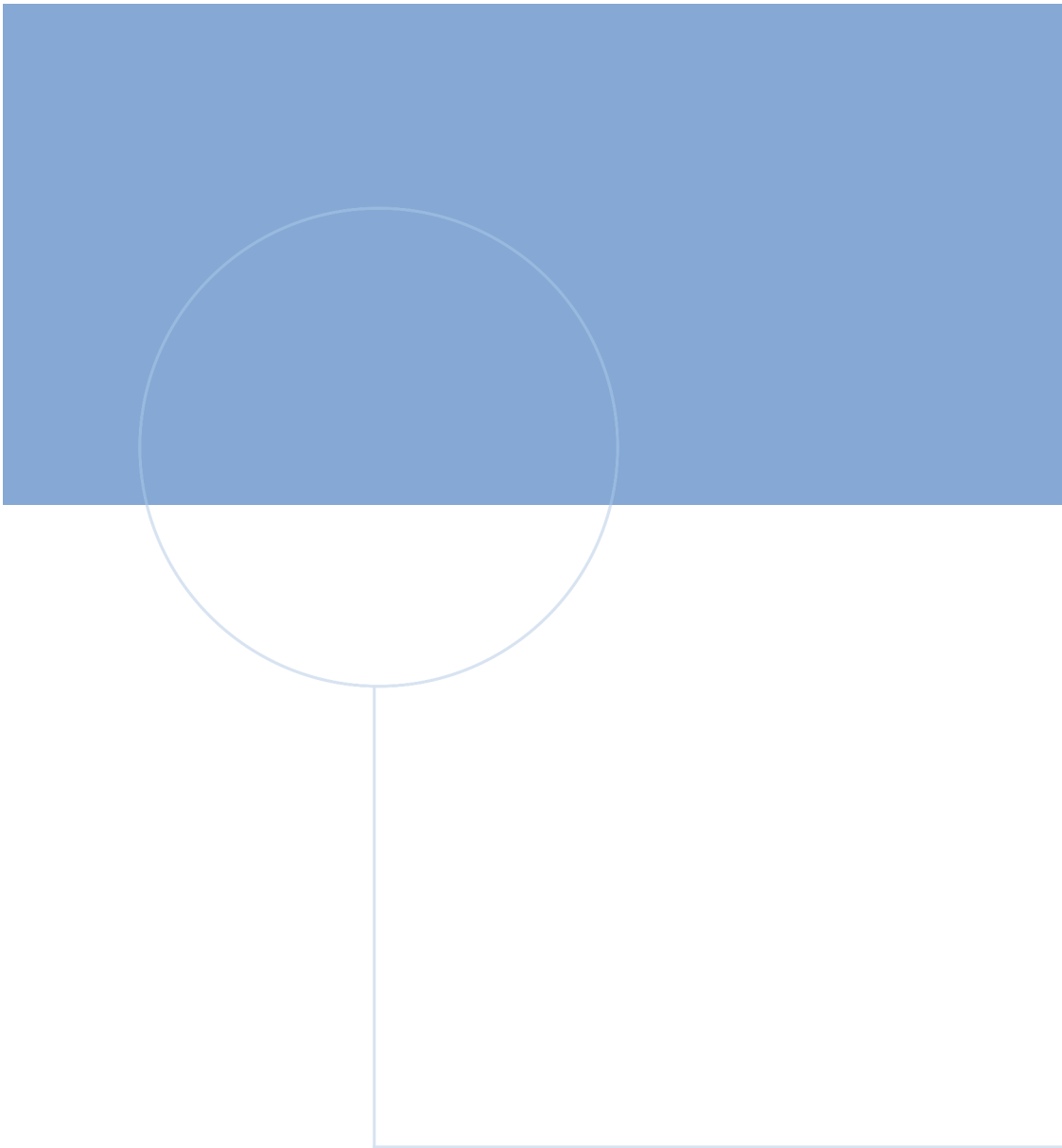

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