The role of palm oil industry in Indonesian economy and its export competitiveness

(パーム油産業のインドネシア経済における役割とその輸出競争力)

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SUMMARY

Indonesia has undergone a transformation process from an agricultural based country into an industrialized country. The World Bank classified Indonesia into a transforming country since agriculture is no longer a major source of growth (World Bank, 2008). On the other hand, Indonesia is a country rich of natural resource including in the agriculture sector and the agricultural employment is still high although with declining trend.

Besides the contribution to the GDP and employment, agriculture sector is also an important sector in acquiring foreign currency through export activities. One of the industries which contribute to acquiring foreign currency is the palm oil industry.

The objective of developing the palm oil industry is to increase the welfare of the people involved in the industry especially the rural population. But is the development of palm industry increases the welfare of rural population?

Since 70 percent of Indonesia's palm oil is exported, discussing the development of palm oil industry is not complete without discussing palm oil export competitiveness. The main concern is to how to achieve export competitiveness and what measures have been taken to increase the export competitiveness.

This research has two main objectives and several specific objectives. The first main objective is to analyze the contribution of palm oil industry on the Indonesian economy. Meanwhile the specific objective is to analyze the linkage of the palm oil industry with the other sectors of the economy and the effect of the palm oil industry on the factor of production and households.

The second objective is to analyze the export competitiveness of Indonesia's palm oil product. Furthermore, the specific objective is to analyze the determinants of crude palm oil (CPO) export competitiveness compare with Malaysia, analyze the source of Indonesia's palm oil product competitiveness and lastly, analyze the market position of Indonesia's palm oil in three markets.

This dissertation is consists of seven chapters, the first chapter is the introduction followed by a brief overview regarding the palm oil industry in Indonesia. The next four chapters are the main content of the dissertation, the third chapter discuss the contribution of palm oil industry on the Indonesian economy, followed by the determinants of crude palm oil (CPO) export competitiveness. The fifth chapter discusses about the export competitiveness of Indonesia's palm oil product and the sixth chapter discusses about the market position of Indonesia's palm oil in three selected countries. Lastly, conclusion and policy recommendations are presented.

The third chapter analyzed the contribution of the palm oil industry in Indonesia employing the input output and social accounting matrix (SAM) analysis. The industry consists of two sectors, the oil palm sector and the animal and vegetable oil processing sector. The contribution is divided into two types, first the contribution on the economy itself and the second the impact on factor of production and households. The result shows that the animal and vegetable oil processing sector contributes more to the economy in output and value added. Moreover, the animal and vegetable oil processing sector is more linked to the other sectors compare to the palm oil sector. On the other hand, the oil palm sector has more contribution on the employment aspect.

On the impact on the factor of production and households, the result

indicates that the oil palm sector mainly benefited the rural agricultural labor and urban non-agricultural labor since the sector is link to the financial sector. Meanwhile, the development of the animal and vegetable oil sector will benefit the rural agricultural and non-agricultural labor since the plant location mainly located in the rural area and it has link with the oil palm sector. For the impact on households, the development of both sectors will have the biggest impact on the agriculture landowner households.

The next chapter is regarding the determinants of CPO export competitiveness. The objective of this chapter is to compare palm oil industry in Indonesia and Malaysia and to analyze the determinants of Indonesia's CPO export competitiveness compare with Malaysia, the main competitor. An export ratio equation between Indonesia and Malaysia is constructed using monthly data. The dependent variable is CPO export of both countries, meanwhile the independent variables includes price ratio, export tax difference, refined palm oil export ratio and exchange rate ratio. The result shows all of the independent variables affected the CPO export competitiveness.

The fifth chapter is regarding Indonesia's palm oil product export competitiveness. This chapter analyzes the export competitiveness of Indonesia's palm oil product compared to Malaysia in three regions: Asia, Africa and Europe. Two palm oil products are analyzed, crude palm oil (CPO) and refined palm oil. Market share is utilized as the measurement of competitiveness. The result indicates that Indonesia's palm oil export has increased significantly over the period of 1999-2001 and 2005-2007. The reason for the increase is the increase in demand and Indonesia's palm oil product has gain export competitiveness compared to Malaysia's product.

The next chapter regards the market position of Indonesia's palm oil in three selected countries. The objective of this chapter is to analyze the competition between palm oil with its substitute and between Indonesia's and Malaysia's palm oil in three selected countries, which is China, India and Netherlands. Two stage import demand is constructed using the autoregressive distributed lag (ARDL) approach and almost ideal system (AIDS). The result indicates that habit persistence, world palm oil and substitute price are the major determinants of palm oil import in China and Netherlands. Substitute price has the largest effect on the palm oil import in these two countries. Meanwhile in India domestic price and trade liberalization are the main determinants. Palm oil price is an important factor in determining palm oil demand in these three countries. In addition, Indonesia's palm oil is more elastic in China and India. In China, both countries palm oil is complementing each other meanwhile in Netherlands they are competing.

From this research it can be concluded that the development of palm oil industry, which include the on-farm, CPO and refined palm oil industry, will have a huge effect on the Indonesian economy. Since almost 70 percent of the palm oil product is exported, increasing palm oil export competitiveness will be an important factor in the development of Indonesia's palm oil industry.

In developing the palm oil industry, there are two approaches that can be taken; domestic and foreign. The domestic approach includes domestic policy which will have affects the domestic palm oil industry. Meanwhile the foreign approach includes policy to increase Indonesia's competitiveness.

On the domestic policy, there are four main objectives to focus on. First, to implement policy that can attract business people to invest in the refined palm

oil industry which has more value added rather than only investing in on-farm or until crushing FFB into CPO. Second, the policies imposed must be toward more participation of farmers in the on-farm activities of oil palm plantation as landowner not as labor. Based on this research, the largest beneficiary of the palm oil industry is the landowner in rural areas. Third, the government must have a clear road map on the palm oil industry. The road map must involve all the stakeholders of the palm oil industry. Lastly, specialization and further cooperation among palm oil producers must be promoted.

Concerning the policy for increasing export competitiveness, there are four activities that can be implemented. First, Indonesia's palm oil must increase its promotion activities in the international market. Second, Indonesian government and private sectors must coordinate its action in order to increase Indonesia's palm oil export. Third, Indonesia and Malaysia as the major producer and exporter of palm oil must cooperate with each other. The cooperation can be in the form of promotion, price stabilization scheme and investment. Fourth, demand for each country must be identified for references by the palm oil producers.

The domestic and foreign approach policies must be implemented simultaneously since both sectors are linked. In order to develop domestic palm oil industry, demand from international market is essential. Increasing export competitiveness will not be achieved without the well established domestic palm oil industry. Hopefully in the future, the Indonesian people especially the rural population will benefit more with the developed palm oil industry

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LIST OF ABBREVIATIONS

AIDS	: Almost Ideal Demand System
ARDL	: Autoregressive Distributed Lag
CIC	: Capricorn Indonesia Consult
CMSA	: Constant Market Share Analysis
CPO	: Crude Palm Oil
IMF	: International Monetary Fund
IMP	: Industrial Master Plan
FFB	: Fresh Fruit Bunch
GDP	: Gross Domestic Product
MPOB	: Malaysia Palm Oil Board
MPOC	: Malaysia Palm Oil Council
NES	: Nucleus Estate and Smallholder Scheme
PIR	: Perkebunan Inti Rakyat
ROW	: Rest of the World
RM	: Malaysian Ringgit
RPO	: Refined Palm Oil
SAM	: Social Accounting Matrix
SITC	: Standard International Trade Classification
UN COMTRADE	: United Nations Commodity Trade Statistics Database

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I. INTRODUCTION

1.1. Background

Indonesia has undergone a transformation process from an agricultural based country into an industrialized country. The World Bank classified Indonesia into a transforming country since agriculture is no longer a major source of growth (World Bank, 2008). The contribution of agricultural GDP has decreased over the years from 23 percent in 1985 into only 14 percent in 2007 (ADB, 2009). From 1985 until 2007, the share of agriculture sector decrease by 2 percent annually. In 1998 and 1999, the share slightly increased caused by the financial crisis which made other sectors decrease its contribution significantly. In 2007, also the share slightly increase (by 6.5 percent) caused by the increase in several price of Indonesia's agricultural primary export such as rubber and palm oil.

On the other hand, Indonesia is a country rich of natural resources including in the agriculture sector and the agricultural employment is still high although with declining trend. In 1970, the share of agriculture employment reached 66.4 percent, in 1985 became 55 percent and in 2007 44 percent. From 1985 to 2007, the employment share of agriculture in average decline by 1 percent annually.

Besides the contribution to the GDP and employment, agriculture sector is also an important sector in acquiring foreign currency through export activities. One of the industries which contribute to acquiring foreign currency is the palm oil industry. The palm oil industry consists of on-farm, which produce fresh fruit bunch (FFB) and processing industry. The processing industry can be divided into two major parts: factories which crushed the fresh fruit bunch (FFB) into crude

palm oil (CPO) and factories which refined the crude palm oil (CPO) into various products called the refined palm oil.

The objective of developing the palm oil industry is to increase the welfare of the people involved in the industry especially the rural population. But is the development of palm industry increases the welfare of rural population? Susilowati (2007) argued that the agro-industry (which includes the palm oil industry) sector has not showed a role in increasing rural population income, agricultural or non-agricultural household. How about the palm oil industry?

Since 70 percent of Indonesia's palm oil is exported, discussing the development of palm oil industry is not complete without discussing palm oil export competitiveness. The main concern is how to achieve export competitiveness and what measures have been taken to increase the export competitiveness.

1.2. Research Objectives

This research has two main objectives and several specific objectives. The first main objective is to analyze the contribution of palm oil industry on the Indonesian economy. Meanwhile the specific objective is to analyze the linkage of the palm oil industry with the other sectors of the economy and the effect of the palm oil industry on the factor of production and households.

The second objective is to analyze the export competitiveness of Indonesia's palm oil product. Furthermore, the specific objective is to analyze the determinants of Indonesia's CPO export competitiveness comparing with Malaysia, analyze the source of Indonesia's palm oil product competitiveness and lastly, analyze the market position of Indonesia's palm oil in three markets.

1.3. Measuring Competitiveness

Many authors have tried to define competitiveness[1]. The definition varies depending on which level of approach is taken. For example, the definition of competitiveness on a country level will be different from that on the firm level. Additionally, the analysis of competitiveness will be different depending on the firm level. In this research, competitiveness will be analyzed on a product basis, with the product as palm oil, and on a country level, with the countries as Indonesia or compared with Malaysia.

After deciding the level of the analysis, the next problem is the method of measuring competitiveness. On a one-product and country level, there are two approaches to measuring competitiveness, the producer approach and market approach. The producer approach measures competitiveness from the producer side using measurements such as price (Durand and Giorno, 1987), real effective exchange rate (Helleiner, 1991, Manzur et.al, 1999) and several indexes such as Revealed Comparative Advantage (RCA) which is introduced by Balassa (1965) and Domestic Resource Cost (DRC)(Monke and Pearson, 1989). Meanwhile, for the market approach, one of the most common measurements is market share or the change in market share (Fagerberg, 1998; Krugman and Hatsopoulos, 1987; Mandeng, 1991; Gopal, 1999; Hasan, 2001; Jin, 2003; Klasra and Fidan, 2005; Torok, 2008). In this research, competitiveness is measured by the change of market share.

[1] See Siggel (2006) for a complete survey of papers related to competitiveness and comparative advantage

1.4. Dissertation Outline

The dissertation consists of seven chapters. Beginning with the introduction and followed by the brief overview of palm oil industry in Indonesia. The main part consists of four chapters, which can be classified into two parts. The first part regarding the role of palm oil industry on Indonesian economy, which consist of one chapter and the second part, export competitiveness of Indonesia's palm oil export. The second part consists of three chapters: the determinants of Indonesia's crude palm oil (CPO) export competitiveness, export competitiveness of Indonesia's palm oil product and Indonesia's palm oil market position in three markets. Lastly, conclusion and policy recommendation are presented. The dissertation flow is presented in Figure 1.1.

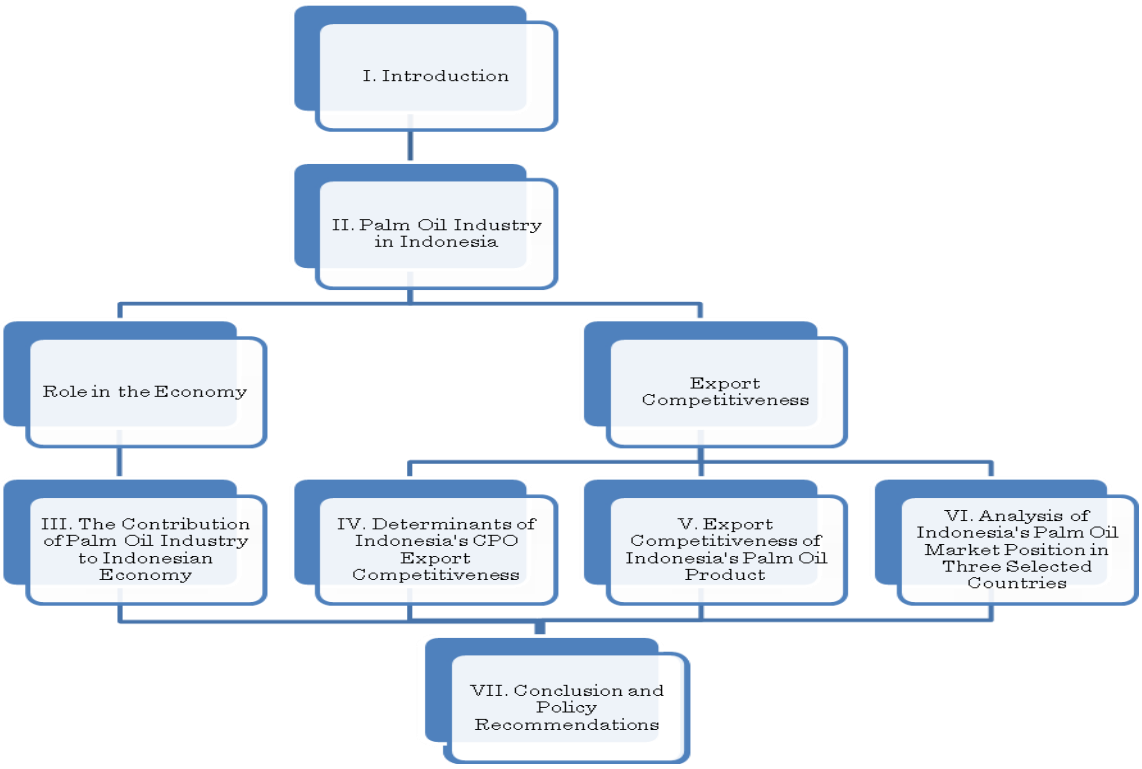

Figure 1.1. Dissertation Flow

II. PALM OIL INDUSTRY IN INDONESIA

2.1. Introduction

Palm oil is produced from the processing of fruit called the fresh fruit bunch (FFB). The FFB is processed in a extraction unit usually located in an estate into a product called the crude palm oil (CPO). Besides CPO, extraction of FFB can produce also palm kernel oil (PKO). This CPO and PKO can be more process into variety of products which various usage.

CPO is one of the important agricultural products produced by Indonesia for both domestic and international market. In the domestic market, CPO is the main raw material of making cooking oil, which is one of the basic needs for the people of Indonesia. In 2009, 6.9 million tons (68.54 percent) CPO was used for making cooking oil, and this number has increased significantly since 2004 when only 3.5 million of CPO was utilized for making cooking oil (CIC, 2010). In addition to raw materials for cooking oil, palm oil is also used to make margarine, soap, oleochemical and the latest is for biofuel.

Comparing with other vegetable oil, production of palm oil is the largest. In 2008, world palm oil production reached 38.9 ton and since 1998 it has increased over 100 percent passing the production of soybean oil (Table 2.1).

Table 2.1. World Vegetable Oil Production in 1998 and 2008 (Ton)

Vegetable Oil	1998		2008	
	Production (Ton)	Share (%)	Production (Ton)	Share (%)
Palm oil	18,215,637	21.77	38,936,925	29.46
Soybean oil	24,184,526	28.91	37,524,824	28.39
Rapeseed oil	11,496,718	13.74	18,171,518	13.75
Sunflower oil	8,868,495	10.60	11,027,327	8.34
Groundnut oil	5,357,069	6.40	5,797,109	4.39
Palm kernel oil	2,313,631	2.77	5,140,477	3.89
Cottonseed oil	3,857,753	4.61	4,988,201	3.77
Coconut Oil	3,500,793	4.18	3,752,825	2.84
Olive oil, virgin	2,394,830	2.86	2,886,019	2.18
Maize oil	1,864,259	2.23	2,217,006	1.68
Others	1,603,253	1.92	1,742,461	2.08
Total	83,656,964	100.00	132,184,692	100.00

Source: FAO (2010)

World production of palm oil is dominated by the two countries, namely Indonesia and Malaysia. Both countries produce 84 percent of the total production of palm oil the world in 2008 (Table 2.2).

Table 2.2. Palm Oil Production by Countries in 2008 (Ton)

Countries	Production (Ton)	Share (%)
Indonesia	16,900,000	43.40
Malaysia	15,823,200	40.64
Nigeria	1,300,000	3.34
Thailand	965,000	2.48
Colombia	780,000	2.00
Papua New Guinea	395,000	1.01
Others	2,773,725	7.12
Total	36,936,342	

Source: FAO (2010)

2.2. Domestic Production of Palm Oil

Fresh fruit bunch (FFB) can be divided into three: smallholders, government-owned and private companies. The first large scale of Indonesia's oil palm plantation was set up by the Dutch colony in North Sumatera using the seed from Deli, which is also located in North Sumatra. Soon afterwards, the British traders also set up oil palm plantation in Malaysia using the seeds from Deli. After Indonesia gain independence in 1945, Dutch plantation owners had no longer support from the Dutch colony and several plantations were collapsed. In 1957, the Dutch colonial plantations were transferred to the Perusahaan Perkebunan Baru (New State Plantation Company) and since then the production had declined. Seventeen oil palm Dutch-owned plantations were nationalized and transferred to the Perusahaan Perkebunan Baru according to Ordinance No 19 1959 (Kano, 2008).

In 1968, the government of Indonesia started to invest again in the palm oil sector through state run companies called Perseroan Terbatas Perkebunan (PTP). During this period the oil palm planted area had increased dramatically. Most of the plantation was located in the North Sumatera province. In the late 1980s, the government began to expand the plantation into the other islands of Kalimantan and Papua.

In 1979, the government implemented the PIR (Perkebunan Inti Rakyat) or NES (Nucleus Estate and Smallholder Scheme). Private companies planted palm tress and after three to four years the planted area is transferred to the smallholder farmers (called plasma). The plasma will take care of the planted land under the guidance of the private companies (called Inti). After the tree has produced, the Inti is required to purchase the FFB from the plasma which is then processed to

CPO.

In 2008, 52.68 percent of the total planted palm trees is controlled by the private companies followed by small holders (39.14 percent) and government-owned (8.19 percent). The private companies have grown thirty times in the period of 1980-2008 with annual average of 12 percent. Meanwhile the government-owned estate in the same period only grew three times with annual average growth of 3 percent. In the 1980's, the government-owned companies dominated the oil palm tree planted areas, but beginning in the 1990's the position has been taken by the private companies.

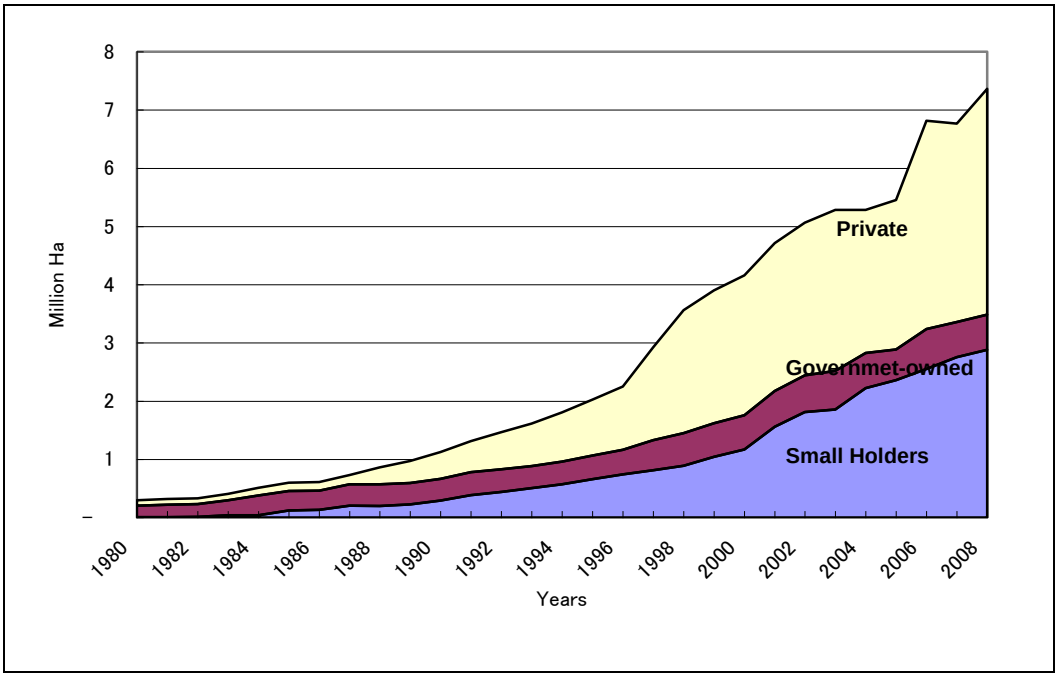

Figure 2.1. Oil Palm Planted Area of Government-Owned, Private and Smallholders,1980-2008
Source: Ministry of Agriculture (2010)

Private companies contributed the largest palm oil production in 2008 with 49.48 percent followed by smallholders (39.47 percent) and government-owned (11.05 percent). The smaller contribution of private and

smallholders in the production compare to the area planted indicate that the government-owned estate has higher productivity. This can be inferred that government-owned company has more experience in palm oil business.

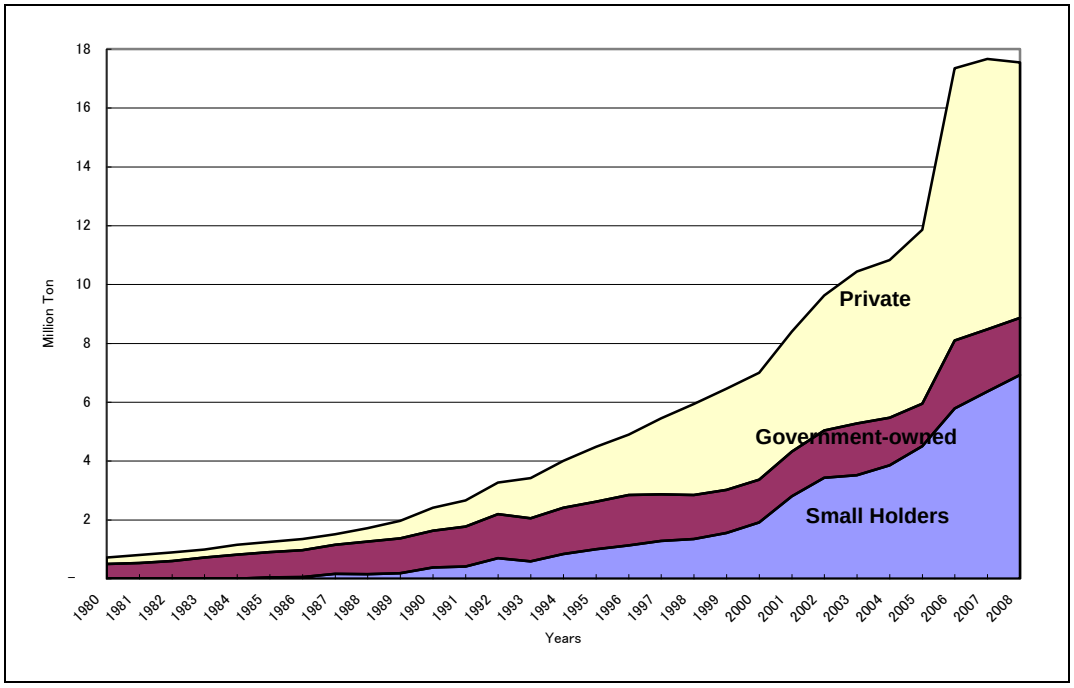

Figure 2.2. Palm Oil Production of Government-Owned, Private and Smallholders,1980-2008
Source: Ministry of Agriculture (2010)

2.3. CPO Production

Fresh fruit bunch (FFB) is processed in a factory into CPO. In 2008 there were 600 CPO factories with the capacity of processing 25,541 ton of FFB per hour. The CPO factories are mainly owned by the government-owned or private companies. Out of 600 factories, 491 units belong to private companies meanwhile the rest belong to government-owned companies (CIC, 2010).

The number of CPO factories has increased significantly from 2004. In 2004 there were only 320 factories with the capacity of 13,521 ton per hour of

FFB. Comparing to 2008, the number and capacities has increased by more than 100 percent.

2.4. Domestic Consumption of Palm Oil

The CPO produced by the CPO processing factories can be exported in form of CPO or refined in refinery to produce various refined palm oil products. In 2008, 3.8 million ton palm oil is consumed domestically or about 21 percent of Indonesia's palm oil production. Almost 68 percent of the domestic palm oil consumption is used for making cooking oil, 7.11 percent utilized in the margarine and shortening industry, 11.18 percent in the soap and detergent industry, 9.37 percent in the oleochemical industry and 4.91 percent in the biodiesel industry (CIC, 2010).

During the period of 2004-2008, palm oil consumption by cooking oil industry has fluctuated. The peak was on 2007, when 5.3 million of palm oil is utilized or 67.20 percent of total palm oil domestic consumption (Figure 2.3). In 2008, the consumption of palm oil in cooking oil industry decrease by 23 percent caused by the decrease in cooking oil production.

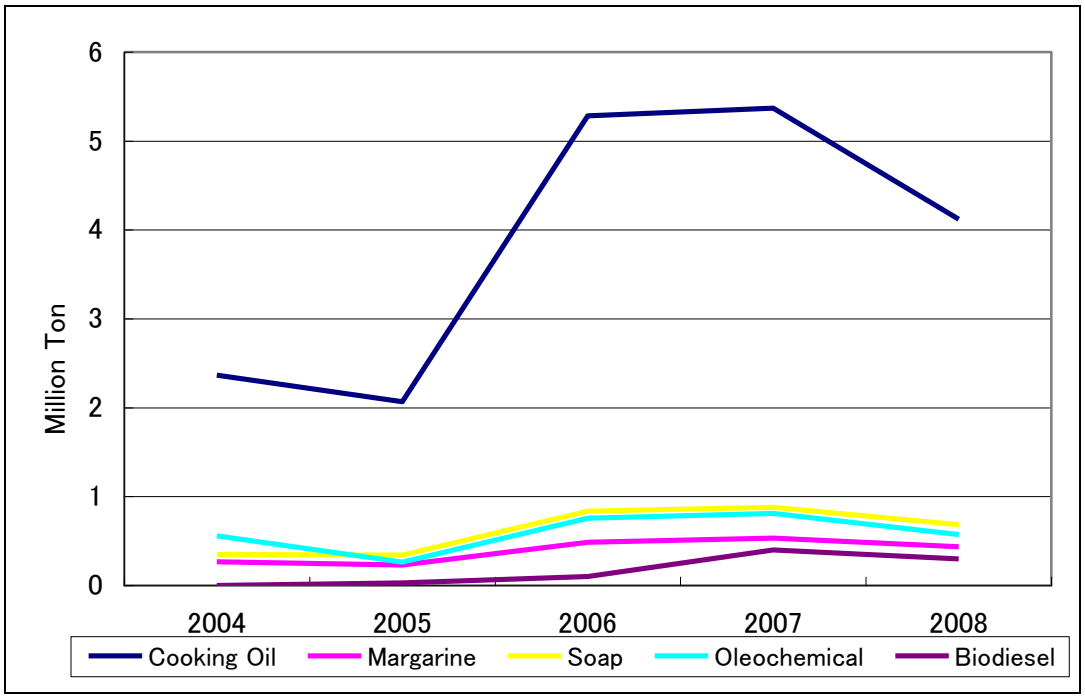

Figure 2.3. Palm Oil Consumption by Industries, 2004-2008
Source: CIC (2010)

2.5. Palm Oil Export

The exported product can be classified into two products: CPO (SITC Rev3 42221) and refined palm oil (SITC Rev3 42229). In 2008, 53 percent of Indonesia's export is in the form of CPO meanwhile 47 percent in the form of refined palm oil. Meanwhile, the largest importer of world palm oil in 2008 is China, India and Netherlands which contribute about half of the world palm oil import (United States Department of Agriculture, 2009).

The main destination of Indonesia's palm oil export is Asia which comprises about 73 percent of total export, followed by Europe by 20 percent, 6 percent to Africa and 1 percent to the rest of the world. India, China, Netherlands, Malaysia and Singapore are the main destination of Indonesia's palm oil export (Figure 2.4). India and China are relatively new market compare to Netherlands

which has been a traditional market for Indonesia's palm oil since the 1960's. Indonesia's total palm oil exports has increased in average by 30.69 percent in value and 22.67 percent in quantity during the period of 1990-2008. Export to India experienced the highest increase during the period of 1990-2008 with an average increase of 84.95 percent in value and 83.40 percent in quantity.

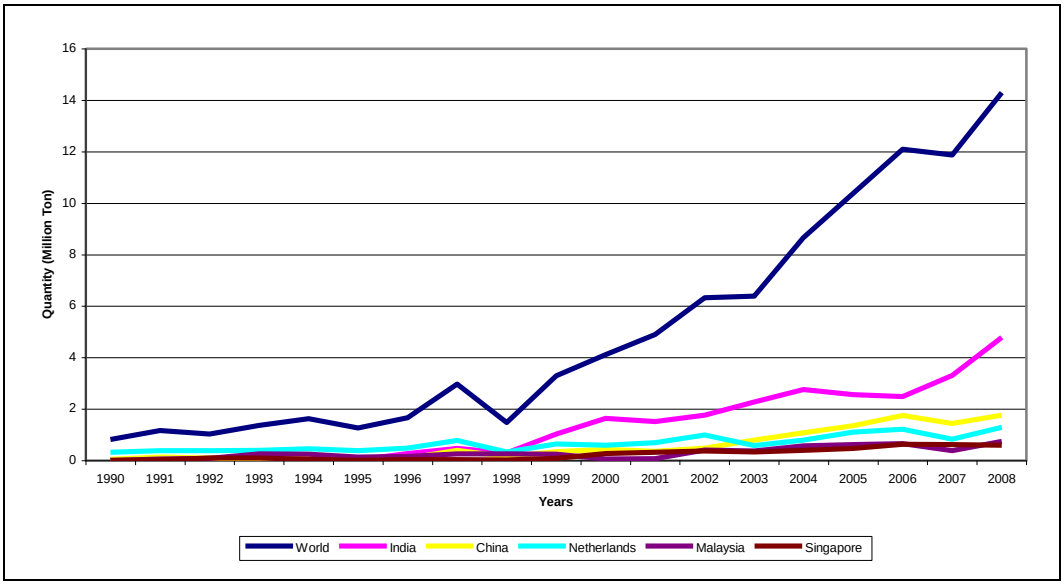

Figure 2.4. Indonesia's Palm Oil Export, 1990-2008
Source: UN COMTRADE (2010)

For CPO, Indonesia' main export destination is India, Netherlands, Malaysia, Singapore and Italy (Figure 2.5). Malaysia, although is the second largest producer of palm oil, is one of the main export destination of Indonesia's CPO. In Malaysia this CPO will be processed into refined palm oil which has higher value added. Meanwhile India is the largest importer of Indonesia's CPO with the proportion of 50 percent of Indonesia's total CPO export.

From 1990-2008, Indonesia's CPO export has increased in average by 32 percent in value and 24 percent in quantity. The proportion of CPO export has decreased significantly from 81 percent in 1990 to 53 percent in 2008.

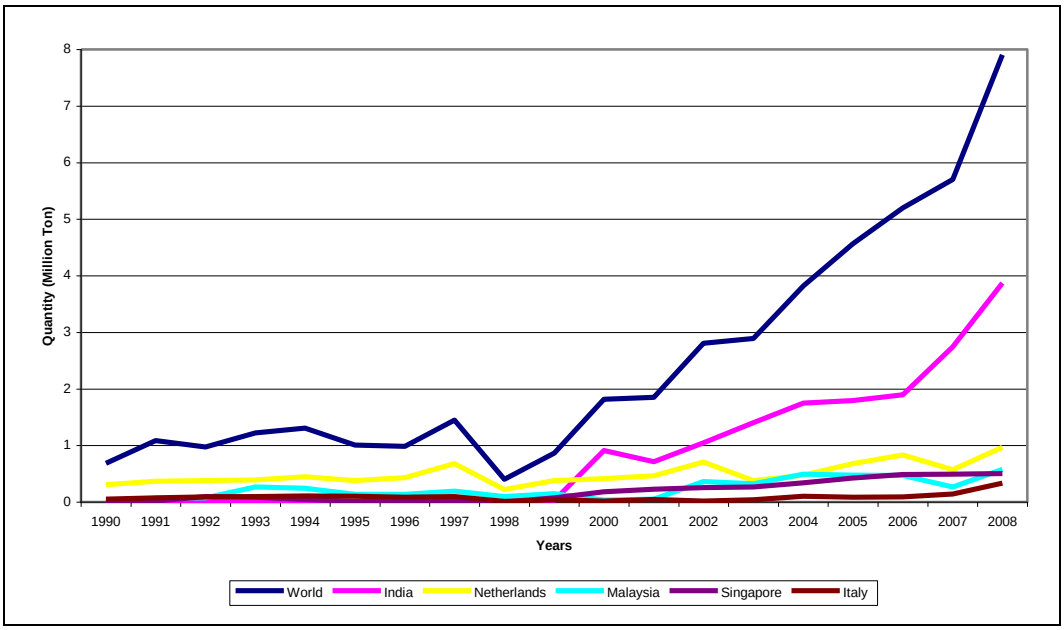

Figure 2.5. Indonesia's CPO Export, 1990-2008

Source: UN COMTRADE (2010)

Indonesia's refined palm oil export has increased significantly since 1990 with the average increase by 43 percent in value and 38 percent in quantity (Figure 2.6). Different from CPO, the largest importer of Indonesia's refined palm oil is China. During the period of 1990-2008, China's import from Indonesia has increased in average by 61 percent in value and 50 percent in quantity.

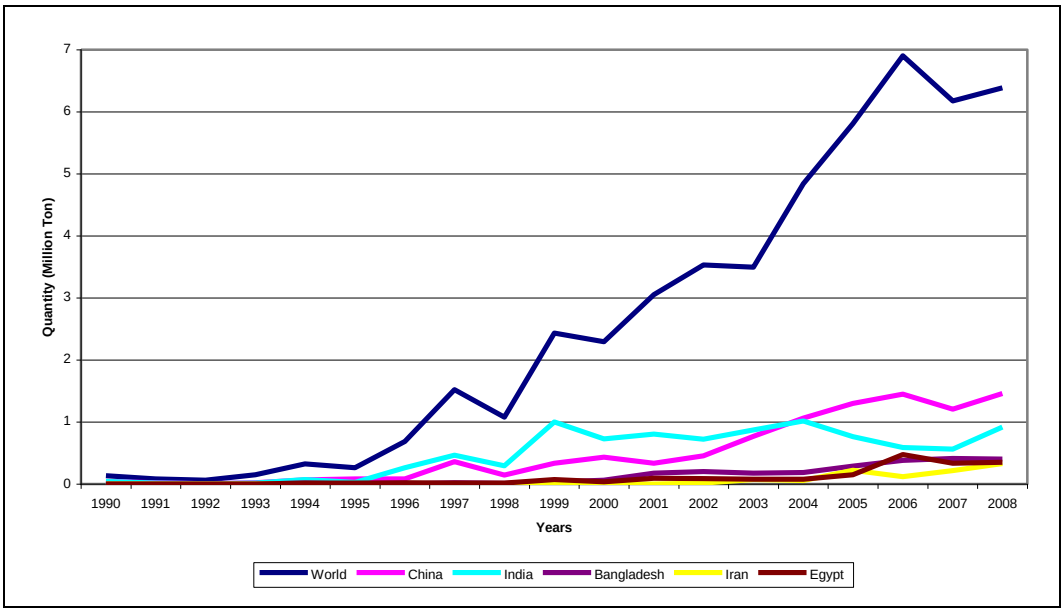

Figure 2.6. Indonesia's Refined Palm Oil Export, 1990-2008
Source: UN COMTRADE (2010)

2.6. Palm Oil Marketing System

During 1970's, a crisis occurred concerning the availability of coconut oil[2] in the domestic market. In order to avoid the same crisis in palm oil, the government in 1978 imposed regulation concerning the allocation of domestic palm oil which will be mainly utilized for producing cooking oil. According to the three ministers regulation dated on December 16 1978, there are several important points regarding the regulation which is (Djauhari dan Pasaribu, 1996) (Pahan, 2008):

- All palm oil producers must provide palm oil for domestic purposes
- The amount provided is determined by the Ministry of Agriculture
- The price of palm oil for domestic purposes is determined by the Ministry of Trade and Cooperatives after consulting with the Ministry of Agriculture and Ministry of Industry. The price is determined every 3 months based on the

[2] Back then, the coconut oil was the main raw material for cooking oil before replaced by palm oil

FOB price in Belawan, the main port for palm oil export.

These regulations made the palm oil distribution system controlled by the government (Figure 2.7).

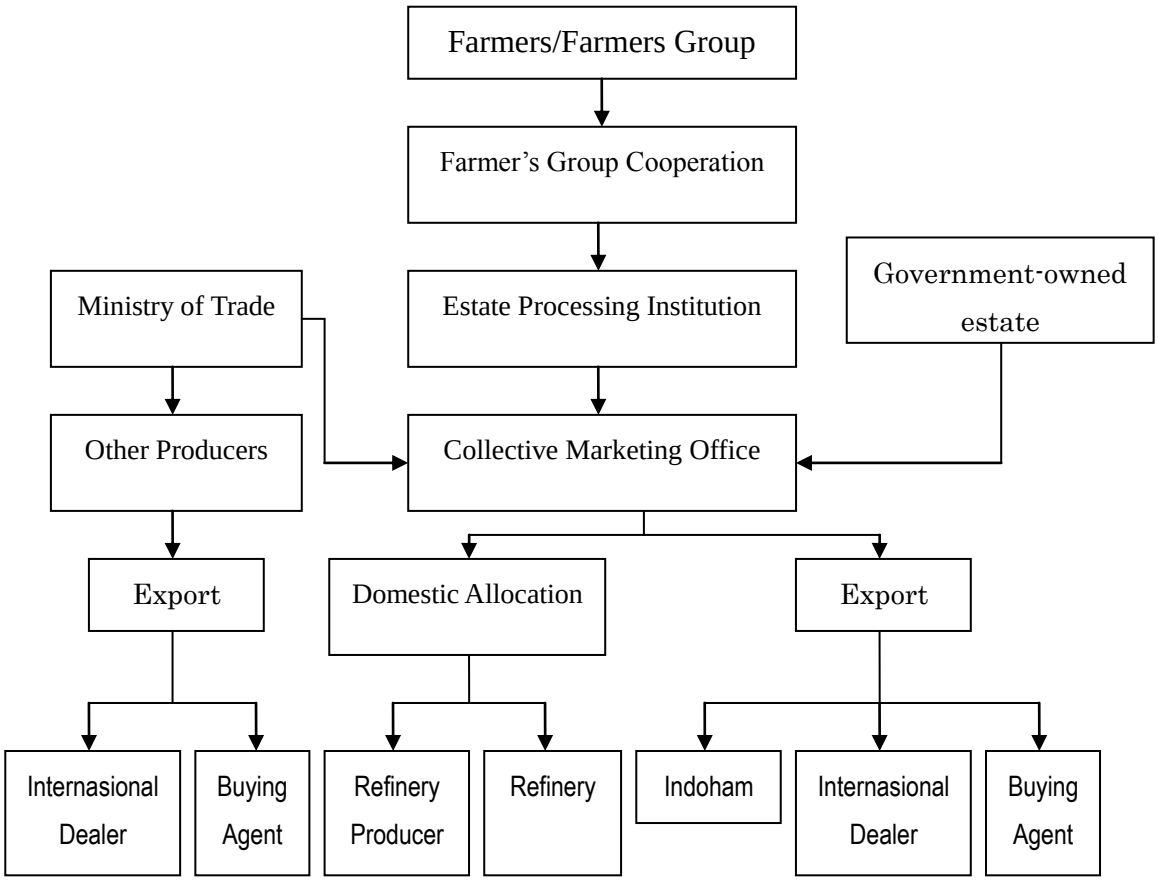

Figure 2.7. Palm Oil Distribution According to Three Ministers Regulation
Source: APB, 1989 in Soetrisno and Winahyu (1991)

From the distribution system of palm oil in Figure 2.7 shows an unfair method allocation of domestic palm oil. Government-owned estate and smallholders have a duty to fulfill the domestic demand first than export. Meanwhile the private estate did not have the obligatory to fulfill domestic market but when the domestic price is higher than international price, private estate tend to sell its product to domestic market causing oversupply in the domestic market (Soetrisno and Winahyu, 1991).

The regulation ended in 1991with the imposing of new three ministries decree by the Ministry of Trade, Agriculture and Industry. The new decree decided to abolish the domestic allocation of palm oil. This decree was intended to increase the palm oil export and to attract investment to the palm oil industry (Pahan, 2008).

The new regulation changed the palm oil marketing and distribution system especially for government-owned and private companies. Farmers sell their fresh fruit bunch (FFB) to the CPO factories through agent which collects the FFB in the farm although some big farmers can sell directly to the factories. The agent has an agreement with the factory for each month to sell certain amount of FFB to the factory. Therefore in order to attract farmers to sell to them, usually agent give attractive price or loans to be paid during harvesting time. Meanwhile for the nucleus-estate farmers, they have the obligation to sell their FFB to the nucleus estate although sometimes farmers also can sell their FFB to agent secretly especially when agent gives better price.

In determining the FFB price, there are two methods, first is the market price which depend on the price of CPO. The second is the price determined by the local government which is based on the decree of Ministry of Agriculture No 395/Kpts/OT.140/11/2005. The price is determined every month based on agreement between price setting members in local government. The members include provincial government, forestry and estate official, nucleus firm, farmers, research institution and other related institutions (Maryadi et.al, 2004).

The formula used to determine the FFB price is as follows:

$P_{FFB} = K (P_{CPO} * R_{CPO}) + (P_{PKO} * R_{PKO})$

Where:

P_{FFB} : FFB price determined by the government (Rp/kg)

K : proportion index which the farmers will obtain (%)

P_{CPO} : price of CPO (Rp/kg)

R_{CPO} : conversion from FFB to CPO (%)

P_{PKO} : price of palm kernel oil (PKO) (Rp/kg)

R_{PKO} : conversion from FFB to PKO (%)

Usually the government determined price is used to determine the price of FFB for nucleus farmers to be sold to the estate. Meanwhile, the market price is usually for independent farmers selling their FFB to agent.

After the FFB is processed into CPO, the marketing system differs from government-owned and private factories. In the government-owned, the marketing mechanism is still the same as previous by using the Collective Marketing Office except there is no obligation to allocate for domestic market. The price is determined through the auction system which is carried out twice a week for international market and everyday for domestic market (Putri et.al, 2006). The auction is taking place in the Collective Marketing Office headquarter in Jakarta. Meanwhile for the private estate, they sold the CPO through their own marketing division. The system can be through auction or direct selling. The buyer of CPO can be direct consumer such as cooking oil industries, oleochemical industries or others or it can be trading companies which act as an intermediary for their consumer especially for foreign consumers.

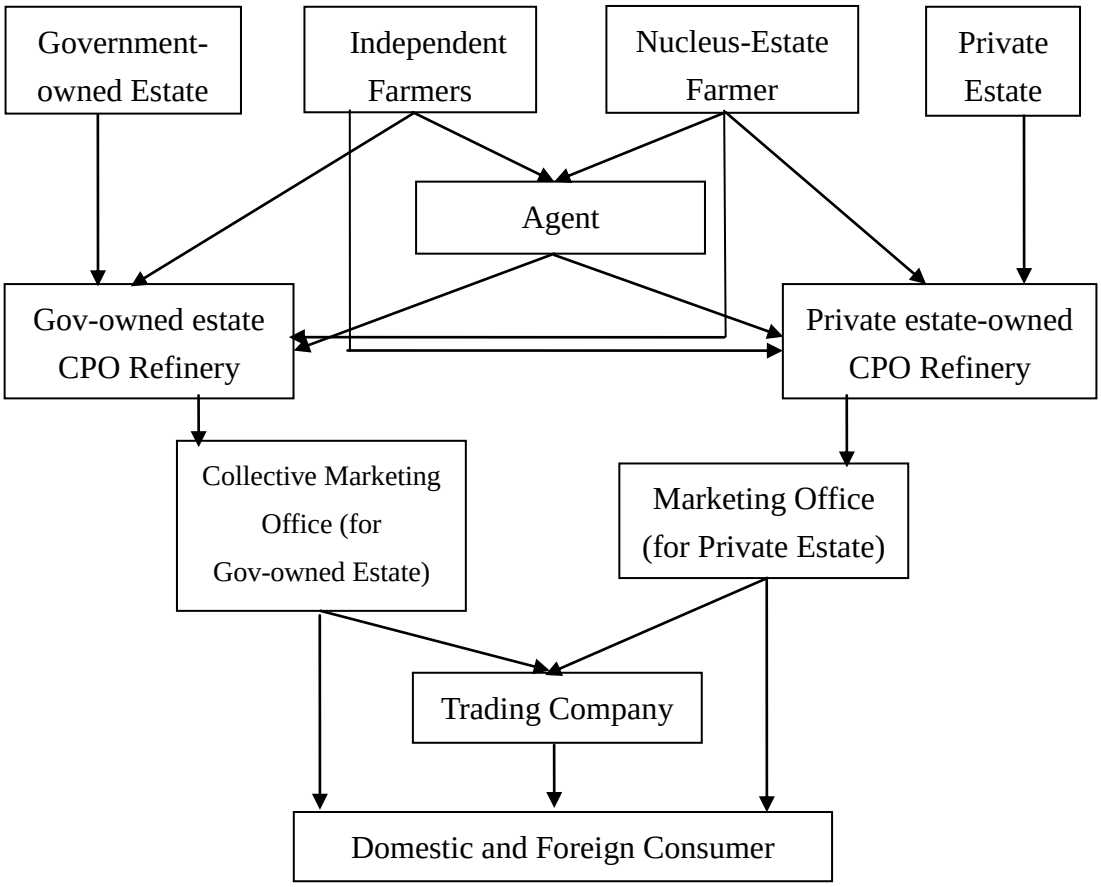

Figure 2.8. CPO Marketing System

2.7. Government Policy

There are two government policies that has affected the palm oil industry, the partnership scheme between government-owned or private companies with farmers and the export tax policy.

2.7.1. Partnership Scheme

The notable increase of the smallholder farmers in the 1980s until the 1990s is mainly contributed by the partnership scheme between government-owned or private companies with farmers. In 1980, the smallholders' oil palm planted area only 6,175 Ha and the number has increased significantly by

2008 with total area of 2.8 million Ha (Ministry of Agriculture, 2010).

The program was started in 1979 when the government implemented the PIR (Perkebunan Inti Rakyat) or NES (Nucleus Estate and Smallholder Scheme) with funding from international donor. Private companies planted palm trees and after three to four years the planted area is transferred to the smallholder farmers (called plasma). The plasma will take care of the planted land under the guidance of the private companies (called Inti). After the tree is producing, the Inti is required to purchase the FFB from the plasma which is then processed to CPO.

The scheme was started bundled with the transmigration program. People from the crowded island of Java was moved to the island of Sumatra and later to Kalimantan to participate in the scheme. The government supported partnership program ended in 2001 (Zen et.al, 2006). Until now, there are five types of partnership program in the oil palm plantation which not only supported by the government but also carried out by the private companies (Zen etal, 2006). In 2007, the government issued Ministry of Agriculture regulation No 26/Permentan/OT.140/2/2007 regarding the requirements to have partnership with local farmers when opening an oil palm plantation.

2.7.2. Export Tax Policy

The trade liberalization policy in 1991 resulted in an increase in both domestic price of cooking oil and volume of palm oil export. Concerned with the increase of cooking oil price, the government issued a new policy by imposing export taxes on palm oil products. The export tax policy was first implemented in September 1994. The implementation of export tax policy on palm oil products can be divided into three periods.

Period I: September 1994 – June 1997

The government issued Decree of Ministry of Finance No 439/KMK.017/1994 to tax on CPO, refined bleached deodorized palm oil (RBD PO), crude olein and refined bleached deodorized oil (RBD olein) beginning on September 1994.

The formula to calculate the export tax was as follows:

Export Tax = Export volume x Export tariff x (Base Price – FOB Price) x Exchange rate

The Free on Board (FOB) price is determined by the Ministry of Finance every month based on average prices of the world market during the previous two weeks; meanwhile the base price is the maximum export price which was free from export tax. The tax rate is getting smaller as the difference between base price and export price is bigger. The complete export duty can be seen at Table 2.3.

One of the palm oil products taxed is CPO. The magnitude of export tax on CPO is shown in Figure 2.8. During this period the export tax ranges from US$ 0 – 100.4. The highest occurred on December 1994 when the FOB price reached US$ 684 per ton, meanwhile the lowest occurred in August 1996 when the FOB price was US$ 434 per ton which lower than the CPO base price of US$ 435.

Table 2.3. Export Tax Structure of Indonesian Palm Oil According to Ministry of Finance Decree No 439/KMK.017/1994

Product	Price Levels	Duty/ton
CPO	Base Price: US$ 435	0%
	Additional :	
	First 35 (435-470)	60%
	Next 35 (470-505)	56% x (EP – BP)
	Next 35 (505-540)	52% x (EP – BP)
	Next 35 (540-575)	48% x (EP – BP)
	Next 35 (575-610)	44% x (EP – BP)
	Balance (P>610)	40% x (EP – BP)
Refined bleached deodorized palm oil (RBD PO)	Base Price: US$ 460	0%
	Additional :	
	First 40 (460-500)	60%
	Next 40 (500-540)	56% x (EP – BP)
	Next 40 (540-580)	52% x (EP – BP)
	Next 40 (580-620)	48% x (EP – BP)
	Next 40 (620-660)	44% x (EP – BP)
	Balance (P>660)	40% x (EP – BP)
Crude olein (CRD olein)	Base Price: US$ 465	0%
	Additional :	
	First 45 (465-510)	60%
	Next 45 (510-555)	56% x (EP – BP)
	Next 45 (555-600)	52% x (EP – BP)
	Next 45 (600-645)	48% x (EP – BP)
	Next 45 (645-690)	44% x (EP – BP)
	Balance (P>690)	40% x (EP – BP)
Refined bleached deodorized Olein (RBD olein)	Base Price: US$ 500	0%
	Additional :	
	First 50 (500-550)	60%
	Next 50 (550-600)	56% x (EP – BP)
	Next 50 (600-650)	52% x (EP – BP)
	Next 50 (650-700)	48% x (EP – BP)
	Next 50 (700-750)	44% x (EP – BP)
	Balance (P>750)	40% x (EP – BP)

Note: EP : export price, BP : base price

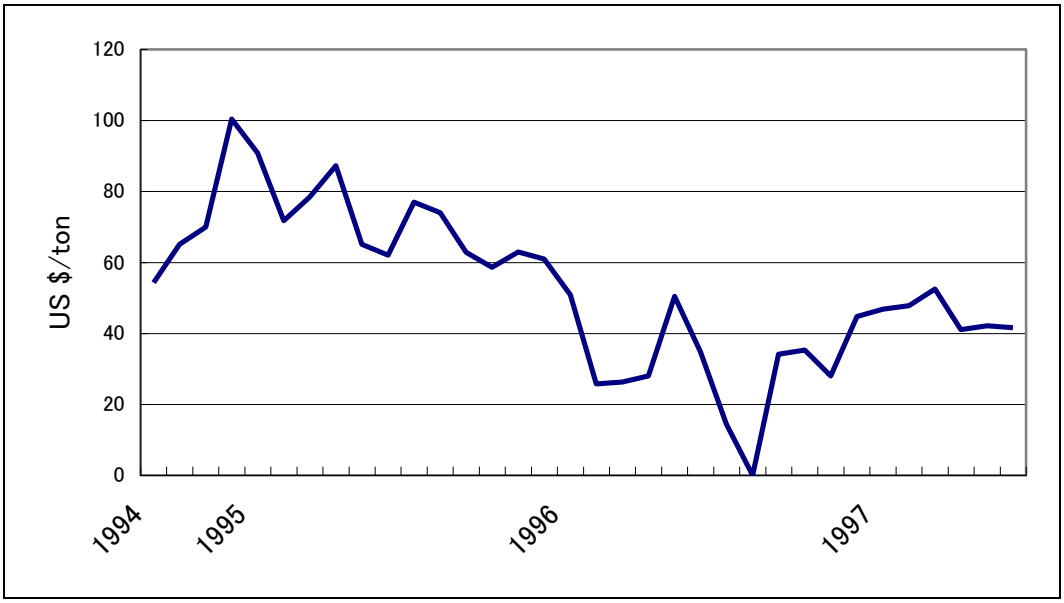

Figure 2.9. CPO Export Tax, September 1994 – June 1997

Period II: July 1997 – August 2007

In July 1997, base on the Decree of Ministry of Finance No 300/KMK.01/1997 the calculation method of export tax was changed. According to the new method the export tax is calculated as follows:

Export Tax = Export tax tariff x Check price x Export volume x exchange rate

However, when the check price has not been determined yet, the calculation of the export tax is as follows:

Export Tax = Export tax tariff x FOB value x exchange rate

The FOB value is the total export value stated on the Commodity Export Report or on the Certain Commodity Export Report.

The new calculation differs from the previous one. In the previous calculation, the export tax depends only at the difference between the FOB price and the base price and only the base price is determined by the government; meanwhile the other variable, such as base price and export tariff, is fixed. The

new calculation of export tax depends on the export tariff and the check price determined by the government, therefore the government can determine the magnitude of the export tax depending on the price of domestic cooking oil. When the domestic price of cooking oil is high, the government imposed high check price and export tariff.

The export tax tariff is determined by the Minister of Finance, while the check price is determined by the Ministry of Trade and Industry in a monthly basis. During this period the number of products being taxed increase from four to ten palm oil and palm kernel oil derivatives including CPO. In addition, from January -April 1998 the government banned the export of palm oil product since the domestic scarcity at that time.

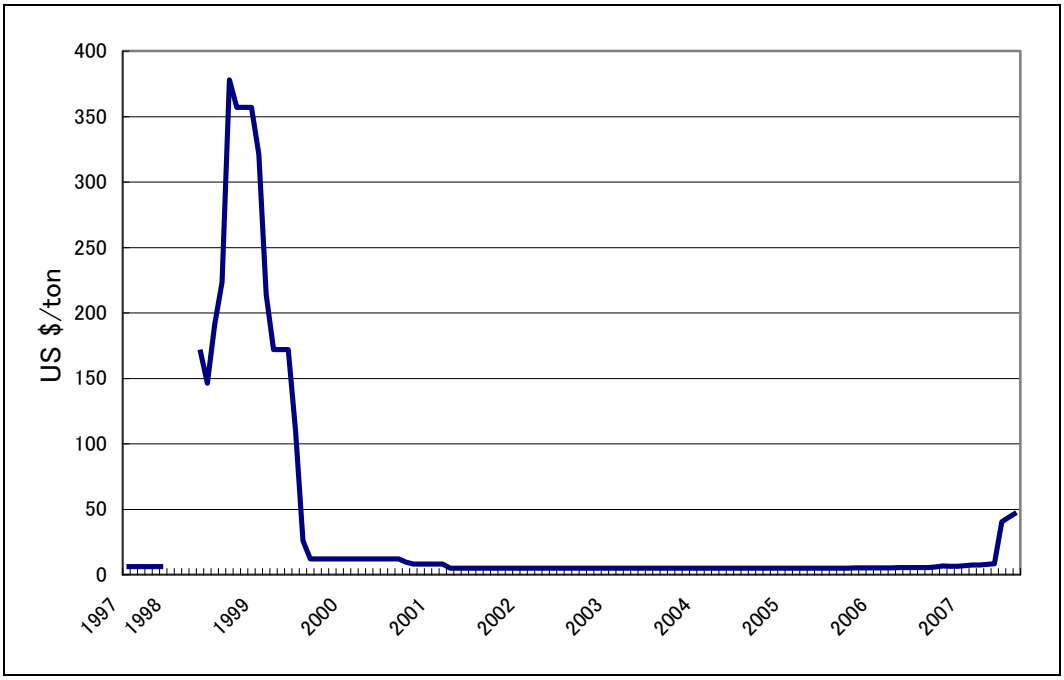

Figure 2.10. CPO Export Tax, July 1997 – August 2007

During this period, the magnitude of the CPO export tax ranges from

US$ 4.8 until US$ 378 per ton (Figure 2.10). The highest occurred during the financial crisis in September 1998 when the export tax tariff reached 60 percent and the check price was US$ 630 per ton CPO. During this period the country was in the mid of the Asian financial crisis which saw a tremendous increase in the domestic cooking oil price. In an attempt to lower the cooking oil price, the government set high export tax on CPO or even banned the CPO export in January-April 1998 in order to guarantee the availability of domestic CPO in an affordable price. After the crisis is over, the government gradually decreased the export tax tariff (Table 2.4).

The magnitude of the export tax during this period depends on two variables, export tax tariff and the check price. The check price is supposed to follow the fluctuation of international price, but during the period of August 1999 until August 2000 the check price of CPO is constant at US$ 120 and during October 2000 – September 2005 when the check price is constant at US$ 160 (Figure 2.11). Therefore during these two periods the CPO export tax is constant (Figure 2.10). Beginning from April 2006, the government updates the check price every month. Meanwhile, for the export tax tariff, the magnitude fluctuated over this period (Table 2.4).

Table 2.4. CPO Export Tax Tariff

Period	Export Tax Tariff (%)
July – December 1997	5
January – April 1998	Export ban
May – June 1998	40
June 1998 – January 1999	60
February – May 1999	40
June 1999	30
July 1999 – August 2000	10
September 2000 – February 2001	5
March 2001 – August 2005	3
September 2005 – May 2007	1.5
June 2007 – August 2007	6.5

Source: Ministry of Finance (various years)

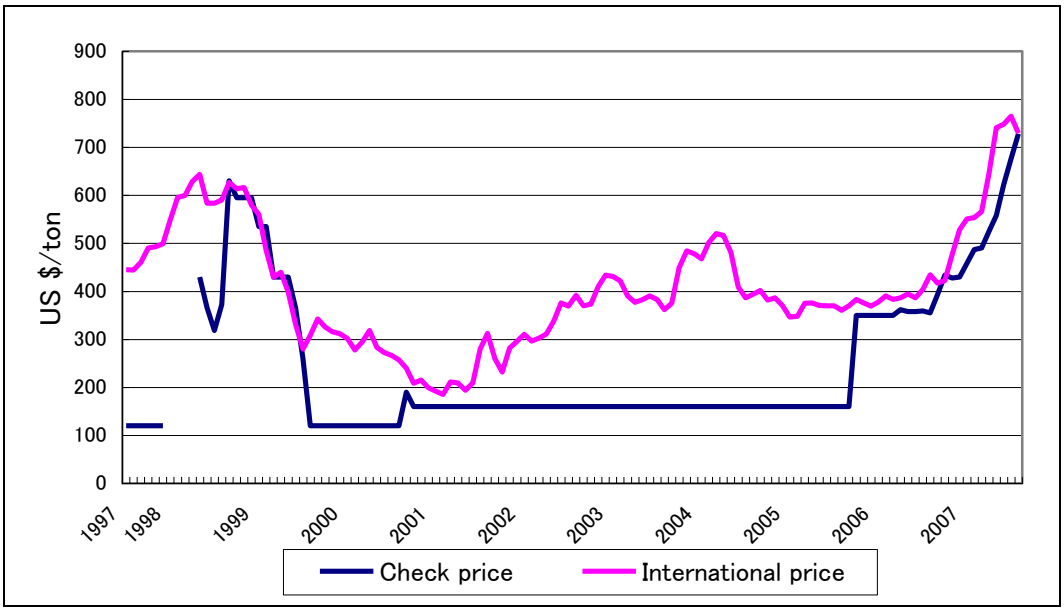

Figure 2.11. Check Price and International Price of CPO, July 1997 – August 2007
Source: Ministry of Trade and IMF (2009)

Period III: September 2007 - now

Beginning in September 2007 based on the Ministry of Finance Decree No 94/PMK.011/2007, the export tax tariff determination is changed. According

to the decree, the export tax tariff is determined base on the reference price set by the Ministry of Trade according to the previous month average international CPO price in Rotterdam. This regulation was imposed because of the increase in the international price of CPO causing palm oil producer to export its product rather than selling in domestic market.

This decree also set the minimum reference price when the palm oil product is taxed. From September 2007 until October 2008 the minimum reference price is US$ 550. Therefore when the reference price is under US$ 550, the export tax tariff is zero. Meanwhile, the higher the reference price the higher export tax tariff is imposed. Beginning on November 2008, the minimum reference price was increased to US$ 700.

There are 15 palm oil products, including CPO, that are taxed with different export tax tariff (Table 2.5). In addition, different from previous period the check price is updated every month and it follows the reference price and international price (Figure 2.12).

During this period, for CPO, the highest export tax paid occurred in April 2008 when the export tax tariff was 20 percent and the check price was US$ 1196. Meanwhile the lowest of 0 percent occurred from November 2008 – May 2009 and August 2009 – December 2009 when the reference price was lower than US$ 700 (Figure 2.13).

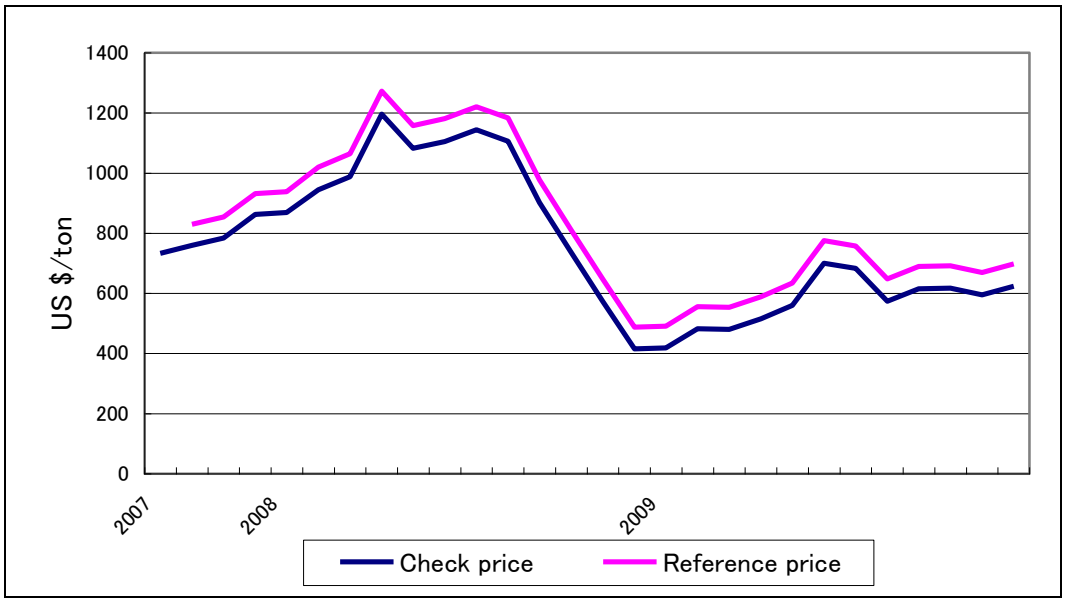

Figure 2.12. Check Price and Reference Price of CPO, September 2007-December 2009

Source: Ministry of Trade (2010)

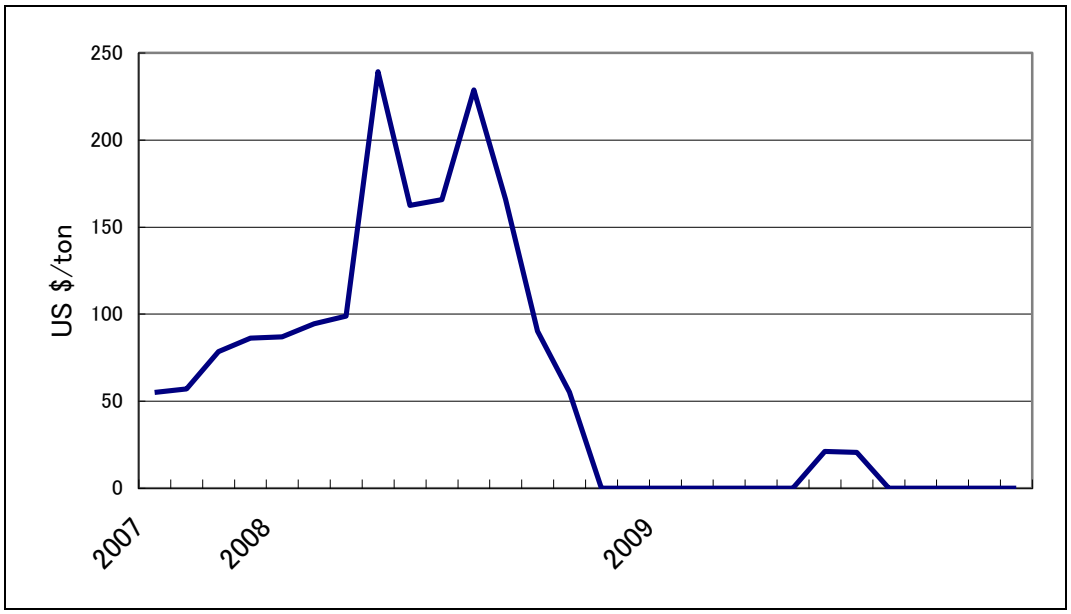

Figure 2.13. CPO Export Tax, September 2007 – December 2009

Tabel 2.5. Palm Oil and Derivatives Export Tax Tariff according to Ministry of Finance Decree No 67/PMK.011/2010, March 2010

Reference Price (US$/ton)	Fresh Fruit Bunch	CPO	Crude Olein	RBD Palm Olein	RBD Palm Kernel Olein	Cride Stearin	Crude Palm Kernel Oil	Crude Kernel Olein	Crude Kernel Stearin	RBD Palm Kernel Oil	RBD Palm Oil	RBD Palm Stearin	RBD Kernel Stearin	Biofuel from Palm Oil	RBD Palm Olein in Package
< 700	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701-750	40	1.5	1.5	1.5	1.5	0	0	0	0	0	0	0	0	0	0
751-800	40	3	3	3	3	1.5	1.5	1.5	1.5	1.5	1.5	0	0	0	0
801-850	40	4.5	4.5	4.5	4.5	3	3	3	3	3	3	1.5	1.5	0	0
851-900	40	6	6	6	6	4.5	4.5	4.5	4.5	4.5	4.5	3	3	0	0
901-950	40	7.5	7.5	7.5	7.5	6	6	6	6	6	6	4.5	4.5	2	2.5
951-1000	40	10	10	10	10	8.5	8.5	8.5	8.5	8.5	8.5	6	6	2	5
1001-1050	40	12.5	12.5	12.5	12.5	11	11	11	11	11	11	7.5	7.5	2	7.5
1051-1100	40	15	15	15	15	13.5	13.5	13.5	13.5	13.5	13.5	11	11	2	10
1101-1150	40	17.5	17.5	17.5	17.5	16	16	16	16	16	16	13.5	13.5	5	12.5
1151-1200	40	20	20	20	20	18.5	18.5	18.5	18.5	18.5	18.5	16	16	5	15
1201-1250	40	22.5	22.5	22.5	22.5	21	21	21	21	21	21	18.5	18.5	7.5	17.5
>1250	40	25	25	25	25	23	23	23	23	23	23	21	21	10	20

Source: Ministry of Finance Decree No 67/PMK.011/2010

III. THE CONTRIBUTION OF PALM OIL INDUSTRY TO INDONESIAN ECONOMY

3.1. Introduction

Over the years palm oil industry has grown significantly. In terms of planted area, oil palm plantation has increased 25 times in 2008 compare to 1980, meanwhile the production increase by 24 times during the same period (Ministry of Agriculture, 2010). Furthermore, the ownership of the oil palm estate has also varied. From only owned by the government and private companies since 1950's to small holder ownership since the end of 1970's by the introduction of nucleus estate and smallholder scheme.

The location of oil palm estate has also dispersed over the years, from only in North Sumatra during the colonial era to the other parts of Sumatra, Borneo, Celebes and even Papua. In 2008, Sumatra island still dominates the location of oil palm plantation with 77 percent of the total planted area in Indonesia followed by Borneo island with 19 percent, Celebes island 2 percent, Java 0.47 percent and the rest 1.53 percent (Ministry of Agriculture, 2010).

Besides factories for producing CPO, industry for producing palm oil derivatives has also expanded over the years such as cooking oil industries, food industries and the latest biofuel industry. For the cooking oil industry, which utilized CPO as its main raw material, the location has spread all over Indonesia. In 2005, the total capacity of cooking oil production was 9.9 million ton per year with Sumatera island has the largest cooking oil production capacity with 58 percent of the total capacity followed by Java island with 38 percent and 14 percent the rest of Indonesia (Infordev, 2006). With the disperse location of

plantation, CPO refinery and cooking oil plant all over Indonesia, the impact of the palm oil industry has dispersed all over the country.

The main objective of this chapter is to analyze the effect of palm oil industry to the Indonesian economy with two specific objectives which is to analyze the link between the palm oil industry and other industries and the effect on factor of production and households. In this study, the palm oil industry consists of two sectors, the oil palm sector which includes the on-farm activities. The second sector is the animal and vegetable oil processing sector which include crushing factories which produce CPO and the refining industry including the cooking oil industry. The effect on the economy consist the effect on output, income, employment, linkage with other industries, and multiplier effect of the industry and the effect on factor of production and households.

3.2. Literature Review

Several studies focused mainly on the contribution of a large or an aggregate sector on a country or a region such as agriculture (Sharma et.al, 1999; Tanjuakio et.al, 1996; Harthoorn and Wossink, 1987; Holland et.al, 2001) and food industry (Mattas and Shrestha, 1989; Lekuthai, 2007). Only a few studies analyze a specific industry such as tobacco industry (Hadi and Friyatno, 2008) and organic apples (Mon and Holland, 2005).

Of the studies of the palm oil industry, several have analyzed the contribution of the industry on the Indonesian economy. Syafa'at and Mardianto (2002) analyzed the sources of Indonesia's output growth using input-output analysis. The authors indicated that the agricultural sector was the main source of output growth in the Indonesian economy, especially during the crisis in

1997-1998. The palm oil industry was one of the contributors to this growth, with positive growth in domestic demand and export.

Susila (2004a), who specifically analyzed the palm oil industry, indicated that the industry contributes to economic growth, helps to alleviate poverty and assists with income distribution. The development of the palm oil industry has had a positive impact on economic growth, as shown by the growth in investment, output and foreign currency earnings over the years. The palm oil industry has also contributed to household income and has been able to increase the assets owned by households. In terms of alleviating poverty and influencing income distribution, the palm oil industry has been helpful because income on the palm oil estate is evenly distributed, as indicated by a gini coefficient of 0.36.

Susila and Setiawan (2007) analyzed the role of estate crop-based industries on economic growth and equity using a SAM approach. Their paper analyzes the on-farm and processing sectors, which include palm oil and cooking oil made from palm oil. The objective of the study was to analyze the effect of the developing estate crop-based industry on economic growth, employment and income distribution. In addition, the study also determined which sectors are the leading sector and the adjusting sector. The results showed that the palm oil and cooking oil sectors are two of the highest contributors to economic growth, employment and equitable income distribution. Hence, the palm oil and cooking oil sectors are considered to be the leading sectors in the Indonesian economy.

Rist et.al (2010) did a field survey in four locations of oil palm plantation in Indonesia. The objective of the survey is to assess the impact of oil palm development on the economic well being of rural farmers. The authors argued that smallholders have benefited from the higher returns to land and labor afforded by

oil palm. Moreover, district authorities and smallholder cooperatives play a key role in the realization of the benefits. Feintrenie (2010) also added that oil palm has high return and more competitive than rubber and much more profitable than rice production for smallholders. Besides the benefit the farmers obtain from oil palm plantation, there are also negative social impacts of the plantation such as conflict between companies and communities caused by unclear land tenure. There are also conflict caused by landownership especially when lands were acquired and planted by estates during the New Order (during the Suharto era), often without consulting traditional owners whose areas were taken from them forcibly (Barlow et.al, 2003).

Several studies have analyzed the impact of the aggregate sector, which includes the palm oil sector, on household income. Susilowati (2007) analyzed the role of agro industry on the national economy and agricultural household income using the SAM approach. The results indicate that the agro industry sector has a greater role in national output, value added and labor creation than does the primary agricultural sector but that the sector does not have a more significant role in increasing the income of agricultural households and non-agricultural households in rural areas than does the primary agricultural sector. The same results have also been presented by Rizak (2006), who claimed that the agro industry is unable to improve employment opportunities and household income but instead only decreased income disparity.

The difference between this paper and the other papers has to do with the sectors analyzed. This study analyzed specific sectors, the oil palm and animal and vegetable oil sectors, whereas other papers that have utilized the same method have mostly used aggregate sectors (i.e., the agro industry). In addition, this paper

attempts to add the limited studies on the contribution of a specific industry to the Indonesian economy.

3.3. Methodology

Two methods are utilized in this chapter, input output and social accounting matrix (SAM) approach. The input output analysis was developed by Wassily Leontief in the late 1920's and early 1930 (Miller, 1997; Miller and Blair, 2009). In order to analyze using input output analysis, input output table or account is utilized. The input output table or account indicates the interconnection of the economy by recording, for a given period (usually one year), the economic transaction that happen in the economy (Miller, 1997). In the input output table or account the rows describe the distribution of producer's output in the economy; meanwhile the columns describe the composition of inputs required by a particular industry to produce its output.

The input output table or account basically indicates the equilibrium between demand and supply in the following equation (Miller, 1997; Miller and Blair, 2009):

$$X_i = A_i + F_i \quad \text{..... (1)}$$

where:

X_i = production of sector i

A_i = intermediate demand of sector i

F_i = final demand of sector i

In matrix notation, equation (1) can be written as follows:

$$AX + F = X \quad \text{..... (2)}$$

where

A = intermediate input coefficient matrix

X = output vector of all sectors

F = final demand vector

Equation (2) can be transformed to the following equation:

$$X = [1\text{-}A]^{-1} F \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

where

$[1\text{-}A]^{-1}$ = Leontief inverse matrix

The 2000 and 2005 input output table published by Statistics Indonesia is utilized to analyze the contribution of palm oil sector and palm oil processing to total output, value added and employment. Meanwhile, 2005 input output table is utilized to analyze the linkage and multiplier analysis. A 33 sector input output table is constructed for the analysis.

Linkage Analysis

In the input output analysis, production in a particular sector has two kinds of economic effects on the other sectors of the economy:

<u>Backward Linkage</u>

If sector j increases its output, it will increase the demand from sector j (as a purchaser) on the sector which products are used as inputs to production in sector j. A measure of the backward linkage is given by the sum of the elements in the j-th column of the technical coefficient matrix, A, it is also called the direct backward linkage (Miller, 1997) In order to include the indirect effect, the total backward linkage is calculated. The total backward linkage utilized the column sums of $(I\text{-}A)^{-1}$ not just A (Miller, 1997).

In order to make comparison between sectors, a normalization procedure is carried out by dividing each backward linkage by the average backward linkage

(Miller, 1997).

Forward Linkage

If sector j increases its output also means additional amounts of product j that are available to be used as inputs in other sectors for the sector's production. The direct forward linkage of sector i is defined as the sum of the elements in the i th row of the direct-output coefficient matrix, D. In order to include the indirect effect, the total forward linkage is calculated. In order to make comparison between sectors, a normalization procedure is carried out by dividing each forward linkage by the average forward linkage (Miller, 1997).

Multiplier Analysis

One of the major use of input output analysis is assessing the effect to the economy from the changes in exogenous elements The term impact analysis is used when the exogenous changes occur because of the actions of only one impacting agent and the change occurs during the short run period. The analysis is derived from the Leontief inverse which is also known as the multipliers. There are three most frequently used multipliers (Miller and Blair, 1985):

Output multiplier

An output multiplier for sector j is the total value of production in all sectors of the economy needed to satisfy the final demand for sector j's output

Income multiplier

Income multiplier analyzes the impact of changes in final demand spending into changes in income received by households.

Employment multiplier

Employment multiplier calculate the impact if changes in final demand into changes in employment in each sector of the economy.

The second method is the social accounting matrix (SAM) approach. Indonesia's 2005 SAM and input output table are utilized in this study. In essence, SAM is the extension of the input-output analysis. The SAM table incorporates the flow of transactions into the factors of production and institutions in addition to the relationship between the sectors of the economy, which is similar to the input-output table. The basic SAM framework consists of three basic forms of economic activity: production (accounts 1, 2 and 3), consumption (accounts 4, 5 and 6), accumulation (account 7) plus the transactions with the rest of the world (Figure 3.1)(Round, 2003).

Each account is represented twice; once as a row (showing receipts) and once as a column (showing payments). The SAM records the transactions between the accounts in the cells of the matrix (T_{ij}). The account in the SAM table can be divided into two parts, endogenous and exogenous accounts (Figure 3.2). The endogenous accounts are those of production (activities and commodities), factors and institution (excluding government). Meanwhile the exogenous accounts are government, capital account and the rest of the world.

The SAM utilized in this study consists of 82 accounts, including 77 endogenous accounts and 5 exogenous accounts. The endogenous accounts consist of 67 productions, 5 factors of production (rural agricultural labor, urban agricultural labor, rural non-agricultural labor, urban non-agricultural labor and non labor), 5 institutions (agricultural worker household, agricultural landowner household, rural non-agricultural household, urban non agricultural household and firm). Meanwhile the exogenous accounts consist of government, account capital, indirect tax, subsidy and rest of the world.

ACCOUNT			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	TOTALS
Production	Commodities	(1)		Intermediate consumption		Household Consumption		Government consumption	Fixed capital formation and change in stocks	Exports	Demand for products
	Activities	(2)	Domestic Sales								Sale of Commodities
Factors of production		(3)		Gross value added payments to factors						Net factor Income from ROW	Factor income receipts
Institution	Households	(4)			Labor and mixed income	Inter-household Transfers	Distributed profits to households	Current transfers to household	Labor and mixed income	Net current transfers from ROW	Current household receipts
	Corporate enterprises	(5)			Operating surplus			Current transfers to enterprises	Operating surplus	Net current transfers from ROW	Current enterprise receipts
	Government	(6)	Net taxes on product			Direct taxes	Direct taxes			Net current transfers from ROW	Current government receipts
Combined capital Accounts		(7)				Household savings	Enterprise savings	Government savings	Capital transfers	Net capital transfers from ROW	Capital receipts
Rest of the world		(8)	Imports						Current external balance		Aggregate receipts from ROW
TOTALS			Supply of Products	Costs of production activities	Factor income payments	Current household outlays	Current enterprise outlays	Current government outlays	Capital outlays	Aggregate outlays to ROW	

Figure 3.1. Basic Social Accounting Matrix
Source: Round (2003)

ACCOUNT		Endogenous				Exogenous	TOTAL
		(1)	(2)	(3)	(4)	(5)	
Commodities	(1)		Intermediate Consumption		Household final consumption expenditure	Other final demands	Total demands for products
Activities	(2)	Domestic supplies					Total activity outputs
Factors	(3)		Value added			Factor income from abroad	Total factor income receipts
Households	(4)			Factor income to households	Inter household transfers	Non-factor income receipts	Total household incomes
Other accounts (Exogenous)	(5)	Import, indirect taxes	Indirect taxes	Other factor payments	Savings etc		Total exogenous receipts
TOTAL		Total supply of products	Total activity outputs	Total factor income payments	Total household outlays	Total exogenous payments	

Commodities	(1)		T_{12}		T_{12}	x_1	y_1
Activities	(2)	T_{21}				x_2	y_2
Factors	(3)		T_{32}			x_3	y_3
Households	(4)			T_{43}	T_{44}	x_4	y_4
Other accounts (Exogenous)	(5)	l_1	l_2	l_3	L_4		Σl
TOTAL		y_1	y_2	y_3	Y_4	Σx	

Figure 3.2. SAM: Endogenous and Exogenous Accounts

Source: Round (2003)

In order to analyze the effect on factor of production and institution, SAM multiplier is calculated. Similar to an input-output model, the matrix of endogenous transaction can be used to define a matrix of column share, by dividing elements in each column of T by its column total.

T = Ay ………………………………………………………………(4)

where T and A have the partitioned structure shown in Figure 3.2. Similarly x and y are respectively the vectors of exogenous injection and account totals. The endogenous accounts in Figure 3.1 can be then written as a series of linear

identities and the system can be solved.

$$y = Ay + x$$
$$= (I - A)^{-1} x$$
$$= M_A x \quad \ldots\ldots (5)$$

where M_A is the SAM multiplier matrix. The multiplier indicates how will be the effect on the change in the exogenous accounts on the specific endogenous accounts which will be emphasized on the factor of production and households

3.4. Empirical Result

The role of oil palm and animal and vegetable oil processing in Indonesian economy is analyzed in its role in output and value added creation. The animal and vegetable oil processing sector is selected since 68 percent domestic palm oil is processed into cooking oil (CIC, 2010). The oil palm output increase by 271 percent during the period of 2000-2005 (Table 3.1). Comparing with the other sectors in the agriculture sector, oil palm ranked eleventh in terms of output contribution in 2005 (Appendix 3.1). In terms of share, oil palm sector also experiences a significant increase especially in the share to agriculture sector. This can inferred that the sector grew faster than the other sectors in the agriculture sector. In addition, when the share of agriculture sector decrease during the period of 2000-2005, oil palm sector experience an increase in its share to total output.

The animal and vegetable oil processing sector contributes four times larger than the oil palm sector. In addition, the sector grew by 82 percent during the period of 2000-2005 which is higher than the growth of the food industry (67 percent). Comparing the growth of oil palm and the processing industry, it

inferred that the on farm activities grew higher than the processing industry of the palm oil. This is supported by the fact that the share of animal and vegetable oil processing sector to total output decrease. This also shows that in recent years, investors are more interested in investing in oil palm plantation than in building the palm oil processing industries.

Table 3.1. The Role of Palm Oil Industry and Other Sectors in Output Creation

Sector	2000			2005		
	Output (Bil Rp)	Share (%)		Output (Bil Rp)	Share (%)	
		Sector	Total		Sector	Total
Oil Palm	5,299	1.93	0.20	19,670	4.07	0.35
Agriculture	274,534		10.16	482,704		8.49
Animal & vegetable oil processing	48,417	14.70	1.79	88,238	16.09	1.55
Food Industry	329,325		12.19	548,333		9.64
Mining	196,815		7.29	387,251		6.81
Manufacturing	749,850		27.76	1,579,811		27.77
Construction & Infrastructure	258,315		9.56	667,335		11.73
Services	892,259		33.03	2,022,840		35.56
Total	2,701,010		100.00	5,688,274		100.00

Source: Statistics Indonesia 2002 and 2007

During the period of 2000-2005, all sectors experience an increase in value added. On the other hand, only the secondary and tertiary sectors enjoyed an increase in value added share. Meanwhile all the primary sectors, agriculture and mining, and food industry suffer a decline in share.

Contrary to the agriculture sector, the value added share of oil palm sector increase during 2000-2005. Hence, the value added increase by 250 percent during the same period (Table 3.2). The value added of oil palm sector ranked eleventh compared to other sectors in the agriculture sector in 2005 (Appendix 3.2).

The animal and vegetable oil processing sector contributes higher value added than the oil palm sector. During the period of 2000-2005, the sector's value added increase by 64 percent (Table 3.2). Although in terms of value increase, the share of animal and vegetable oil processing sector decrease. This indicates that the growth of other sector in the food industry is higher.

Table 3.2. The Role of Palm Oil Industry and Other Sectors in Value Added Creation

Sector	2000			2005		
	Value Added (Bil Rp)	Share (%)		Value Added (Bil Rp)	Share (%)	
		Sector	Total		Sector	Total
Oil Palm	3,555	1.68	0.26	12,436	3.37	0.43
Agriculture	211,904		15.51	369,095		12.83
Animal & vegetable oil processing	19,208	17.14	1.41	31,413	16.31	1.09
Food Industry	112,063		8.20	192,601		6.69
Mining	167,692		12.27	317,170		11.02
Manufacturing	273,535		20.02	603,080		20.96
Construction & Infrastructure	84,967		6.22	233,773		8.13
Services	516,339		37.79	1,161,173		40.36
Total	1,366,500		100.00	2,876,892		100.00

Source: Statistics Indonesia 2002 and 2007

3.4.1. Linkage Analysis

Animal and vegetable oil processing sector ranked second after the animal feed sector for the highest direct backward linkage (Appendix 3.3). But if the indirect effect is included the animal and vegetable oil processing sector is the highest total backward linkage. This shows that the increase in output in this sector has the biggest total effect on the other sectors especially which provides input to the sector such as the palm oil sector. Meanwhile, the oil palm sector

has relatively lower direct and total backward linkage with other sectors which is shown by the direct and total backward index less than 1. On the other hand, comparing the oil palm sector with the other agricultural sector, oil palm sector has higher direct and total backward linkage. This indicates that this sector has more linked with other sectors in providing input for production. The oil palm sector mostly utilized input from the financial sector (27 percent) especially for financing the plantation and basic chemical, fertilizer and pesticides sector (17 percent). Meanwhile the animal and vegetable oil processing sector mainly utilized input from its own sector (44 percent) and oil palm sector (30 percent). The input from its own sector is mostly in the form of CPO which is processed to other products. Meanwhile from the oil palm sector is in the form of FFB to produce CPO.

For the forward linkage, palm oil and animal and vegetable oil processing sector has relatively low forward linkage (Appendix 3.4) which can be explained that output from these two sectors are utilized in limited sectors of the economy. The animal and vegetable oil processing sector has larger direct and total forward linkage compared to the oil palm sector which inferred that the output of the animal and vegetable oil processing sector is utilized more as an input by the other sectors. This result also found in the case of tobacco and cigarette sector in Indonesia (Hadi and Friyatno, 2008). Almost 89 percent output from the oil palm sector is utilized by the animal and vegetable oil processing sector mainly for making CPO. Meanwhile, the output of the animal and vegetable oil processing sector main utilized by its own sector (75 percent) and 11 percent by the food processing sector.

From the backward and forward linkage analysis, it can be inferred that

developing animal and vegetable oil processing sector will have more impact on the other sector rather than developing the oil palm sector.

3.4.2. Multiplier Analysis

The multiplier analysis consist of three types; output, income and employment (Appendix 3.5). In the output multiplier, animal and vegetable oil processing sector has an output multiplier of 2.2682 which means that an increase in Rp 1 million of final demand in the animal and vegetable oil processing sector will increase the output of all sectors by Rp 2.2682 million. The output multiplier is higher than the oil palm sector which has the value of only 1.6903.

Looking at the effect on each sectors, an increase of Rp 1 million in final demand of the oil palm sectors mainly increase its own sector by Rp 1.0172 or 60.18 percent of the total increase (Table 3.3). Meanwhile 16.34 percent of the increase went to the service sectors.

Table 3.3. Output Multiplier of the Oil Palm Sector

Sectors	Source	Share (%)
Oil Palm	1.0172	60.18
Financial Sector	0.1247	7.38
Other Services	0.0871	5.16
Trade, Restaurant and Hotel	0.0642	3.80
Basic Chemical, Fertilizer and Pesticides Products	0.0598	3.54
Oil, Gas and Mining	0.0396	2.34
Transportation	0.0333	1.97
Infrastructure	0.0322	1.90
Food Processing	0.0293	1.73
Electric Equipments and Machinery	0.0252	1.49
Other Sectors	0.1777	10.51
Total	1.6907	100.00

On the other hand, an increase of Rp 1 million in final demand of the animal and vegetable oil processing sector not only increase its own sector by Rp 1.3992 million but also increase the oil palm sector by Rp 0.2764 million (Table 3.4). It can be inferred that developing the animal and vegetable oil processing sector also can develop the palm oil sector which supply the raw materials for the sector.

Table 3.4. Output Multiplier of the Animal and Vegetable Oil Processing Sector

Sectors	Source	Share (%)
Animal and Vegetable Oil Processing	1.3992	61.69
Oil Palm	0.2764	12.19
Trade, Restaurant and Hotel	0.0906	4.00
Financial Sector	0.0894	3.94
Food Processing	0.0740	3.26
Other Services	0.0565	2.49
Other Estate Crops	0.0417	1.84
Food crops	0.0373	1.64
Transportation	0.0354	1.56
Basic Chemical, Fertilizer and Pesticides Products	0.0254	1.12
Other Sectors	0.1424	6.28
Total	2.2682	100.00

In the income multiplier, animal and vegetable oil processing sector has a slightly higher income multiplier compared to palm oil sector. An increase of Rp 1 million in final demand of the animal and vegetable oil processing will increase income in all sectors by Rp 0.3225 million, meanwhile an increase at the same value in oil palm will increase income in all sectors by Rp 0.3149 million.

An increase of Rp 1 million of final demand in the oil palm sector will increase the income in its own sector by Rp 0.2001 million or 63.55 percent of the total income multiplier (Table 3.5). Meanwhile, the rest mainly goes to the service

sector and the input sector which provides input for the oil palm sector. Moreover, the increase in the final demand of the oil palm sector does not significantly affect the income of its processing industry (animal and vegetable oil processing industry).

Table 3.5. Income Multiplier of the Oil Palm Sector

Sectors	Source	Share (%)
Oil Palm	0.2001	63.55
Other Services	0.0262	8.32
Financial Sector	0.0238	7.54
Trade, Restaurant and Hotel	0.0114	3.62
Basic Chemical, Fertilizer and Pesticides Products	0.0072	2.30
Transportation	0.0054	1.71
Infrastructure	0.0050	1.59
Oil, Gas and Mining	0.0045	1.42
Agriculture Infrastructure	0.0041	1.30
Agricultural Service	0.0039	1.25
Other Sectors	0.0233	7.41
Total	0.3149	100.00

For the animal and vegetable oil processing sector, an increase of Rp 1 million in final demand of the sector will increase its own sector by Rp 0.1690 million. Different from the palm oil sector, the increase in the final demand of the animal and vegetable oil processing sector will also significantly increase the income in the palm oil sector by Rp 0.0544 million (Table 3.6).

Table 3.6. Income Multiplier of the Animal and Vegetable Oil Processing Sector

Sectors	Source	Share (%)
Animal and Vegetable Oil Processing	0.1690	52.41
Oil Palm	0.0544	16.86
Financial Sector	0.0170	5.28
Other Services	0.0170	5.26
Trade, Restaurant and Hotel	0.0161	4.99
Other Estate Crops	0.0096	2.99
Food Processing	0.0060	1.85
Transportation	0.0057	1.78
Food crops	0.0050	1.56
Livestock, Forestry and Fishery	0.0031	0.96
Other Sectors	0.0195	6.05
Total	0.3225	100.00

The oil palm sector has more effect on the employment compare to the animal and vegetable oil sector. An increase in Rp 1 billion of final demand in the oil palm sector will increase employment by 109.5 people compare to the animal and vegetable oil processing sector which increase the employment by 50.2 people. This indicates that the palm oil sector is a labor intensive sector compare to the animal and vegetable oil processing sector.

An increase in the final demand of the oil palm sector mainly increase the employment in its own sector (90.23 percent)(Table 3.7). For the animal and vegetable oil processing sector, the increase in the final demand of the sector by Rp 1 billion will increase the employment in its own sector by 26.8 people and also in the palm oil sector by 8.7 people (Table 3.8). Although in total, the employment multiplier of the animal and vegetable oil sector is lower than the palm oil sector but the increase in final demand of the animal and vegetable oil processing sector will also affect other sector including the oil palm sector.

Table 3.7. Employment Multiplier of the Oil Palm Sector

Sectors	Source	Share (%)
Oil Palm	0.0988	90.23
Agricultural Service	0.0019	1.77
Trade, Restaurant and Hotel	0.0017	1.52
Livestock, Forestry and Fishery	0.0014	1.28
Other Services	0.0013	1.23
Food crops	0.0011	1.01
Transportation	0.0005	0.43
Financial Sector	0.0005	0.42
Other Estate Crops	0.0004	0.37
Basic Chemical, Fertilizer and Pesticides Products	0.0004	0.34
Other Sectors	0.0015	1.40
Total	0.1095	100.00

Table 3.8. Employment Multiplier of the Animal and Vegetable Oil Processing Sector

Sectors	Source	Share (%)
Oil Palm	0.0268	53.46
Animal and Vegetable Oil Processing	0.0087	17.25
Other Estate Crops	0.0048	9.48
Food crops	0.0025	4.95
Trade, Restaurant and Hotel	0.0023	4.67
Livestock, Forestry and Fishery	0.0015	3.04
Other Services	0.0009	1.74
Agricultural Service	0.0007	1.36
Transportation	0.0005	0.99
Financial Sector	0.0003	0.66
Other Sectors	0.0012	2.41
Total	0.0502	100.00

3.4.3. SAM Analysis

The link between the oil palm and the animal and vegetable oil sectors with the factors of production is through the factor payment (T_{32} in Figure 3.2).

Meanwhile, the households are indirectly related through the factors of production. The link between the factors of production and households is through factor income to households (T_{43} in Figure 3.2)..

The animal and vegetable oil sector features higher factors payment than the oil palm sector (Table 3.9). If we compare the two sectors, it can be inferred that the oil palm sector is more labor-intensive than the animal and vegetable oil sector, as indicated by the higher proportion of payments for labor. For the oil palm sector, 97 percent of the payment went to labor, while only 81 percent did for the animal and vegetable oil sector.

For the oil palm, the largest proportion went to rural agricultural labor because the sector is mainly located in rural areas. Meanwhile, in the animal and vegetable oil sector, the largest proportion went to rural non-agricultural labor, followed by the urban non-agricultural sector. From this, we can infer that the sector's production is located in both rural and urban areas. It is mainly CPO production that occurs in the rural areas, while cooking oil production mainly occurs in urban areas.

Table 3.9. Payments from Oil Palm and Animal and Vegetable Oil Sector in 2005 (Billion Rp)

Factors	Oil Palm		Animal and Veg. Oil	
	Value	%	Value	%
Rural Agricultural Labor	10,619	86.84	0	0.00
Urban Agricultural Labor	1,135	9.28	0	0.00
Rural Non-agricultural Labor	87	0.71	14,754	48.34
Urban Non-agricultural Labor	22	0.18	10,113	33.13
Non Labor	365	2.99	5,655	18.53
TOTAL	12,228	100.00	30,522	100.00

Source: Statistics Indonesia (2007)

Non-agricultural urban households take the highest proportion of their

income from factor payments, with 93 percent of the total income. In contrast, agriculture household workers have the lowest percentage, with 85 percent (Table 3.10). Interestingly, for agricultural worker households, the highest proportion of income comes from urban non-agricultural labor. From this, we can infer that members of agricultural households also do non-agricultural work in urban areas, serving as temporary workers or seasonal workers in addition to their agricultural work.

Table 3.10. Household Source of Income in 2005 (Billion Rupiah)

Income Source	**Household**			
	Agriculture		**Non-agriculture**	
	Worker	**Landowner**	**Rural**	**Urban**
I. Factor payments from:				
Rural Agric. Labor	20,581	131,798	98,201	0
Urban Agric. Labor	16,451	9,648	0	7,669
Rural Non-agric. Labor	7,949	41,922	316,186	0
Urban Non-agric. Labor	35,577	108,917	0	689,123
Non Labor	7,541	74,897	153,181	200,336
Total I	88,099	367,182	567,568	897,128
II. Transfer from:				
Other households group	500	1,618	2,294	3,382
Firm	3,323	11,264	14,505	17,198
Government	3,597	10,752	18,995	33,855
ROW	7,872	16,448	19,500	13,409
Total II	15,292	40,082	55,294	67,844
TOTAL (I + II)	103,391	407,264	622,862	964,972

Source: Statistics Indonesia (2007)

The next step in the analysis is to calculate the SAM multiplier. The SAM multiplier is calculated to analyze the effect of changes in the exogenous accounts on the factors of production and households, which are treated as the endogenous accounts. An increase in endogenous accounts (i.e., exports or government transfers) of Rp 1 million in the animal and vegetable oil sector will increase the factor payment by Rp 0.245 million and only by Rp 0.196 million in

the oil palm sector (Table 3.11). For the oil palm sector, the highest increase will be in rural agricultural labor because this type of labor is a part of this sector. Meanwhile, urban non-agricultural labor will also be affected because this sector has a direct link with the financial sector, which finances the palm oil plantations, as shown by the high amount of funds transferred from the financial sector to the palm oil sector as indicated in the input-output table (Statistics Indonesia, 2007). This can also be explained by the fact that many small plantation owners came from urban areas.

In the animal and vegetable oil sector, rural non-agricultural labor will be the most affected because most of CPO refinery is located in the rural area, and the refinery is closely linked with the oil palm plantation. For this reason, rural agricultural labor is also affected by this increase. Therefore, injecting capital in the animal and vegetable oil sector will not only benefit rural-non agricultural labor but also labor related to the on-farm sector. Compared to the aggregate sector, Rizak (2006) calculated the SAM multiplier for the factor of production for agro industry in one province in Indonesia, which showed a higher impact of the industry on the factor of production with a total multiplier of 2.0155.

Table 3.11. SAM Multipliers for Factor of Production

Factors	Palm Oil	Animal and Vegetable Oil
Rural Agricultural Labor	0.0951	0.0811
Urban Agricultural Labor	0.0082	0.0073
Rural Non-agricultural Labor	0.0159	0.0978
Urban Non-agricultural Labor	0.0731	0.0553
Non Labor	0.0036	0.0036
TOTAL	0.1959	0.2451

Source; Author’s calculation

Table 3.12. SAM Multipliers for Households

Households	Palm Oil	Animal and Vegetable Oil
Agriculture		
- Worker	0.0643	0.0842
- Landowner	0.1505	0.1298
Non-agriculture		
- Rural	0.0344	0.0301
- Urban	0.0166	0.0136
TOTAL	0.2658	0.2578

Source; Author's calculation

The oil palm sector has more of an impact on households than the animal and vegetable oil sector, as shown by the higher SAM multiplier (Table 3.12). Interestingly, in both sectors, landowners will be the most affected by the injection on these two sectors. In the oil palm sector, the landowner can obtain income from selling the fresh fruit bunch (FFB) or from renting the land to other farmers.

Compared to other sectors, the oil palm and animal and vegetable oil sectors have a level of influence that is relatively small. For the agro industry, the influence level is 2.8570 in South Sulawesi province (Rizak, 2006); for tourism, it is 7.173 (Saptutyningsih, 2003); and for large-scale coal mining, it is 1.433; for small-scale coal mining, it is 1.410 in South Kalimantan province (Fatah, 2008). There are three explanations for the small impact of the oil palm and animal and vegetable industry compared to that of the other sectors. First, the impact of palm oil industry is relatively small in the country level, second, the other sectors are aggregates of several sectors and lastly other study mainly analyze the impact on provincial level; therefore, the impact will be higher.

Based on these analyses, it can be inferred that the processing industry has more of an impact on the labor income meanwhile the on-farm activities has more impact on household income especially in the rural areas. Landowner is the

largest beneficiary of the palm oil industry, on-farm and processing activities. In recent years, the number of smallholder farmers has increased significantly, although they are not always be considered as rural population since many of them are actually resides in urban areas and have their worker to take care of their oil palm plantation

The government has realized the importance of the palm oil sector for the rural population, and in 2007, the government issued regulations No 26/Permentan/OT.140/2/2007 indicating requirements for opening palm oil estates. One of the regulations states that if a company desires to open a new plantation of more than 25 hectares, that company must establish a partnership with local farmers for a minimum of 20 percent of the total area planted. Basically, this regulation is the continuation of the nucleus estate scheme (NES) established by the government in the 1980s which has stopped in 2001 (Zen et.al, 2006). If this regulation is imposed properly, farmers will be landowners, and they will enjoy greater benefits.

3.5. Conclusion

The animal and vegetable oil processing sector has relatively more contribution to the Indonesian economy in the output and value added creation compare to the oil palm oil. Moreover, the animal and vegetable oil processing sector also has larger forward and backward impact to the other sectors. Only in the employment palm oil sector has greater impact on the economy than the animal and vegetable oil processing sector which suggests that the palm oil sector is a labor intensive sector. Therefore, developing the oil palm sector will have more impact on employment, meanwhile developing the animal and vegetable oil

processing sector will have more impact on output, value added, income and other sectors of the economy.

The animal and vegetable oil sector made payments that were almost two times higher for the factors of production than the oil palm sector. The development of the oil palm sector will not only benefit rural agricultural labor and agriculture worker households but will also have a positive impact on urban non-agricultural labor because this sector has close links with the financial sector. Meanwhile, the development of the animal and vegetable oil sector will benefit both agricultural and non-agricultural labor in rural areas because the sector is closely linked with the oil palm sector. In both sectors, agricultural landowner households will be most affected by the development of these sectors. With this in mind, the aim of the policies imposed on the palm oil industry is to make farmers or the rural population into the landowners of the palm oil estates instead of just workers.

IV. DETERMINANTS OF INDONESIA'S CRUDE PALM OIL (CPO) EXPORT COMPETITIVENESS

4.1. Introduction

Indonesia and Malaysia are the major producers of palm oil in the world. In 2008, 84 percent of the world's palm oil production came from these two countries (FAO, 2010). Both countries have been producing palm oil for over a hundred years. Malaysia has dominated the production of palm oil since the 1960's but in 2005 Indonesia's production exceeded Malaysia (United States Department of Agriculture, 2010).

Meanwhile in the export market, both countries contribute 92 percent of the total world palm oil export with Malaysia is the highest with 15.3 million ton followed by Indonesia with 14.7 million ton in 2008 (United States Department of Agriculture, 2010).

Indonesia dominates the CPO export market since Malaysia is more concentrating on exporting refined palm oil which has more value added. In 2008, Indonesia exported 6.5 billion US$ of CPO meanwhile Malaysia only exported 1.8 billion US$ (UN Comtrade, 2010).

The objective of this chapter is two fold, first is to compare descriptively Indonesia and Malaysia's palm oil industry. Second is to analyze the factors affecting export competitiveness of Indonesia's CPO export compare to Malaysia.

4.2. Literature Review

As a major producer of palm oil, Indonesia and Malaysia's palm oil industry has interacted over the years. Mohammad et.al (1999) revealed that

liberalization policy in Indonesia will have impact on the Malaysian palm oil industry. The main impact is the increase in capacity utilization of the Malaysian palm oil industry. Meanwhile Amiruddin (2003) compared export duty imposed on both countries palm oil products.

Regarding export competitiveness, several studies have analyzed for various agricultural products including palm oil. Jin (2010) analyzed the effect of competition between wheat export countries on the US market shares in ten Asian countries using panel estimation. The dependent variable is the US wheat market shares meanwhile the independent variables are in the relative form between US against Australia and Canada which is considered to be the market competitor. The independent variables include relative price and its volatility and relative exchange rate and its volatility too. The result indicates that none of the explanatory variables have distinct effect on US wheat market shares.

Meanwhile Dohlman et.al (2001) qualitatively analyzed US export competitiveness in soybean compared with Brazil and Argentina. The authors compared these three countries production cost, cost of internal marketing and transportation and shipping costs to a common export destination. The result inferred that Brazilian and Argentine soybeans have become more competitive due to declining internal marketing and transportation cost including the abolishing of export tax.

For palm oil export competitiveness, Hasan et al. (2001) analyzed the dynamic effect of export tax and relative export price (international price divided by Indonesian FOB price) on net export share using the vector autoregressive regression (VAR) in Indonesia. The result indicates that export tax has negative

relation with net export share meanwhile relative export price has positive relation with relative export share.

Obado et.al (2009) specifically analyzed the effect of export tax on Indonesia's palm export competitiveness utilizing simultaneous equation. The result indicates that export tax negatively affects oil palm mature area, production, export and domestic price; on the other hand it has positive effect on CPO consumption and stock. The authors conclude that export tax reduces competitiveness of Indonesia's palm oil industry.

From the firm level, Baskett and Jacquemard (2006) describe one of the foreign company's competitiveness. The company, PT Socfindo, has retained its competitive advantage in terms of production cost and profitability. This is achieved through the twin mechanisms of increased productivity (internal factor) and rupiah devaluation (external factor).

This paper is different from the others in two aspects. First, this paper specifically analyzed the competitiveness of specific product, which is CPO, meanwhile other papers mainly discussed palm oil as a whole. Secondly, this paper utilized the ratio equation to analyze the competitiveness between Malaysia.

4.3. Indonesia and Malaysia's Palm Oil Industry: Compared

The first oil palm tree was planted in Botanical Garden in Buitenzorg (now called Bogor around 60 km south of capital city of Jakarta) in West Java in 1848. The descendants of these oil palm trees were transferred to Deli in North Sumatra were they were first used as ornamental plants.

The first large scale oil palm plantation was set up in 1911 by the Dutch

colony using the seed from Deli. Soon afterwards, the British traders also set up oil palm plantation in Malaysia using the seeds from Deli. After Indonesia gain independence in 1945, Dutch plantation owners had no longer support from the Dutch colony and several plantations were collapsed.

In 1957, the former Dutch colonial plantations were transferred to the Perusahaan Perkebunan Baru (New State Plantation Company) and since then the production had declined. Only until 1968, the government of Indonesia started again in the oil palm plantation through state owned plantation. During this period the oil palm planted area had increased dramatically.

The government started the involvement of small farmers in oil palm plantation in 1978 by introducing the PIR (Perkebunan Inti Rakyat) or NES (Nucleus Estate and Smallholder Scheme) followed by other schemes (Zen et.al, 2006). This scheme is basically similar to FELDA (Federal Land Development Authority) in Malaysia (Rasiah and Shahrin, 2006). In this scheme, the government owned or private plantation (called Inti) planted oil palm trees and after three or four years the planted area is transferred to the smallholder farmers called plasma. During the three to four years, the farmers worked for the plantation. After the tree has produced, the inti is required to purchase the FFB from the plasma and the inti will deduct the harvesting money to pay for the area transferred to the plasma.

After the economic crisis in 1997-1998, private plantation investment has increased significantly. The NES supported by the government has stopped in 2001 but by the government owned or private company still continued (Zen et.al, 2006). In 2007, the government imposed regulation No

26/Permentan/OT.140/2/2007 regarding the requirements to establish a plantation. One of the requirements is that in order to open a large scale plantation, the company must have a minimum of 20 percent of the area in the partnership scheme with the local people.

Oil palm in Malaysia was introduced after Indonesia from the Deli seed and it was first commercially planted in 1917 but it remains a minor plant until the mid 1950s (Athukorala and Loke, 2009). From the late 1950s until the late 1960s the Malaysian palm oil industry grew significantly triggered by the nationalization of oil palm plantation in Indonesia and the crisis in Congo as the leading producer of palm oil at that time (Martin, 2006). Companies including Unilever started to invest in Malaysia rather than in Indonesia.

In 1961, the government of Malaysia introduced the Federal Land Development Authority (FELDA) for oil palm (Rasiah and Shahrin, 2006). At first, the scheme was to give settlers individual title of land (4 Ha), a house and a garden plot located within a larger management block of land. Settlers work on an individual basis and participated as equal owners with no rights over any particular plot of land (Vermeulen and Goad, 2006).

In the 1970s, the scheme was changed to a block system (Vermeulen and Goad, 2006). Under this system, each settler is responsible for 4 Ha of land and they are organized into groups of 20 for cooperative work. Individual farmers are responsible for the transport of the FFB from their own field to the road and the communal block pays for the transport to FELDA oriented crushing factories. Profit from the FFB sales is divided equally among members.

FELDA introduced a new system in 1985. At this scheme, settlers were

expected to work for a fixed wage and receive dividends from a share equivalent to 4 Ha of oil palm. After repayment of debts, the settlers obtained the title to a house with a plot of land for subsistence production and a share in the plantation.

Almost similar to Indonesia's case on nationalizing Dutch plantation, Malaysia's government also took control the foreign owned company by buying the company's share during the late 1970s until early 1980s. Malaysian government set up a parastatal corporation to buy the foreign company's share. Parastatal corporation like Permodalan Nasional Berhad, bought the share of Sime Darby and Guthries (Martin, 2006).

In 1985, the government of Malaysia introduced the Industrial Master Plan (IMP) I which has the objective to rationalize the palm oil refining and fractionation in order to increase efficiency and competitiveness in the world market (Rasiah and Shahrin, 2006). Under the IMP I, oil palm refineries enjoyed a tax abatement of corporate income amounting to 50 percent of export sales and also enjoyed the double-deduction tax benefit on export sales which cause export oriented firms to avoid paying tax altogether (Rasiah and Shahrin, 2006). The other tax related incentives were given for the research and development activities. A tax allowance of 50 percent was given on qualifying research and development expenditures over a period of 10 years (Rasiah, 2006). Other incentives in human resources, technology, financing, physical infrastructure and regulation also imposed.

The IMP I caused the processing capacity's exceeded the supply of CPO. Therefore Malaysian government launched the IMP II in 1996. The focus on the IMP II was to increase the value added of the downstream industry through

focusing in biotechnology. IMP II also encouraged Malaysian firms to seek raw material (i.e CPO) from aboard especially Indonesia (Rasiah and Shahrin, 2006). In 1999, Malaysian companies have acquired more than 1.3 million Ha of oil palm area in Indonesia (Casson, 1999).

Indonesia and Malaysia have implemented several policies to develop the palm oil industry. The difference between these two countries are that the Malaysian policies were export oriented especially on the refined palm oil, meanwhile Indonesia's palm oil policy were to encourage import substitution (Rasiah and Shahrin, 2006).

Although the two countries have different policy but in terms of oil palm planted ownership the two countries has similar composition with slight differences (Figure 4.1). The two countries have different classification but it is comparable. In Malaysia's classification, smallholder are farmers not participating in the government or state scheme, meanwhile smallholder in Indonesia's classification include farmers participating in NES or other schemes. For the private companies, in Malaysia include government owned company meanwhile in Indonesia it differentiates between the two.

The composition of smallholder farmers (smallholder in Indonesia's classification and smallholder plus government and state scheme in Malaysia's classification) is relatively similar at about 39 percent. Meanwhile in the private companies (in Malaysia include government-owned companies) the composition is also relatively similar at 61 percent but the composition of government-owned company is larger in Malaysia since several large companies belongs to the government.

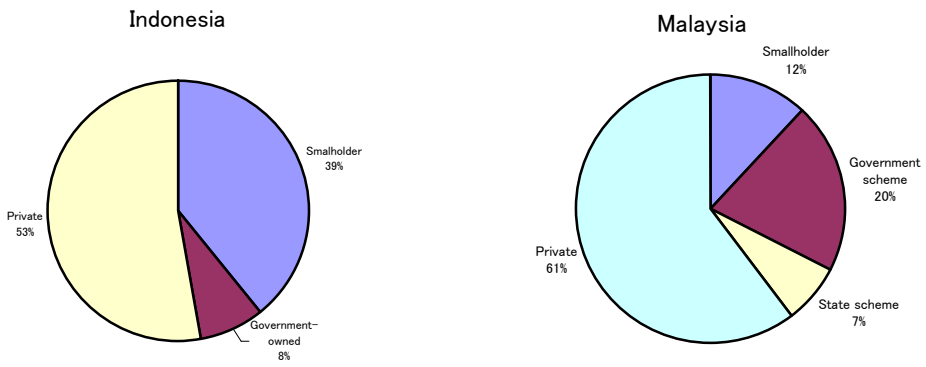

Figure 4.1. Indonesia and Malaysia's Oil Palm Planted Area Composition, 2008
Source: Ministry of Agriculture and MPOB (2010)

Comparing the two countries oil palm planted area over the years, it shows that Indonesia has surpassed Malaysia in 1998 (Figure 4.2). From 1990, the average area increase is 11 percent meanwhile Malaysia only 4.5 percent. On the other hand, in terms of production Indonesia surpassed Malaysia in 2006 (Figure 4.3). This inferred that Malaysia has better productivity than Indonesia, with less planted area can achieve higher production rate. The other factor is the increase in oil palm matured area (Abdullah and Lazim, 2006). Othman et.al (2004) argued that Malaysia's notable increase in FFB and CPO production was mainly due to land expansion over the years.

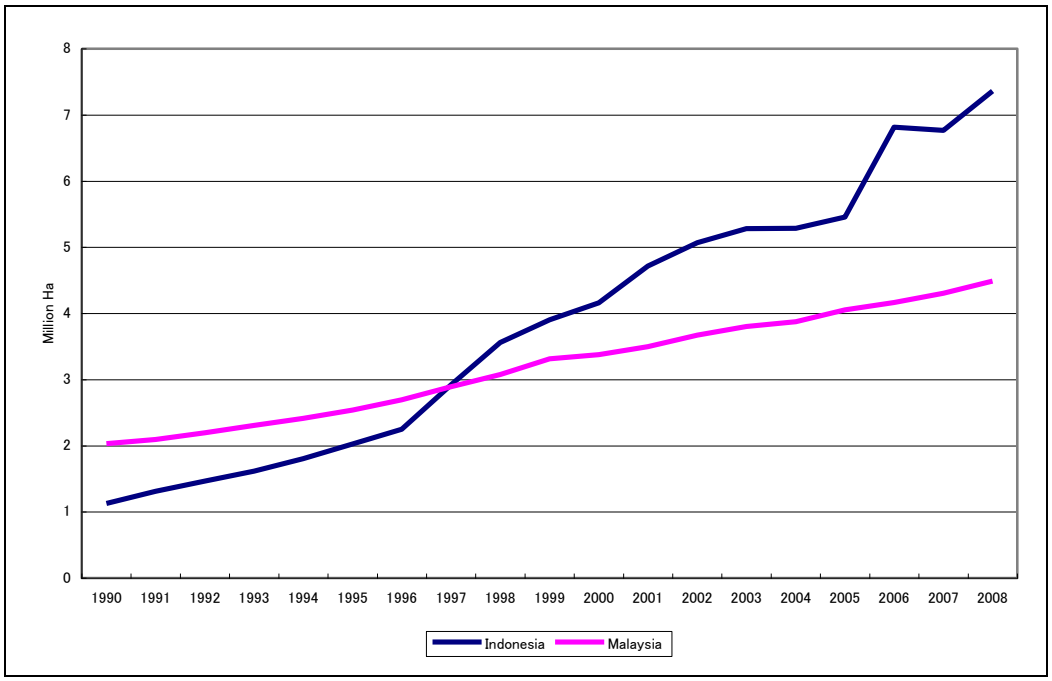

Figure 4.2. Indonesia and Malaysia's Oil Palm Planted Area, 1990-2008
Source: Ministry of Agriculture and MPOB (2010)

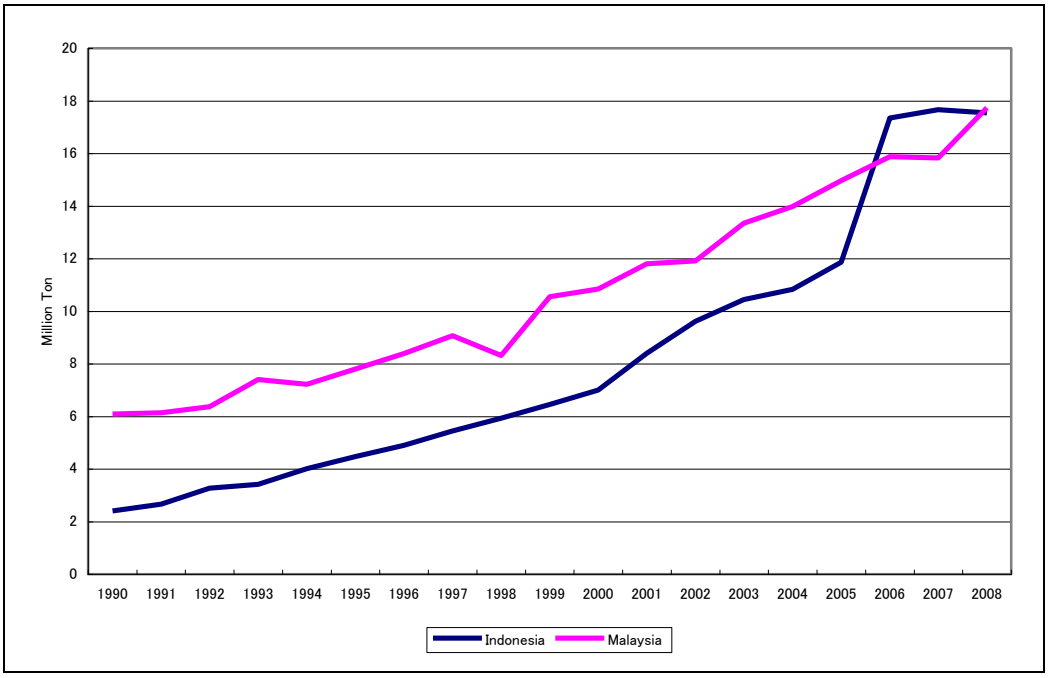

Figure 4.3. Indonesia and Malaysia's CPO Production, 1990-2008
Source: Ministry of Agriculture and MPOB (2010)

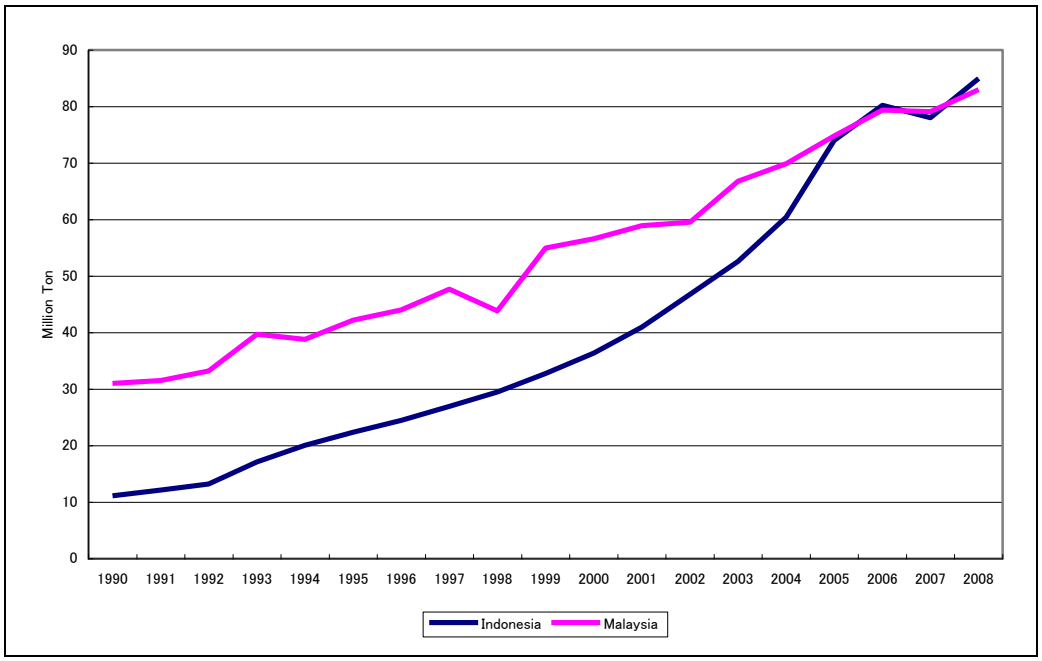

Figure 4.4. Indonesia and Malaysia's FFB Production, 1990-2008
Source: FAO (2010)

Indonesia is considered to have an advantage over Malaysia in producing palm oil with its abundant land and labor. But this advantage is not reflected in the price of the products. FFB, domestic CPO and CPO FOB prices are relatively similar on both countries (Figure 4.5, 4.6 and 4.7). Interestingly, when high price occurred, the price in Malaysia is higher than Indonesia

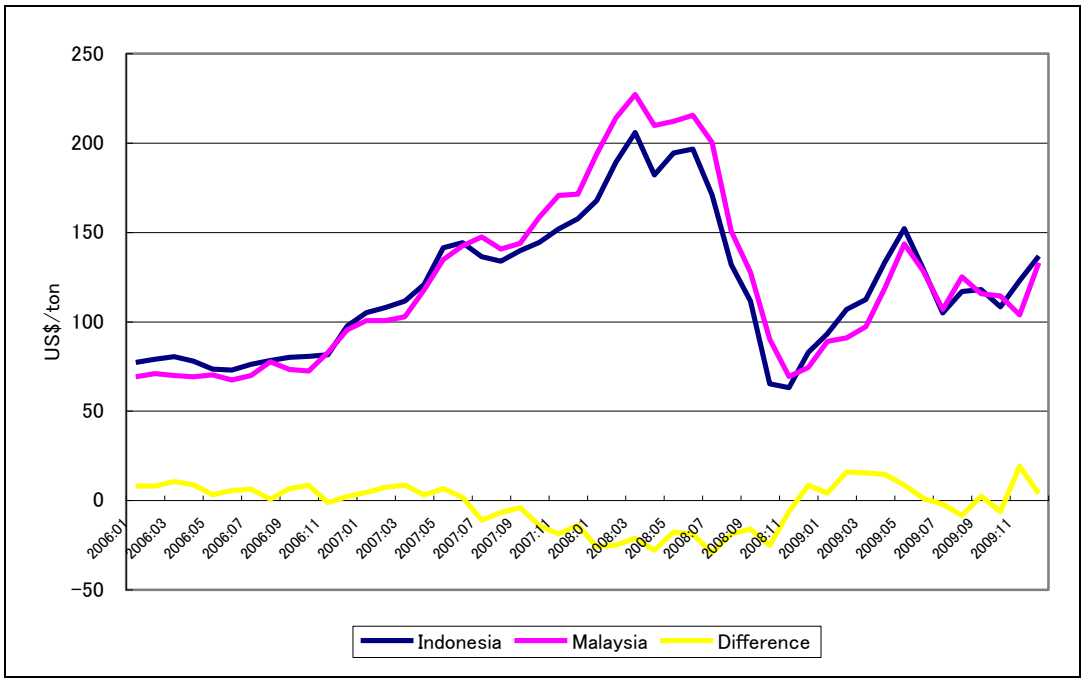

Figure 4.5. Indonesia and Malaysia FFB Price, January 2006-December 2009
Source: Smart Corp. and MPOB (2010)

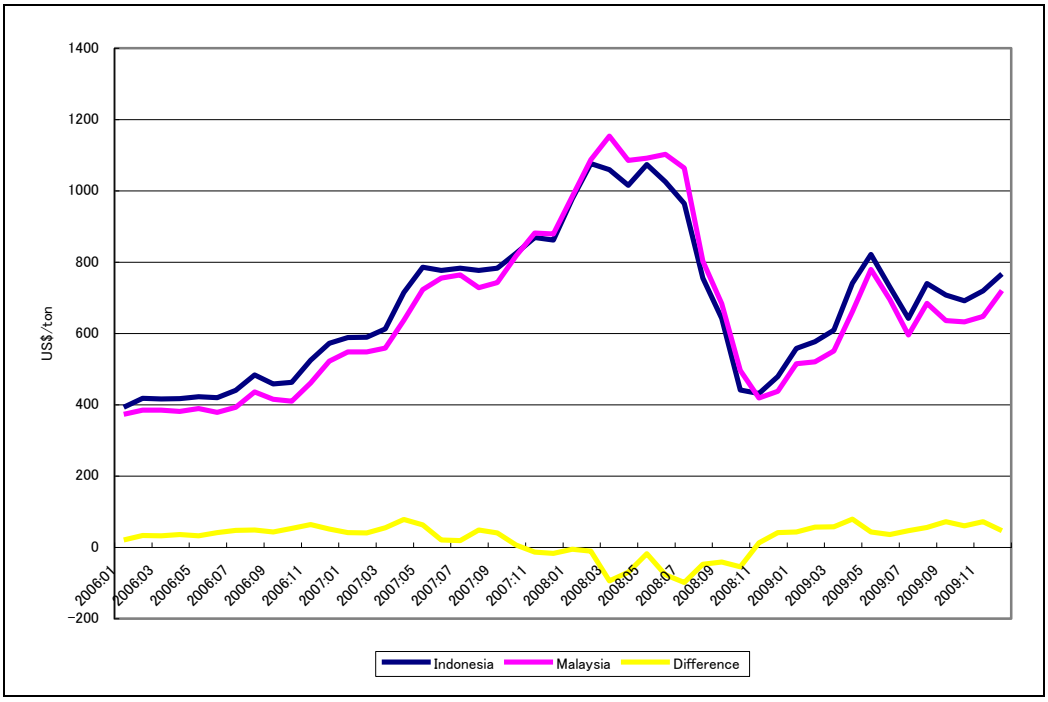

Figure 4.6. Indonesia and Malaysia Domestic CPO Price, Jan 2006-Dec 2009
Source: Smart Corp. and MPOB (2010)

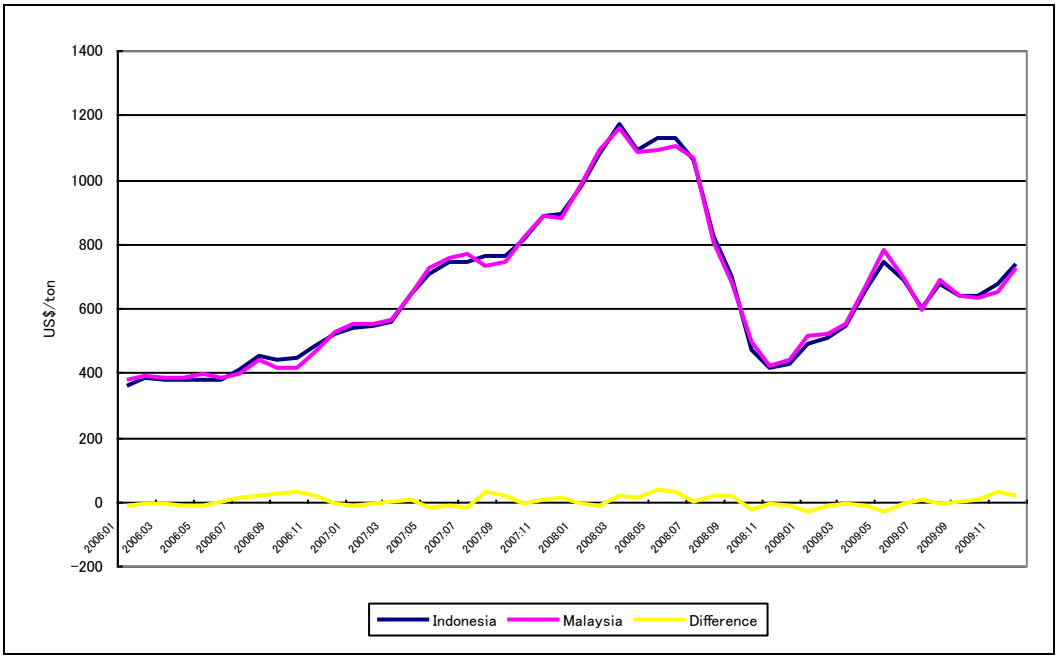

Figure 4.7. Indonesia and Malaysia's FOB CPO Price, Jan 2006-Dec 2009
Source: Smart Corp. and MPOB (2010)

The cost structure in producing FFB is quite different in Indonesia and Malaysia especially for smallholder farmers. For the smallholder participating in the NES plasma in West Sumatra Indonesia, the largest cost went to fertilizer (47 percent) followed by labor cost (25 percent), crop transport (11 percent), management fee (8 percent), road maintenance and other physical costs 3 percent each and pest and disease control 1 percent (Jelsma et.al, 2009). But in reality, the cost structure varies since not all smallholder farmers fertilized their oil palm trees.

Meanwhile in the case of smallholder in Malaysia, the largest cost went to harvesting and collecting (36 percent), followed by upkeep and transportation (24 percent each), fertilizer and application (23 percent) and other cost (6 percent) (Ismail et.al, 2003).

For big companies in Indonesia, the largest cost went to fertilizer with 43

percent followed by harvesting (36 percent), upkeep (18 percent) and other cost 3 percent (Pahan, 2008). In Malaysia, the largest cost went to joint estate cost with 28 percent, followed by fertilizer cost with 22 percent, harvesting and collection (19 percent), transportation (19 percent) and estate upkeep and cultivation (12 percent) (Noor et.al, 2004).

One of the important cost components is labor. For the big plantation, usually they have a permanent worker, meanwhile in smallholders usually they hire temporary workers during harvesting. In Malaysia, due to the shortage of domestic workers, foreign workers dominate in the palm oil industry especially for hard labor type of job such as harvesting (Amatzin, 2006). These workers are paid in the amount between 20-25 ringgit per day or US$ 6-7.5 per day (Amatzin, 2006). Meanwhile in Indonesia, hired labor for harvesting usually consists of local people and they are paid around Rp 30,000 per day or around US$ 3.3 per day. (Statistics Indonesia, 2009)

In total cost, producing palm oil is cheaper in Indonesia compare to Malaysia. In Indonesia, to produce 1 ton of CPO required US$ 165.2 meanwhile in Malaysia US$239.4 (Simeh, 2004; Asopa and Simeh, 2006). Cheaper cost but similar selling price inferred that Indonesian palm oil companies generate higher profit compared to their counterparts in Malaysia.

4.4. Methodology

The export ratio is constructed to investigate the Indonesia's CPO export competitiveness compared with Malaysia. The dependent and independent are all in the relative form comparing the Indonesia against Malaysia except for export

tax variable, in order to incorporate the effects of competition between the two countries. By using the relative form, it can incorporate a third-country effect into the model which minimizes specification error arising from the fact that trade flows depend on cost of purchasing goods not only from an exporting country but from other competitors (Jin, 2010). Besides Jin (2010), Xing and Wan (2006) also use ratio variable as dependent and independent variable to explain relation between foreign direct investment (FDI) and exchange rate in Asian countries.

The equation is written as follows:

$$\ln\left(\frac{X_I}{X_M}\right)_t = \alpha_0 + \alpha_1.\ln\left(\frac{P_I / CPI_I}{P_M / CPI_M}\right)_t + \alpha_2.\ln\left(\frac{ER_I / CPI_I}{ER_M / CPI_M}\right)_t + \alpha_3\left(TX_I - TX_M\right)_t + \alpha_4.\ln\left(\frac{XR_I}{XR_M}\right) + \varepsilon_t$$

where

X : CPO export (ton)

P : domestic price of CPO (rupiah or ringgit)

ER :exchange rate (rupiah/US$ or ringgit/US$)

TX : effective export tax (%)

XR : refined palm oil export (ton)

CPI : consumer price index (2000 = 100)

subscript I indicates Indonesia and M Malaysia

The dependent variable is the ratio between Indonesia's CPO export and Malaysia's CPO export. The equation investigates the competitiveness of Indonesia's CPO export compared to Malaysia's CPO export.

The price effect of the equation consists of two variables, real price and

real exchange rate. The first independent variable is the real domestic price between the two countries which is the proxy of production cost. The coefficient is expected to be negative; it means that when the price ratio decrease the export ratio is predicted to increase.

The second variable is real exchange rate. The coefficient is expected to be positive. When rupiah is depreciated relative to ringgit, the price of CPO in the terms of rupiah will decrease, hence export ratio will increase.

The next variable is refined palm oil ratio. The inclusion of the variable is to analyze the effect of the higher value-added palm oil product on the CPO export. The coefficient can be positive or negative. If it is positive it indicates that the competitiveness of refined palm oil export will induced CPO export competitiveness. Meanwhile if it is negative it shows that higher refined palm oil export will decrease export of CPO since it is utilized to produce refined palm oil.

The last variable is the difference between the two countries effective export tax. The effective export tax variable analyzes the effect of both countries export tax policy to the export ratio. Starting from July 1997, the two countries implemented export tax policy with different method of calculations. The coefficient is expected to be negative which means that when smaller difference in effective export tax will increase Indonesia's export competitiveness to Malaysia.

The CPO export tax calculation in Malaysia is similar to the calculation by the Indonesian government from September 1994 to June 1997. The calculation is based on the difference between export price and based price which is fixed at RM 650 (Table 4.1).

Table 4.1. Malaysia's CPO Export Tax Tariff Rate

Price (RM/ton)	Duty (%)
First RM 650	0
Next additional RM 50	10
Next additional RM 50	15
Next additional RM 50	20
Next additional RM 50	25
Plus on the balance	30

Source: Amiruddin (2003)

Comparing the effective export tax between Indonesia and Malaysia can be inferred that during the year 1998 until June 1999, Indonesia CPO effective export tax was higher than Malaysia but after that period Malaysia's effective export tax was higher (Figure 4.8). This does not indicate that Indonesia CPO export is more competitive than Malaysia since one of the objectives of the export tax for Malaysia is to encourage the palm oil processed industry which gain higher value added.

In determining the adequacy of the model, several tests are conducted. The Jarque-Bera statistic is utilized to test the normal distribution of the standardized residual or the normality test. If the residual is normally distributed than the Jarque-Bera stastic should not be significant. The Langrange Multiplier (LM) test is conducted to detect the serial correlation. The null hypothesis is that there is no serial correlation problem. Lastly, the Breusch-Pagan-Godfrey (BPG) to test for heteroskedasticity. The null hypothesis is that there is no heteroskedasticity.

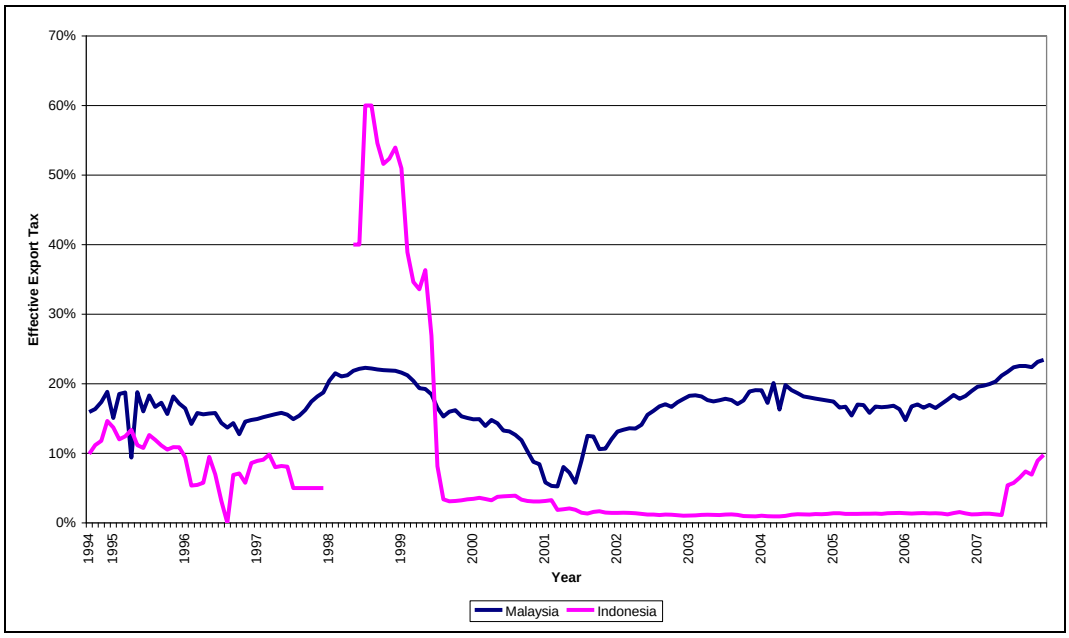

Figure 4.8. Indonesia and Malaysia's CPO Effective Export Tax (September 1994-December 2007)

The data used in constructing the export ratio equation is monthly data from January 2001 until December 2007, which is collected from various sources. CPO and refined palm oil export of Indonesia was compiled from Statistics Indonesia source. Domestic price of CPO in Indonesia is taken from the Statistical Estate of Indonesia. Nominal exchange rate and consumer price index of Indonesia and Malaysia are from the International Financial Statistics (IFS) database of the International Monetary Fund (IMF). Meanwhile the data of Malaysia's palm oil came from the Malaysia Palm Oil Board (MPOB). The effective export tax is calculated by the author. The summary of the variables is presented in Table 4.2.

Table 4.2. Summary of Variables

Variables	Mean	Std. Dev.	Min.	Max.
Indonesia's CPO export (ton)	273,282	165,699	15,697	925,847
Malaysia's CPO export (ton)	107,317	65,082	1	262,235
Indonesia's CPO real price (Rp/ton)	2,730	519	1,735	4,210
Malaysia's CPO real price (Ringgit/ton)	1,414	401	685	2,545
Indonesia's real exchange rate (Rp/ $)	6,923	1,472	4,745	10,355
Malaysia's real exchange rate (Ringgit/ $)	3.56	0.27	2.85	3.87
Indonesia's CPO effective export tax (%)	4.08	8.36	0.92	50.95
Malaysia's CPO effective export tax (%)	16.25	3.89	5.24	23.43
Indonesia's refined palm oil export (ton)	354,517	176,963	68,759	1,002,634
Malaysia's refined palm oil export (ton)	897,621	175,060	465,136	1,292,615

4.5. Empirical Result

The result of the equation which explains the Indonesia's competitiveness compared to Malaysia is reported in Table 4.4 which is calculated using ordinary least square (OLS) method. Two equations are constructed, the first is that all variables are in the same time frame (no lag variables). Meanwhile on the second equation the price ratio is in the lag form. The objective of incorporating the lag variable is to take account the information lag of the price between the two countries.

The diagnostic test on both equations shows that the residual is normally distributed and there is no indication of serial correlation and heteroskedasticity. In the first equation, the result indicates that all the variables are significant except for the price ratio. In addition, refined palm oil ratio is positive which shows that the export competitiveness of refined palm oil will have positive effect on CPO

export competitiveness. The other reason is that there is an interaction between the two countries palm oil industry. Malaysia is the fifth largest Indonesia's CPO export destination in 2007 (UN COMTRADE, 2008). Although Malaysia is the second largest producer of palm oil, the country also imported palm oil mainly in the form of CPO especially from Indonesia. This is caused by three reasons; firstly, Indonesia is the largest producer of palm oil. Second, recently several Malaysian companies were investing in Indonesia in the palm oil sector especially opening palm oil estate and CPO refinery. In 2002, these companies planted almost 250.000 Ha of palm tree in Indonesia which is about 5 percent of the total area of palm trees (Teoh, 2002). These companies export the CPO to Malaysia in order be processed into refined palm oil. Lastly, the CPO imported from Indonesia[3] is needed to supply the palm oil industry in Malaysia for producing several products of refined palm oil which is to be exported.

In order to explain the positive coefficient of the refined palm oil ratio, the variable must be breakdown. An increase in Indonesia's refined palm oil export will cause a decrease in CPO export including export to Malaysia, hence, Malaysia's CPO which is intended to be exported will be used to produce refined palm oil to replace the CPO import from Indonesia as a result Malaysia's CPO export will decrease. Therefore when the refined palm oil export ratio increases, caused by an increase in Indonesia's refined palm oil export and decrease in Malaysia's refined palm oil export, it is predicted to increase the CPO export ratio. The increase in the CPO export ratio is caused by the decrease in the Malaysia's CPO export which is larger than the decrease in CPO export of Indonesia. The

[3] From 1990-2007, in average 83.24 percent of Malaysia's CPO import came from Indonesia

positive relation between refined palm oil export and CPO export also shows that refined palm oil export competitiveness will induced CPO export competitiveness.

Table 4.3. Export Ratio Estimates

Variables	Equation 1	Equation 2
Constant	-11.5155 (-2.9123***)	-12.1926 (-3.0238***)
Real Price Ratio	-0.5147 (-1.3772)	
Real Price Ratio (-1)		-0.7576 (-2.0955**)
Real Exchange Rate Ratio	1.5971 (3.2021***)	1.7117 (3.3858***)
Effective Export Tax Difference	-0.0971 (-5.2504***)	-0.1022 (-5.2387***)
Refined Palm Oil Export Ratio	0.6113 (5.4604***)	0.6482 (5.7995***)
R^2	0.5174	0.5169
F-stat	21.1756	20.8601
Diagnostic test[a]		
Jarque-Bera	0.5318	0.5246
LM χ^2 (1)	0.2429	0.2455
LM χ^2 (2)	0.3263	0.3473
LM χ^2 (3)	0.2637	0.3081
LM χ^2 (4)	0.3925	0.4025
BPG χ^2	0.5007	0.2892

Note: The number in the parenthesis is the t value
[a] the numbers are in the form of p-value
***, ** significant at 1 and 5 percent, respectively

A one percent depreciation of rupiah compare to ringgit is predicted to increase export ratio by 1.5971 percent. Depreciation in rupiah will make CPO from Indonesia cheaper in terms of rupiah which create more incentive for producer to export their CPO. From the data it shows that both countries exchange rate have appreciated but Indonesia's currency appreciated more (Figure 4.9). Different result from Jin (2010) which shows that exchange rate has no significant affect on the US market share of wheat in East Asia.

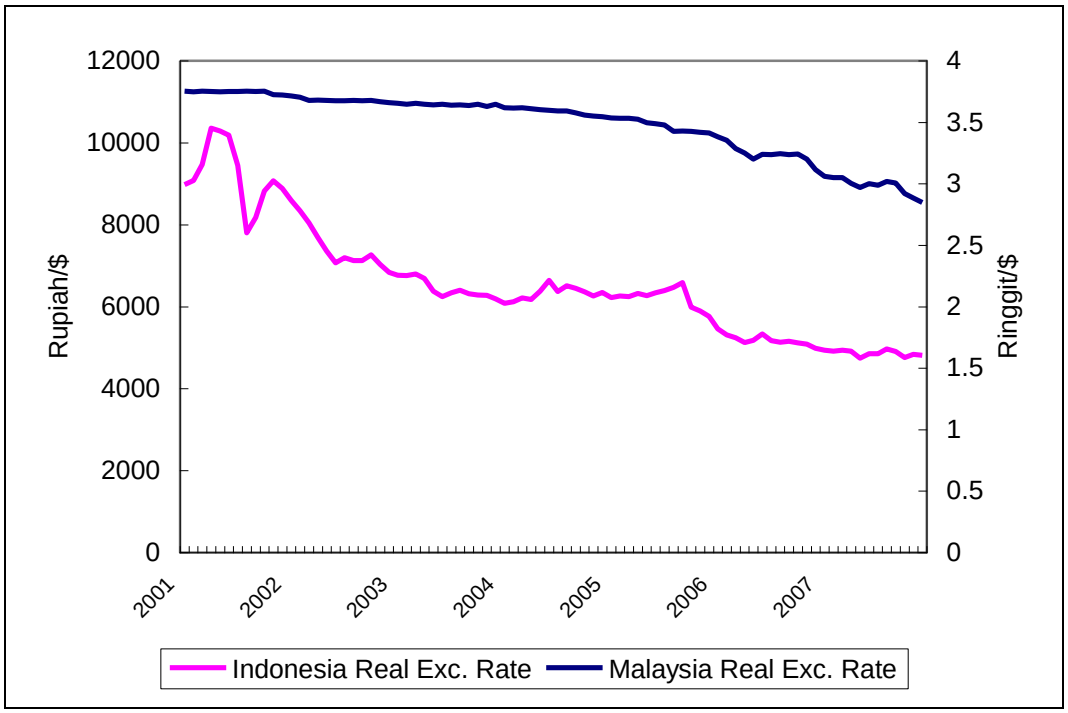

Figure 4.9. Indonesia and Malaysia's Real Exchange Rate, January 2001-December 2007
Source: International Monetary Fund (2009)

Lastly, the implementation of export tax will decrease the domestic price, while it will increase the export price. Figure 4.10 illustrates the effect of export tax at a rate of *t*. The domestic price of export falls to p_t, reducing the sum of consumer and producer surplus by the area of p_FDCp_t. However, the tax yields revenue equal to after tax volume multiplied by the tax rate or the area of $p^*_tACp_t$. The loss of tax is equal to the area of BCD, while a terms of trade gain equal to the area of $p^*_tABp_F$ (Helpman and Krugman, 1989).

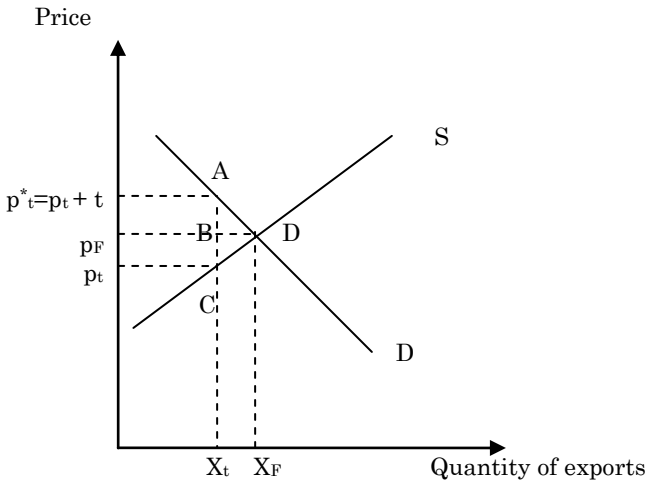

Figure 4.10. The Imposition of Export Tax
Source: Helpman and Krugman (1989)

From the econometric result reveals that a one percent increase in the effective export tax difference is predicted to decrease the CPO export ratio by 0.0971 percent. Therefore an increase in Indonesia's effective export tax relative to Malaysia will decrease Indonesia's CPO export assuming, a constant Malaysia's CPO export. After July 1997, the export tax calculation was different between the two countries. Indonesia relies on the figure determine by the government; meanwhile Malaysia's calculation depends on the FOB price of CPO which is determined by the market. Hence, when Indonesia's government increase either check price or the export tax rate, it will decrease the competitiveness of CPO export compared to Malaysia. This findings support the result of Hasan et.al (2001) which showed that the imposition of export tax has long-lasting, negative effects on competitiveness of the Indonesian palm oil industry. This negative effect is also supported by the research by Larson (1996), Marks et.al (1998), Susila (2004b), Putri et.al (2006) and Obado et.al (2009).

On the other hand, this finding indicates that the export tax policy has able to meet one of its objectives which are to limit CPO export in order to supply

domestic refined palm oil industry. As Susila (2004b) argued that the policy has been effective instrument to control domestic CPO and cooking oil price.

The second equation employs one month lag of price ratio. The result indicates that the price ratio become significant at 5 percent level. This shows that the export ratio is influenced by the one month lag of price ratio instead of the price ratio in the same month. The other variables have relatively the same coefficient with the first equation.

Comparing with other variables, the effect of export tax is relatively small. On the other hand, only the export tax variable is under the control of the government. Therefore the government can determine its level such in the case when the international price decreases, the government set the export tax to 0 percent.

The implementation of export tax has conflicting result. By imposing export tax, CPO export will decrease but on the other hand the government need to control the availability of the domestic CPO to be processed into cooking oil and keep the price affordable. Therefore, the government must correctly determine the magnitude of the export tax which at least minimized the negative effect of both objectives. The imposing of export tax tariff based on the international price is a proper policy to protect the cooking oil consumer and also to support farmers and exporters.

4.6. Conclusion

Indonesia and Malaysia's palm oil industry have its similarity and differences. Concerning the producer, both countries are relatively similar with 61

percent owned by private and government-owned companies and 39 percent belong to the smallholder farmers. Meanwhile the difference is mainly in the policy objective. Malaysia's government policy on palm oil industry is developing the industry into an export oriented commodity meanwhile Indonesia's policy is mainly making the palm oil industry as an import substitute commodity.

In producing CPO, Indonesia has lower cost compared to Malaysia. But the selling price is relatively similar. Consequently it inferred that Indonesia's palm oil companies generate more profit compare to Malaysian companies.

Regarding the determinants of Indonesia's CPO export competitiveness, lag price, exchange rate, export tax and refined palm oil export affected Indonesia's CPO export competitiveness. In terms of magnitude, exchange rate has the most affect on Indonesia's CPO export competitiveness.

In addition, imposing export tax policy will decrease Indonesia's CPO export competitiveness. The decrease of the export competitiveness has positive and negative impact. The negative impact is that the policy will hurt the palm oil industry since it causes the export to decrease. Meanwhile, the positive impact is that the decrease in competitiveness hopefully will encourage the CPO producer to sell the product domestically in order to process it into refined palm oil which has greater value added than CPO. Then, it will be more profitable to export the product in the form of refined palm oil.

V. EXPORT COMPETITIVENESS OF INDONESIA'S PALM OIL PRODUCT

5.1. Introduction

World palm oil consumption has significantly increased over the years. From 1964 to 2008, consumption has increased an average of 8.7% annually (United States Department of Agriculture, 2009). In 2007/2008, the world consumption of palm oil reached almost 40 million tons, and in 2050, it is forecasted to reach 93-256 million tons, depending on the edible oil substitute demand (Corley, 2009).

Meanwhile, in Indonesia, the palm oil industry has grown significantly over the years. By 2007, planted area and production had increased to 23 and 24.5 times their level in 1980. In addition, planted area grew, on average, 11% from 1980 to 2007, while production grew, on average, by 13%. Casson (1999) has argued that this tremendous growth was caused by several factors, especially the efficiency and high yield of the harvest combined with low production cost, a promising domestic and international market, and government policy, which supports the development of the palm oil industry.

Seventy percent of the palm oil production in Indonesia is exported. As a result, the export market has played an important role in the growth of the palm oil industry. By 2007, palm oil export had increased to 23.6 times its level in 1980, with average growth of 28% in terms of quantity and 27% in terms of value annually (UN Comtrade, 2009).

The main market destination of Indonesia's palm oil in 2007 was Asia, with 72.81%, followed by Europe with 18.61% and Africa with 7.17% (UN

Comtrade, 2009). Malaysia is the main competitor with Indonesia in terms of palm oil.

The objective of this paper is to analyze the competitiveness of Indonesia's palm oil product in the three regions: Asia, Europe and Africa. The change in market share is employed to analyze the competitiveness of Indonesia's palm oil product. In addition, Malaysia's change in market share is also calculated to facilitate comparison with Indonesia. In addition to market share calculations, constant market share analysis (CMSA) is utilized to search for the source of the change in market shares.

5.2. Literature Review

There are several methods in measuring competitiveness or specifically export competitiveness on the producer's approach. The common method is using constant market share analysis (CMSA) and calculating indexes such as revealed comparative advantage (RCA) or domestic resource cost (DRC) ratio. Several studies have also utilized these methods for palm oil.

Noh and Arshad (1998) calculated the competitiveness of Malaysia's agricultural product, including palm oil, using the constant market share analysis. The authors calculated for four palm oil products: CPO, refined palm oil, half processed palm oil and palm oil. The result indicates that the largest increase of export is for the half processed palm oil. The increase for three products is mainly caused by the market effect except for palm oil which is mainly caused by the competitive effect.

Simeh (2004) calculated revealed comparative advantage (RCA) index for several vegetable oil in several countries including Indonesia and Malaysia

palm oil. The result indicates that RCA for Indonesia's palm oil decrease from 3.705 in 1990 to 2.474 in 2002. Meanwhile, RCA Malaysia's palm oil valued 9.099 in 2002 inferring that Malaysia's palm oil has a comparative advantage over Indonesia's palm oil.

Lastly, Agustian and Hadi (2004) calculated the domestic resource cost (DRC) ratio and profitability coefficient ratio (PCR) for palm oil in North Sumatra province in Indonesia. The result indicates that DRC ratio is 0.6 meaning that producing palm oil in North Sumatra province has a comparative advantage. Furthermore, the value of PCR is 0.5 inferring that the commodity also has a competitive advantage.

This paper utilized constant market share analysis (CMSA) which is commonly used for multi-product approach but in this paper the methodology is used for only one product. Furthermore, this paper decomposes the market into three: Asia, Europe and Africa, and two products are analyzed: CPO and refined palm oil. Besides calculating for Indonesia, CMSA for Malaysia is also computed in order to compare with the competitor

5.3. Methodology

Two-step analyses are conducted in this paper. The first step is calculating the market share of Indonesia and Malaysia's palm oil product in several countries in the three regions: Asia, Europe and Africa. Two average time periods are calculated, 1999-2001 and 2005-2007. The second step using the previous market share in the regions, constant market share analysis (CMSA), is taken in order to analyze the source of growth of palm oil export.

The analysis was applied for the first time in the international trade flow

by Tyszynski (1951). The analysis basically decomposed export growth into four components (Richardson, 1971): the market size effect, the market composition effect, the commodity composition effect and the competitive effect.

The market size effect shows that the country's export growth is caused by the increase in market destination imports. The market size effect results from a shift in world demand. The market composition effect indicates that the country can concentrate on a relatively growing market compared to the world market. The commodity composition effect shows whether a country has concentrated on a commodity whose market is expanding rapidly. Lastly, the competitiveness effect is the residual of the CMSA, which is not explained by the other three effects. It is also assumed that the role of domestic factors of the exporting countries is dominant.

Many studies using the CMSA have employed a multi-product and multi-market focus. Only a few studies have applied the same approach to one product and multiple markets. These studies include Ongsritrakul and Hubbard (1996), Barbaros et al. (2007) and Turkekul et al. (2007). Because only one product is analyzed, only three components are included: market size, market composition and the competitive effect.

The CMSA will be calculated for two palm oil products, CPO and refined palm oil. For the purposes of this study, CPO and refined palm oil export in the period from 2005-2007 were analyzed in comparison to those in the base period of 1999-2001, which represents the situation after the economic crisis.

Following Ongsritrakul and Hubbard (1996), the following equation is used:

$$q^1 - q^0 = S^0(Q^1 - q^0) + \sum_{i=1}^{13}(S_i^0 - S^0)Q_i^1 + (q^1 - \sum_{i=1}^{13} S_i^0 Q_i^1)$$

(1) (2) (3)

where

q : the quantity of Indonesia's or Malaysia's palm oil product export to the region

S : Indonesia's or Malaysia's palm oil product market share of total export to the region

S_i : Indonesia's or Malaysia's palm oil product market share of total export to the i-th countries in the region

Q : the quantity of total palm oil product export to the region

Q_i : the quantity of total palm oil product export to the i-th countries in the region

The superscripts 0 and 1 refer to the base and subsequent period, respectively.

The equation shows that the changes in the quantity of Indonesia's or Malaysia's palm oil product export to the destination markets between the two periods ($q^1 - q^0$) can be decomposed into three components on the right hand side of the equation, which represents the size of market effect (1), market composition effect (2) and competitive effect (3).

The analysis will be carried out with two commodities: palm oil product commodities, CPO (SITC Rev 3 42221) and refined palm oil (SITC Rev 3 42229). The export data was compiled from the United Nations Commodity Trade Statistics (COMTRADE) Database.

5.4. Empirical Results

The analysis will focus on three regions: namely, Asia, Europe and Africa. The characteristics of the palm oil market in these three regions are different, thereby necessitating this classification.

5.4.1. Asia

Asian countries are the largest producer of and market for palm oil product. Ninety-one percent of palm oil production in 2007/2008 was produced in this region, and 64% of the world consumption came from Asia (United States Department of Agriculture, 2009). Palm oil production is dominated by two countries, Indonesia and Malaysia, which contributed 87% of the world's palm oil production; meanwhile, the largest consumer of palm oil is China, which consumes 13% of the world's palm oil, followed by Indonesia with 11.7% and India with 11.6% in 2007/2008 (United States Department of Agriculture, 2009). In terms of trade, 58% of the CPO and refined palm oil goes to Asian countries (UN Comtrade, 2009).

The Asian market is also the fastest growing market. Asia's imports of CPO increased by 264% in 2005-2007 over 1999-2001 (Table 5.1); meanwhile, the market for refined palm oil grew by 48% (Table 5.2). Looking at individual countries, we see that the fastest growing CPO markets in Asia are Pakistan, Azerbaijan and China, which grew 6083%, 2105% and 1564%, respectively (Table 5.1). For refined palm oil, the fastest growing markets are Vietnam, United Arab Emirates and China, which grew 258%, 249% and 230%, respectively (Table 5.2).

There are several reasons for the tremendous growth of the Asian market for CPO and refined palm oil. First, the steady economic growth of Asian

countries is supported by a large population. Countries like China, India, Pakistan, Vietnam and others have enjoyed stable economic growth over the years, especially after the Asian financial crisis in 1997-1998. Rifin (2005) indicates that income elasticity for CPO is higher than its price elasticity, which implies that increase in income will cause higher increase in demand for palm oil than will other variables such as price. In addition, the growing food and oleo-chemical industry contributed to the growing demand for palm oil. In Pakistan, the refinery capacity doubled in 2007 from 2025 tons/day to 4225 tons/day, causing the significant increase in CPO export (Daily Times, 2006)

Secondly, several countries have undergone trade liberalization, which makes the inflow of goods easier and cheaper. India, China and Vietnam are among the countries that have liberalized their trade policies. The government of India imposed a trade liberalization policy in 1994. Before trade liberalization, the vegetable oil importation (including the importation of palm oil) was conducted by the Government State Trading Corporation, with annual import quantities determined by the government. After trade liberalization, import tariffs were imposed (Dohlman et al. 2003; Srinivasan, 2005; Persaud and Landes, 2006). In 2006, China abolished the tariff rate quota (TRQ) for several products, including palm oil after it was implemented since 2002 due to joining the WTO (MPOC, 2007a). During the implementation of TRQ, a specified quantity of imports will be imposed at a lower tariff rate; meanwhile, an additional import that is over the quota will be assigned higher tariff rate (Hsu and Tuan, 2001). Vietnam liberalized its trade policies after joining the ASEAN Free Trade Area (AFTA) in 2006, which made the import tariff for palm oil decrease at a maximum level of 5% for products coming from ASEAN countries; the prior level was 10% (MPOC,

2008a).

The third reason is the competitiveness of palm oil compared to other vegetable oils. Palm oil products are less expensive than other vegetable oils, such as soybean oil or sunflower oil. In July 2009, the international price of CPO was US$ 601.95/ton; meanwhile, soybean oil is US$ 750.65/ton and sunflower oil is US$ 1021.87/ton (International Monetary Fund, 2009). In addition to competition between imported products, competition between domestically produced edible oil and imported palm oil has also occurred. In the Philippines, the largest producer of coconut oil, refined palm imports have increased significantly, by 182% (Table 5.1). The main reason for the increase is that the price of coconut price has increased; hence, producers prefer to export the product, leaving the domestic supply to decrease. As a substitute for coconut oil, palm oil is imported because it less expensive than coconut oil (MPOC, 2008b).

Palm oil also has an advantage in terms of transportation cost, especially for Asian countries. The transportation cost of shipping the product to the destination countries is relatively cheaper because the main producers of palm oil are also Asian countries; meanwhile, the main producers of soybean oil and sunflower oil are non-Asian countries.

Fourth, several countries have served as hubs for other countries. Increases in refined palm oil imports by Jordan (at a rate of 136%) occurred because Jordan was serving as a hub for Iraq (MPOC, 2006). The same also applies for the United Arab Emirates. The country served as a major re-export hub, sending the product to neighboring countries, especially the Gulf Cooperation Countries (GCC) which consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. Trading between the GCC countries in edible oils

and fats (including palm oil) does not entail customs duty, normally a minimum of 5% if the product comes from outside the GCC countries (MPOC, 2008c). For Central Asian countries, Pakistan has served as a hub. Many palm oil products distributed to Afghanistan, Kyrgyzstan, Kazakhstan and other countries came from Pakistan (Palmoilhq, 2009).

Finally, there is the question of operating a joint venture company in the export destination country. Malaysia set up a joint venture company refining CPO. The company, the MAPAK refinery, started operating in 2006 and has contributed to an increase of more than 50% in Malaysian CPO imports (MPOC, 2007b)

The choice of importing CPO or refined palm oil also depends on several factors. First is the availability of refineries. Countries like India, which mostly import CPO, have huge refinery industries that utilize CPO as their input (Srinivasan, 2005). Second is the price difference between CPO and refined palm oil. The buyer will choose the most profitable form to buy, according to whether buying the product in the form of CPO and refining it or buying it in the form of refined palm oil is more lucrative. The third factor is the import duty. Before the AFTA was imposed in Vietnam in 2006, the import duty for importing CPO was only 5%; meanwhile, importing it in the form of refined palm oil meant being charged a 10% import duty. Hence, the buyers would prefer to buy in the form of CPO (MPOC, 2008a).

Table 5.1. Indonesia's Market Share of CPO in Asian Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Indonesia**	**Market Share**	**Total Import**	**Import from Indonesia**	**Market Share**
India	939,397	531,489	0.5658	2,470,139	2,077,109	0.8409
Bangladesh	258,041	139,334	0.5400	1,475,603	846,323	0.5735
China	23,687	5,055	0.2134	394,058	174,770	0.4435
Pakistan	5,226	2,500	0.4784	323,150	156,238	0.4835
Vietnam	44,235	1,261	0.0285	194,657	75,980	0.3903
S Arabia	89,989	2,948	0.0328	160,708	91,036	0.5665
Yemen	7,964	0	0.0000	88,635	18,830	0.2124
Sri Lanka	1,278	0	0.0000	70,970	14,194	0.2000
Japan	18,679	1,676	0.0897	26,461	7	0.0003
Jordan	32,410	242	0.0075	23,138	19,639	0.8488
Azerbaijan	424	0	0.0000	13,450	4,101	0.3050
Syria	4,510	0	0.0000	11,526	2,109	0.1830
RO Asia	23,082	169	0.007	25,560	3,069	0.1200
Total	1,291,470	680,410	0.5268	5,278,055	3,483,405	0.6600

On the country level, it can be noted that Indonesia's CPO exports to Asian countries have increased by 409%; this change is larger than the increase in imports for Asian countries, and therefore, Indonesia's market share has also increased, from 47% to 66% (Table 5.1). Pakistan's CPO market has the highest growth level for Indonesia's CPO, with 6150%, followed by Vietnam at 5926% and China at 3358%. For refined palm oil, Indonesia's exports to Asian countries increased by 127%, causing Indonesia's market share to increase from 19% to 30% (Table 5.2).

Table 5.2. Indonesia's Market Share of Refined Palm Oil in Asian Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Indonesia**	**Market Share**	**Total Import**	**Import from Indonesia**	**Market Share**
China	1,343,501	385,127	0.2867	4,437,142	1,294,754	0.2918
Pakistan	944,719	32,553	0.0345	1,355,150	566,258	0.4179
Japan	358,462	7,762	0.0217	476,910	153	0.0003
India	1,946,093	565,554	0.2906	316,561	234,021	0.7393
Rep Korea	199,309	1,201	0.0060	215,354	5,042	0.0234
Vietnam	50,085	63	0.0013	179,310	36,925	0.2059
Iran	6	0	0.0000	161,410	24,167	0.1497
UAE	44,705	909	0.0203	155,931	15,898	0.1020
Hongkong	253,854	15,596	0.0614	151,516	30,432	0.2008
Philippines	53,269	1,543	0.0290	150,250	31,571	0.2101
Jordan	46,864	4,380	0.0935	110,706	95,823	0.8656
S. Arabia	45,541	383	0.0084	101,547	113	0.0011
RO Asia	146,733	34,020	0.2319	252,711	49,568	0.1961
Total	5,433,141	1,049,090	0.1931	8,064,497	2,384,724	0.2957

Malaysia mainly focuses on the export of refined palm oil rather than CPO. The government of Malaysia imposed on export tax on CPO in order for the CPO to be refined locally and exported in the form of refined palm oil (Gopal, 1999; Amiruddin, 2003). Malaysia's CPO share of the Asian market has decreased from 49% to 33%, although in terms of quantity, Malaysia's CPO export has increased by 122% (Table 5.3).

Table 5.3. Malaysia's Market Share of CPO in Asian Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
India	939,397	376,691	0.4010	2,470,139	344,581	0.1395
Bangladesh	258,041	117,501	0.4554	986,369	618,092	0.4189
China	23,687	18,157	0.7666	394,058	173,931	0.4414
Pakistan	5,226	2,559	0.4897	323,150	166,787	0.5161
Vietnam	44,235	42,974	0.9715	194,657	89,854	0.4616
S Arabia	89,989	84,012	0.9336	160,708	69,397	0.4318
Yemen	7,964	3,925	0.4929	88,635	60,184	0.6790
Sri Lanka	1,278	12	0.0095	70,970	7,020	0.0989
Japan	18,679	17,003	0.9103	26,461	26,415	0.9982
Jordan	32,410	31,844	0.9825	23,138	3,412	0.1474
Azerbaijan	424	35	0.0830	13,450	9,348	0.6950
Syria	4,510	4,510	1.0000	11,526	9,133	0.7923
RO Asia	23,082	15,523	0.6725	25,560	9,037	0.3536
Total	1,436,516	703,068	0.4894	4,774,042	1,584,580	0.3319

The largest decrease in market share occurred in India, Saudi Arabia and Jordan. In those three countries, Malaysia's CPO export also decreased. For refined palm oil, Malaysia's export to Asian countries increased by 29%, and because the increase was smaller than that of the total imports by Asian countries, Malaysia's market share decreased from 77% to 67% (Table 5.4).

Table 5.4. Malaysia's Market Share of Refined Palm Oil in Asian Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
China	1,343,501	928,142	0.6908	4,437,142	3,132,541	0.7060
Pakistan	944,719	900,177	0.9529	1,355,150	770,712	0.5687
Japan	358,462	346,565	0.9668	476,910	475,108	0.9962
India	1,946,093	1,355,086	0.6963	316,561	52,293	0.1652
Rep Korea	199,309	194,608	0.9764	215,354	208,941	0.9702
Vietnam	50,085	7,490	0.1495	179,310	138,716	0.7736
Iran	6	6	1.0000	161,410	86,273	0.5345
UAE	44,705	28,878	0.6460	155,931	134,896	0.8651
Hongkong	253,854	228,272	0.8992	151,516	115,854	0.7646
Philippines	53,269	44,381	0.8331	150,250	116,687	0.7766
Jordan	46,864	41,941	0.8949	110,706	13,733	0.1241
S Arabia	45,541	12,766	0.2803	101,547	11,975	0.1179
RO Asia	146,733	82,307	0.5609	252,711	138,923	0.5497
Total	5,433,141	4,170,619	0.7676	8,064,497	5,396,651	0.6692

Comparing the changes in market share for the two countries and the two products, one can conclude that Indonesia has gained competitiveness in CPO and refined palm oil in the Asian market. The main reason for the increase in Indonesia's market share is the price difference between Indonesia and Malaysia's palm oil product. Asian markets are price-sensitive, and a slight difference in price will shift the supplier toward purchasing from other countries. In the case of Indonesia and Malaysia's palm oil, there exists a price difference of up to US$ 5/ton, with Malaysian product priced higher (Subramani, 2005)

The Malaysians realized that suppliers from Indonesia were offering lower prices and thus implemented other strategies. One of the strategies was the signing of trade agreements that would eventually benefit their product

performance. The Malaysian government signed a Free Trade Agreement (FTA) with the government of Pakistan in November 2007 that took effect beginning on January 1, 2008. With this agreement, palm oil from Malaysia was to receive a 10% duty discount for the first two years, and beginning in January 2010, the discount would increase to 15% (MPOC, 2007b). However, the Indonesians countered the Malaysian strategy by also signing a Preferential Trade Agreement (PTA) with Pakistan, where this agreement was signed in March 2009. The PTA specified that Pakistan agreed to cut 10% of its import duty on Indonesia's CPO and CPO-based product (Palmoilhq, 2009)

With almost all markets in Asia, Indonesia has a high market share; the only exceptions are Japan and South Korea. In Japan, Indonesia has less than 1% of the refined palm oil market; meanwhile, Malaysia is dominant with almost a 100% market share. The reason for this is that the Japanese buyer still perceives Indonesia as only producing CPO and not refined palm oil. Japan has mainly imported refined palm oil from Malaysia. The other reason is that Japanese tankers carrying palm oil are reluctant to enter Indonesian waters because of security concerns.

The constant market share analysis (CMSA) is conducted to analyze the source of export growth for CPO and refined palm oil in the Asian market. For Indonesia, the increase in CPO exports is greater than the increase in refined palm oil exports (Table 5.5). For CPO, the increase in demand is responsible for the increase in Indonesia's exports. Meanwhile, for refined palm oil export, the main source of Indonesia's exports is the competitive effect. Comparing the two commodities, it can be inferred that Indonesia's export growth in CPO is caused by the shift in demand, while the increase in refined palm oil export is occurring

because Indonesia's refined palm oil is becoming more competitive in the Asian market. The main reason is that Indonesia palm oil is sold cheaper than that of its main competitor, Malaysia.

Table 5.5. Constant Market Share Analysis of Indonesia's CPO and Refined Palm Oil Export in Asia, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	1,809,422	59.26
Market composition effect	196,492	6.44
Competitive effect	1,047,354	34.30
Total	3,053,268	100.00
Refined Palm Oil		
Size of market effect	508,091	33.11
Market composition effect	83,735	5.46
Competitive effect	942,808	61.44
Total	1,534,634	100.00

On the other hand, the increase in refined palm oil export is greater than the increase in CPO export for Malaysia (Table 5.6). This is obvious because Malaysia imposed export taxes on its CPO export in order to supply the domestic refined palm oil industry; eventually, the refined palm oil will also be exported. For both CPO and refined palm oil, Malaysia is losing its competitiveness, as shown by the negative sign for the competitive effect. This is mainly caused by the price difference between Malaysia and Indonesia's palm oil product.

Table 5.6. Constant Market Share Analysis of Malaysia's CPO and Refined Palm Oil Export in Asia, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	1,888,896	216.51
Market composition effect	-27,090	-3.11
Competitive effect	-989,363	-113.40
Total	872,443	100.00
Refined Palm Oil		
Size of market effect	2,019,896	164.75
Market composition effect	-167,129	-13.63
Competitive effect	-626,734	-51.12
Total	1,226,033	100.00

5.4.2. Europe

European countries are the second largest consumer of palm oil after Asian countries. In 2007/2008, this region consumed 5.6 million tons, representing 14% of the world consumption of palm oil (United States Department of Agriculture, 2009). The European market is different from the Asian market. In the Asian market, palm oil is mainly used for making cooking oil; meanwhile in European countries, palm oil is mainly utilized in the food industry, such as for making margarine, biscuits, chocolate, snacks, chips and other similar products; it is also used in the soap, detergent and cosmetics industries (van Gelder, 2004).

International traders play an important role in bringing palm oil product to Europe. According to van Gelder (2004), there are four types of traders involved in palm oil trading in Europe:

- European trading subsidiaries of importing countries' oil palm plantation companies

- Trading arms of the major European edible oil refining companies
- The procurement divisions of major European food, detergent and chemical companies
- Independent edible oil traders and brokers

The European market grew significantly over the period 1999-2001 to 2005-2007. CPO imports grew by 164%, while refined palm oil import grew by 63% (Table 5.7). Looking at the individual countries, one can see that the largest CPO import increase occurred in the Ukraine, with 6442%, followed by Turkey (2665%) and Ireland (1388%). Meanwhile, for refined palm oil imports, the largest increase was Sweden with 541%, followed by Romania (469%) and Ukraine (282%) (Table 5.8).

There are several factors that affect the significant increase in CPO and refined palm oil imports in the European market. First is the increase in demand for biodiesel. The European Union agreed to increase the use of biofuels to a minimum of 2% of total liquid fuel consumption by 2005 and to 5.75% in 2010, although these targets are non-mandatory. In order to meet the targets, about 2.5 million tons of biodiesel (for the 2% target) and then approximately 14 million (for the 5.75% target) needed to be produced (Ahmad and Sue, 2005). In Turkey, the increase in palm oil imports was mainly caused by the increase in palm oil usage in the biodiesel industry. Annually, almost 10,000 to 12,000 tons of palm oil are utilized in the biodiesel industry in Turkey (MPOC, 2007c).

The second factor is the decrease in local vegetable oil production. The main vegetable oil products in European countries are rapeseed oil and sunflower oil. Over the years and in several countries, the production of these local vegetables has decreased for various reasons. In seeking a substitute for the

locally produced vegetable oil, consumers found palm oil, which is cheaper and widely used worldwide. The tremendous increase in palm oil imports by the Ukraine has been partially impacted by this factor. The main vegetable oil product in the Ukraine is sunflower oil. Over the years, the production of sunflower oil has shown poor performance, causing the price to increase. In looking for a substitute for sunflower oil, the processing industry has turned to palm oil, which is cheaper than sunflower oil (Foodnavigator.com, 2004).

The third factor is the increasing demand in the food industry. The increasing demand in the food industry has not been followed by an increase in the local production of vegetable oil. Hence, the food industry searched for imported vegetable oil that could be used in the process. Sunflower oil is the main vegetable oil in Russia, but with the growing demand from the food industry, the production of sunflower seeds cannot meet the demand from the food industry. In 2007, palm oil accounted for 54% of total vegetable oil imports. Palm oil products are mostly utilized in making margarine, which is the most important fat in a Russian consumer's diet, and are even used as cooking oil for some segments (MPOC, 2008d).

Lastly, several countries serve as re-export points for other countries. The Netherlands has traditionally served as a hub for the other European countries. Recently, the Ukraine has also taken on this role for other countries, such as Russia and other eastern European countries.

On exporter side, it should be noted that Indonesia's exports of CPO to European countries have increased by 125% (Table 5.7). Despite the export quantity increase, the market share of Indonesia's CPO has decreased from 38% to 37% because the total import increase is higher than the increase in Indonesia's

exports to European countries. On the other hand, the market share of Indonesia's refined palm oil in Europe has increased from 18% to 30%, and in terms of quantity, exports have increased by 174% (Table 5.8).

Indonesia suffered a decrease in CPO market share in several western European countries, such as the Netherlands, Germany, Spain, France and Belgium. According to the Indonesia's Palm Oil Company Association, the decrease in CPO market share has been mainly caused by the negative campaign initiated by the non-governmental groups (NGOs) in the European countries. In 2005, the government of Indonesia planned to build a palm oil plantation along the border of Indonesia and Malaysia on the island of Borneo, which mainly consists of tropical forest. It was claimed that the opening of the palm oil plantation would destroy 1.8 million Ha of tropical forest. After further research, the plan was terminated for a different reason: because the geographic and soil conditions were not suitable for the plantation. Despite this, many people think that the plan was implemented, especially people in European countries (The Jakarta Post, 2009).

Table 5.7. Indonesia's Market Share of CPO in European Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Indonesia**	**Market Share**	**Total Import**	**Import from Indonesia**	**Market Share**
Netherlands	444,925	245,152	0.5510	1,341,898	441,647	0.3291
Germany	185,400	91,655	0.4944	485,769	224,676	0.4625
UK	357,992	42,257	0.1180	440,932	124,191	0.2817
Spain	65,882	51,851	0.7870	218,687	91,768	0.4196
Italy	117,179	23,589	0.2013	217,830	107,036	0.4914
France	41,507	19,434	0.4682	105,904	38,848	0.3668
Belgium	73,663	13,249	0.1799	88,436	9,860	0.1115
Ukraine	829	0	0.0000	54,224	54,224	1.0000
Denmark	11,173	1,865	0.1669	53,840	19,892	0.3695
Poland	22,009	18,597	0.8450	39,409	16,967	0.4305
Finland	1,012	0	0.0000	24,875	0	0.0000
Turkey	803	800	0.9958	22,213	17,390	0.7829
Ireland	1,139	0	0.0000	16,949	379	0.0223
Sweden	3,139	197	0.0627	15,850	0	0.0000
Norway	376	0	0.0000	6,956	2,978	0.4281
RO Europe	20,927	6,627	0.3167	21,451	7,687	0.3583
Total	1,347,954	515,272	0.3823	3,155,222	1,157,543	0.3669

The conditions regarding CPO exports have not affected refined palm oil exports. CPO in Europe is mainly consumed by the western European countries, which are more sensitive to environmental issues; meanwhile, the main consumers for refined palm oil export are the eastern European countries (i.e., Russia), which are less sensitive to environmental issues.

Table 5.8. Indonesia's Market Share of Refined Palm Oil in European Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Indonesia**	**Market Share**	**Total Import**	**Import from Indonesia**	**Market Share**
Russia	171,757	42,926	0.2499	570,064	189,695	0.3328
Germany	327,930	32,185	0.0981	495,821	188,979	0.3811
Turkey	207,797	74,689	0.3594	428,060	215,250	0.5029
Netherlands	334,536	73,308	0.2191	369,327	152,093	0.4118
Belgium	155,790	10,733	0.0689	311,662	10,647	0.0342
Italy	146,991	15,113	0.1028	279,068	75,476	0.2705
France	121,348	7,945	0.0655	213,704	24,374	0.1141
Ukraine	49,570	6,774	0.1367	189,416	101,384	0.5352
UK	193,798	34,758	0.1794	168,164	38,315	0.2278
Denmark	84,029	81	0.0010	123,327	334	0.0027
Poland	27,562	9,777	0.3547	106,246	285	0.0027
Sweden	14,531	66	0.0046	93,161	13	0.0001
Spain	95,611	54,838	0.5735	92,101	40,130	0.4357
Greece	24,335	4,889	0.2009	63,636	34,527	0.5426
Romania	7,955	772	0.0970	45,306	2,134	0.0471
RO Europe	144,257	9,075	0.0629	235,495	35,112	0.1491
Total	2,107,798	377,929	0.1793	3,440,121	1,036,977	0.3014

Malaysia has benefited from the decrease in Indonesia's CPO market share; more specifically, the country has experienced an increase in market share from 17% to 36% (Table 5.9). In terms of quantity, Malaysia's CPO exports to European countries have increased by 391%. In countries where Indonesia has suffered decrease in market share, Malaysia has increased its market share. This shows that the negative campaign has been effective in these countries and that buyers have shifted their supplier to Malaysia.

Table 5.9. Malaysia's Market Share of CPO in European Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
Netherlands	444,925	119,238	0.2680	1,341,898	799,683	0.5959
Germany	185,400	37,836	0.2041	485,769	101,779	0.2095
UK	357,992	33,080	0.0924	440,932	69,672	0.1580
Spain	65,882	5,014	0.0761	218,687	15,323	0.0701
Italy	117,179	7,233	0.0617	217,830	18,888	0.0867
France	41,507	7,783	0.1875	105,904	51,068	0.4822
Belgium	73,663	8,367	0.1136	88,436	13,791	0.1559
Ukraine	829	781	0.9419	54,224	0	0.0000
Denmark	11,173	2,432	0.2177	53,840	26,389	0.4901
Poland	22,009	3,171	0.1441	39,409	20,024	0.5081
Finland	1,012	0	0.0000	24,875	5	0.0002
Turkey	803	3	0.0042	22,213	4,823	0.2171
Ireland	1,139	18	0.0160	16,949	6,269	0.3699
Sweden	3,139	2,294	0.7309	15,850	15,110	0.9533
Norway	376	0	0.0000	6,956	3,569	0.5130
RO Europe	20,927	7,063	0.3375	21,451	3,446	0.1606
Total	1,347,954	234,314	0.1738	3,155,222	1,149,838	0.3644

Meanwhile, with regard to refined palm oil products, it can be noted that Malaysia's exports to European countries have increased by 22% but that their market share has decreased from 48% to 36% (Table 5.10). This decrease has been caused by the price difference between its product and Indonesia's refined palm oil, as well as by the aggressive marketing strategy of Indonesia's palm oil company.

Table 5.10. Malaysia's Market Share of Refined Palm Oil in European Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
Russia	171,757	83,978	0.4889	570,064	248,736	0.4363
Germany	327,930	141,135	0.4304	495,821	77,192	0.1557
Turkey	207,797	129,983	0.6255	428,060	211,969	0.4952
Netherlands	334,536	235,510	0.7040	369,327	188,802	0.5112
Belgium	155,790	22,392	0.1437	311,662	24,976	0.0801
Italy	146,991	109,653	0.7460	279,068	128,476	0.4604
France	121,348	2,952	0.0243	213,704	34,085	0.1595
Ukraine	49,570	37,424	0.7550	189,416	80,035	0.4225
UK	193,798	85,567	0.4415	168,164	48,975	0.2912
Denmark	84,029	57,466	0.6839	123,327	82,516	0.6691
Poland	27,562	475	0.0172	106,246	4,229	0.0398
Sweden	14,531	5,834	0.4015	93,161	87,591	0.9402
Spain	95,611	33,638	0.3518	92,101	25,808	0.2802
Greece	24,335	16,216	0.6663	63,636	19,290	0.3031
Romania	7,955	1,520	0.1910	45,306	21,005	0.4636
RO Europe	144,257	52,754	0.3657	235,495	42,790	0.1817
Total	2,107,798	1,016,496	0.4823	3,440,121	1,243,390	0.3614

Although Indonesia's exports to Europe have increased, the CMSA shows that Indonesia's CPO lost competitiveness in the European market. This is indicated by the negative value for competitive effect, which was caused by the negative campaign initiated by the NGO in Europe (Table 5.10). Meanwhile, the increase in Indonesia's refined palm oil exports is mainly caused by the competitive effect, which contributed 66% of increase in exports.

Table 5.11. Constant Market Share Analysis of Indonesia's CPO and Refined Palm Oil Export in Europe, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	690,851	106.68
Market composition effect	180,985	27.95
Competitive effect	-224,250	-34.63
Total	647,586	100.00
Refined Palm Oil		
Size of market effect	238,886	36.25
Market composition effect	20,368	3.09
Competitive effect	399,794	60.66
Total	659,048	100.00

Table 5.12. Constant Market Share Analysis of Malaysia's CPO and Refined Palm Oil Export in Europe, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	314,156	34.22
Market composition effect	98,986	10.78
Competitive effect	504,799	54.99
Total	917,941	100.00
Refined Palm Oil		
Size of market effect	642,519	283.18
Market composition effect	-7,729	-3.41
Competitive effect	-407,897	-179.77
Total	226,893	100.00

Malaysia benefited from the loss of competitiveness of Indonesia's CPO exports in Europe. Although Malaysia concentrated on refined palm oil exports, CPO exports gained competitiveness. On the other hand, refined palm oil exports lost their competitiveness, although the export quantity increased (Table 5.12).

5.4.3. Africa

The palm tree originated in Africa and, until the 1960s, African countries such as Zaire (formerly the Belgian Congo) and Nigeria dominated the palm oil export industry, before Malaysia and Indonesia took their place. In the 1980s, the two African countries stopped exporting palm oil (Corley and Tinker, 2003; Martin, 2006). Corley and Tinker (2003) explain that there are four reasons why Nigeria stopped exporting palm oil. Those reasons are as follows: high population growth, which caused demand to increase; low farm gate prices; traditional plantations and government mismanagement. In 2007/2008, African countries only produced 6.7% of the world's palm oil (United States Department of Agriculture, 2009). The largest producer of palm oil in Africa is Nigeria, followed by the Ivory Coast and the Congo.

African countries consumed 11.47% of the world's palm oil in 2007/2008 (United States Department of Agriculture, 2009). Palm oil is mainly used for cooking oil, margarine and soap. In order to fulfill its needs with regard to palm oil consumption, it imports 61.4% of its palm oil (United States Department of Agriculture, 2009).

African countries' CPO imports grew 114% during the period from 1999-2001 to 2005-2007 (Table 5.13); meanwhile, refined palm oil imports grew by 151% during the same period (Table 5.14). Several countries increased their CPO imports significantly; imports for Morocco grew by 41,012%, while those for Madagascar grew by 25,184% and for Mozambique by 9190% (Table 5.13). For refined palm oil imports, the three countries that experienced tremendous growth were Algeria (41,749%), Uganda (3257%) and Tunisia (1709%) (Table 5.14).

The significant increase in the CPO and refined palm imports in the African countries is caused by several factors. First is the increase in demand from the food industry. In South Africa, the main contribution of the increase in refined palm oil imports is the increase in demand from the food industry. With increases in income, the demand for snacks and ice cream has also increased (MPOC, 2008e).

Second, trade liberalization has played a crucial role in the increase in several countries' palm oil imports. Trade liberalization has increased the competitiveness of palm oil as compared to other edible oil but also that between CPO and refined palm oil. In Tunisia, the government eliminated the import duty on CPO, sunflower seed oil and corn oil and also reduced the value-added tax (VAT) on those products from 18% to 6% in 2006 (MPOC, 2008f). In Algeria, the government also reduced the import duty for refined palm oil from 30% to only 2.5% in 2005 (MPOC, 2008g). Meanwhile, in Morocco, the government imposed different import duties on CPO and refined palm oil, causing the installation of new physical refineries that make CPO into refined palm oil. The government imposed a 2.5% import duty on CPO and one of 25% on refined palm oil. As a result, buyers tend to import CPO rather than refined palm oil (MPOC, 2008g). The same is also occurring in Kenya, Tanzania and Uganda. These countries subscribe to the East African Countries (EAC) Customs protocol, which has imposed no tariff on imported raw materials and intermediate goods, including palm oil. The protocol has been in effect since 2005 (Wambura, 2009).

Lastly, several countries serve as a hub for other countries. In Africa, Benin serves as a hub for palm oil to enter other nearby countries, especially countries located in the western part of Africa (MPOC, 2007d).

On the exporter side, it should be noted that Indonesia's CPO exports to African countries have increased by 246% and that market share has also increased, from 36% to 58%. Tanzania, Tunisia and Ghana are the countries with the largest increase in imports from Indonesia. These three countries' imports have increased by 30,047%, 1,466% and 327%, respectively. In several countries, Indonesia's market share is relatively small; these countries include Uganda, Niger and Mauritania. Interestingly for Uganda, most of the imports have come from Singapore, which is not a producer of CPO. Singapore just re-exports the CPO that has come from Indonesia or Malaysia.

Table 5.13. Indonesia's Market Share of CPO in African Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	Import from Indonesia	Market Share	Total Import	Import from Indonesia	Market Share
Kenya	206,626	85,412	0.4134	364,099	269,886	0.7412
Tanzania	1,516	233	0.1539	104,860	70,338	0.6708
Mozambique	53	0	0.0000	65,616	14,622	0.2228
Uganda	34,821	323	0.0093	46,802	1,898	0.0405
Algeria	37,182	10,839	0.2915	28,631	18,652	0.6515
Tunisia	11,426	1,199	0.1049	26,517	18,774	0.7080
Madagascar	68	0	0.0000	17,171	8,984	0.5232
Ghana	3,486	1,466	0.4205	16,435	6,257	0.3807
Morocco	33	0	0.0000	13,677	10,042	0.7342
Niger	2,349	0	0.0000	10,272	29	0.0028
Mauritania	1,427	0	0.0000	10,030	0	0.0000
Egypt	9,740	0	0.0000	8,608	3,360	0.3904
RO Africa	37,521	25,682	0.6845	29,275	9,792	0.3345
Total	346,901	125,153	0.3608	741,991	432,632	0.5831

Meanwhile, Indonesia's refined palm oil exports have increased by 263%

to African countries, and its market share has also increased from 27% to 39% (Table 5.14). Algeria, Uganda and Egypt are the countries with the largest increase in imports from Indonesia. These three countries have seen imports increase by 289,251%, 12,729% and 1,723%, respectively.

Table 5.14. Indonesia's Market Share of Refined Palm Oil in African Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	Import from Indonesia	Market Share	Total Import	Import from Indonesia	Market Share
Egypt	216,820	16,232	0.0749	648,888	295,995	0.4562
S. Africa	175,160	52,379	0.2990	287,989	101,838	0.3536
Tanzania	114,549	73,817	0.6444	232,723	143,708	0.6175
Uganda	2,278	29	0.0127	76,475	3,714	0.0486
Algeria	151	18	0.1206	63,298	52,776	0.8338
Kenya	62,266	20,765	0.3335	48,924	21,617	0.4419
Ethiopia	3,527	118	0.0334	46,933	686	0.0146
Senegal	7,565	2,964	0.3918	42,474	6,694	0.1576
Sudan	2,578	0	0.0000	32,637	575	0.0176
Zambia	9,868	702	0.0712	28,197	0	0.0000
Niger	23,770	0	0.0000	25,747	40	0.0015
Tunisia	1,213	796	0.6568	21,940	15,483	0.7057
RO Africa	51,095	14,207	0.2781	126,062	17,846	0.1416
Total	670,840	182,029	0.2713	1,682,287	660,971	0.3929

Malaysia's CPO exports to African countries have suffered a decrease of 25%, and its market share has decreased from 37% to only 13% (Table 5.15). The largest decrease has occurred in Kenya, Uganda and Algeria, where imports decreased by 99%, 98% and 65% respectively. In Kenya and Uganda, Malaysia lost its competitiveness to Indonesia meanwhile in Uganda to Singapore.

Table 5.15. Malaysia's Market Share of CPO in African Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
Kenya	206,626	49,918	0.2416	364,099	667	0.0018
Tanzania	1,516	667	0.4399	104,860	27,607	0.2633
Mozambique	706	204	0.2882	65,616	13,884	0.2116
Uganda	34,821	29,127	0.8365	46,802	455	0.0097
Algeria	37,182	26,195	0.7045	28,631	9,096	0.3177
Tunisia	11,426	10,227	0.8951	26,517	7,389	0.2787
Madagascar	68	62	0.9086	17,171	6,528	0.3802
Ghana	3,486	813	0.2331	16,435	4,091	0.2489
Morocco	33	33	1.0000	13,677	3,523	0.2576
Niger	2,349	0	0.0000	10,272	2,113	0.2057
Mauritania	1,427	1,333	0.9343	10,030	7,824	0.7801
Egypt	9,740	4,319	0.4435	8,608	3,597	0.4179
RO Africa	37,521	4,990	0.1330	29,275	9,587	0.3275
Total	346,901	127,887	0.3687	741,991	96,362	0.1299

On the other hand, Malaysia's refined palm exports to African countries have increased by 111%, but the country's market share has declined from 56% to 47% (Table 5.16).

Table 5.16. Malaysia's Market Share of Refined Palm Oil in African Countries, 1999-2001 and 2005-2007 (Ton)

Country	Annual Average 1999-2001			Annual Average 2005-2007		
	Total Import	**Import from Malaysia**	**Market Share**	**Total Import**	**Import from Malaysia**	**Market Share**
Egypt	216,820	187,441	0.8645	648,888	345,065	0.5318
S. Africa	175,160	119,847	0.6842	287,989	184,091	0.6392
Tanzania	114,549	33,825	0.2953	232,723	86,975	0.3737
Uganda	2,278	724	0.3178	76,475	62,657	0.8193
Algeria	151	106	0.6995	63,298	9,724	0.1536
Kenya	62,266	14,047	0.2256	48,924	5,979	0.1222
Ethiopia	3,527	2,007	0.5690	46,933	30,483	0.6495
Senegal	7,565	1,225	0.1620	42,474	12,722	0.2995
Sudan	2,578	2,129	0.8256	32,637	1,984	0.0608
Zambia	9,868	19	0.0019	28,197	93	0.0033
Niger	23,770	303	0.0128	25,747	11,640	0.4521
Tunisia	1,213	395	0.3255	21,940	6,207	0.2829
RO Africa	51,095	15,873	0.3106	126,062	41,026	0.3254
Total	670,840	377,941	0.5634	1,682,287	798,644	0.4747

The CMSA indicates the source of export growth of CPO and refined palm oil of Indonesia and Malaysia. In Africa, the increase in Indonesia's refined palm oil export is greater than that of its CPO. In addition, the competitiveness effect is responsible for most of the growth of Indonesia's CPO and refined palm oil exports (Table 5.17). On the other hand, the value of the market composition effect of both CPO and refined palm oil is negative. This shows that Indonesia's market destination has lower export growth than overall growth.

Table 5.17. Constant Market Share Analysis of Indonesia's CPO and Refined Palm Oil Export in Africa, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	142,539	46.36
Market composition effect	-69,500	-22.60
Competitive effect	234,440	76.25
Total	307,479	100.00
Refined Palm Oil		
Size of market effect	274,451	57.30
Market composition effect	-91,827	-19.17
Competitive effect	296,318	61.87
Total	478,942	100.00

Malaysia's exports of CPO to African countries decreased over the period, while refined palm oil exports have increased, although the market share has decreased. In the case of both products, Malaysia has lost its competitiveness to Indonesia and to some extent to Singapore. The increase in exports of refined palm oil has mainly been caused by an increase in demand for the product.

Table 5.18. Constant Market Share Analysis of Malaysia's CPO and Refined Palm Oil Export in Africa, 1999-2001 and 2005-2007.

	Quantity (Ton)	**Share (%)**
CPO		
Size of market effect	145,653	-462.02
Market composition effect	16,188	-51.35
Competitive effect	-193,366	613.37
Total	-31,525	100.00
Refined Palm Oil		
Size of market effect	569,833	135.45
Market composition effect	54,758	13.02
Competitive effect	-203,887	-48.46
Total	420,704	100.00

5.5. Conclusion

Indonesia has experienced a significant increase in exports and market share for CPO and refined palm oil in the three regions, except in the case of CPO in European countries. The increase can be explained by the shift in demand and increasing competitiveness. The shift in demand is mainly caused by the stable economic situation and trade liberalization policy imposed by the importing countries, which reduces trade barriers in the form of import duties. The other reason is that Indonesia is gaining competitiveness over Malaysia. The main reason is that palm oil products coming from Indonesia are sold at lower prices than in Malaysia; the aggressive marketing strategy by Indonesia's exporter company is also a factor.

In the future, Indonesia must penetrate the existing market in which it has a low market share. This includes Japan and South Korea in Asia, eastern European countries, Uganda in Africa and new markets such as United States. In order to penetrate these markets, Indonesia exporters must coordinate their actions. Malaysia has its own agency called the Malaysia Palm Oil Council (MPOC), which promotes Malaysia's palm oil promotion in several countries. Indonesia might emulate Malaysia's strategy by setting up such kind of agency that would have representatives in potential market countries. This agency could promote Indonesia's palm oil and counter campaigns against Indonesia's palm oil.

VI. ANALYSIS OF INDONESIA'S PALM OIL MARKET POSITION IN THREE SELECTED COUNTRIES

6.1. Introduction

World palm oil consumption in 2008/2009 reached 42.3 million ton, this number has increased by 8.4 percent annually since 1980 (United States Department of Agriculture, 2010). According to Carter et.al (2007) the increase in world palm oil consumption is caused by two reasons, palm oil is cheaper than other vegetable oils and its cheaper to produced.

The largest consumer of palm on the same year was China, India, EU-27, Indonesia and Malaysia, respectively. These five countries consumed almost 55 percent of the total world consumption in 2008/2009. From these five countries, only two countries, Indonesia and Malaysia, are palm oil producers meanwhile the other three countries mostly imported the palm oil products mainly from Indonesia and Malaysia.

Indonesia and Malaysia are the main producers of palm oil in the world. In 2008/2009, 87 percent of the world palm oil production came from these two countries (United States Department of Agriculture, 2010). During the same year, Indonesia produced 19.5 million ton palm oil and Malaysia produced 17.7 million ton palm oil (United States Department of Agriculture, 2010). Indonesia's production increase by 12.6 percent annually in average since 1980; meanwhile Malaysia's production increase by 7.3 percent annually (United States Department of Agriculture, 2010)

Indonesia and Malaysia are also the main exporter of palm oil. In exporting, palm oil product can be classified into two commodities; CPO (SITC

42221) and refined palm oil (SITC 42229). Indonesia mainly exported in the form of CPO, meanwhile Malaysia in the form of refined palm oil. In 2008, Indonesia exported palm oil product with the value of 12.4 billion US$ which comprise of 6.6 billion US$ CPO and 5.8 billion US$ refined palm oil. Meanwhile in the same year, Malaysia exported 12.7 billion US$ which comprises 10.9 billion US$ refined palm oil and only 1.8 billion US$ CPO (UN Comtrade, 2010).

In the importer side, the largest importers in 2008 were China, India and Netherlands, respectively. China imported 5.2 billion US$, India 2.4 billion US$ and Netherlands 1.9 billion US$ (UN Comtrade, 2010). India and Netherlands mainly imported in the form of CPO, meanwhile China in the form of refined palm oil.

Comparing with the other vegetable oil, world palm oil consumption was the largest in 2008/2009 (Figure 6.1). In terms of annual increase, palm oil has increased 6.4 percent in average annually since 1980, meanwhile rapeseed oil grew 6.2 percent, soybean oil 4.4 percent and sunflowerseed oil 3.6 percent in the same period.

Palm oil also is the largest vegetable oil being traded. In 2007 it reached 19.2 billion US$ and the number has increased significantly over the years (Figure 6.2). In terms of average increase, palm oil also has the greatest increase with 11 percent in average annually since 1980, followed by rapeseed oil by 10.9 percent, soybean oil by 9.2 percent and sunflowerseed oil by 8.6 percent. The large increase of world palm oil trade is caused by two reasons. First, it is caused by the increase in world consumption of palm oil as shown in Figure 1. Second, palm oil consumers are depending heavily on the source of palm oil from two countries, Indonesia and Malaysia, through trade.

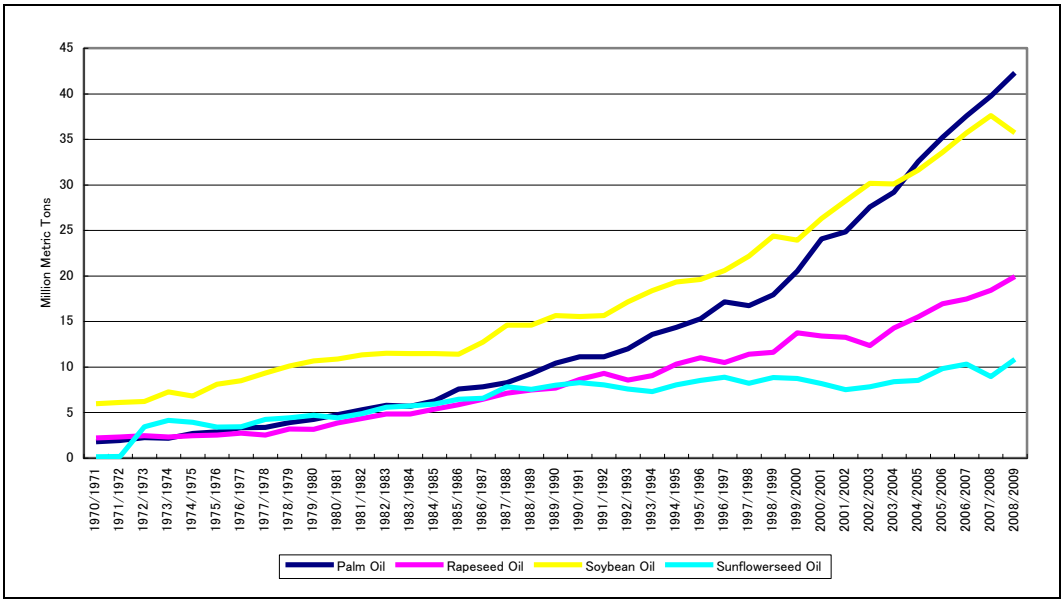

Figure 6.1. World Vegetable Oil Consumption, 1970-2009
Source: United States Department of Agriculture (2010)

This paper has two main objectives, to analyze the competition between palm and other vegetable oils and between Indonesia's palm oil product with its competitor especially Malaysia. The comparison is conducted in three countries; China, India and Netherlands, which is the largest importer of palm oil. After determining Indonesia's position in these three markets, strategy to improve Indonesia's position is formulated.

This chapter is arranged as follows. The next section discusses literature review and the palm oil market in China, India and Netherlands followed by the methodology utilized in this paper. The next part concerns on the results and lastly conclusion is presented.

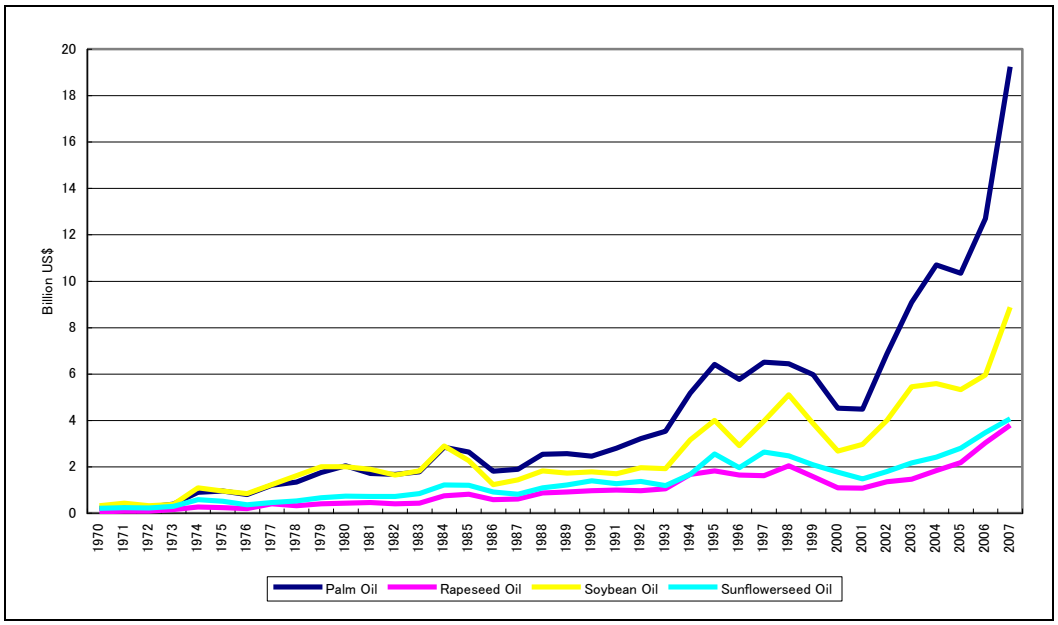

Figure 6.2. World Vegetable Oil Trade, 1970-2007
Source: Food and Agriculture Organization Statistics (2010)

6.2. Literature Review

There have been several studies on Indonesia's and Malaysia's palm oil products in the world market, which either compared the two countries or discussed each individual country. Rifin (2010) calculated Indonesia's market position in the world market comparing with Malaysia using similar approach. The result shows that the increase in the world demand for palm oil is mostly contributed by the increase in world income. In addition, palm oil products from Indonesia and Malaysia are complementary to each other rather than competing. Therefore, both countries should co-operate in order to increase the world demand for palm oil in the future.

Awad et.al (2007) analyzed palm oil import demand for ten Middle East and North African (MENA) countries using the autoregressive distributed lag (ARDL) technique. The result indicates that palm oil prices and income are significant determinant of palm oil demand in the ten countries. Meanwhile, price

of product played an important role in determining import demand of palm oil on most of the countries.

For individual country, Yulismi and Siregar (2007) calculated Indonesia's short-run and long-run own price and income elasticities for palm oil in China, India and European Union. The authors inferred that in both countries Indonesia's palm oil is price-inelastic and has an income elasticity above one.

Shariff et al. (2006) calculated the same elasticities for Malaysia's palm oil in five countries: China, Pakistan, India, South Korea and Egypt. Both short-run and long-run elasticities were calculated. The results show that Malaysia's own price elasticities in the short-run are mainly elastic except in China, while in the long-run they are all elastic except in South Korea which is insignificant. For income elasticity, in the short-run income is insignificant, while in the long-run income is significant and elastic in China, Pakistan and India.

Furthermore, Niemi (2004) calculated own price elasticity and income elasticity for various agricultural products including palm oil in the European Union (EU) market. The results indicate that palm oil in the EU market has inelastic price elasticity in both the short-run and the long-run, and an income elasticity of 0.63 in both the short-run and long-run

Unlike previous studies, this study utilized a different method which can analyze the interaction between Indonesia's and Malaysia's palm oil products. Previous studies only analyzed individual countries, and where both countries were analyzed, the interaction between the palm oil products from both countries could not be captured

6.3. Palm Oil Market in China, India and Netherlands

6.3.1. China

China is the largest market for palm oil. In 2008/2009 the country consumed 13 percent of the total world palm oil consumption and all of it were imported (United States Department of Agriculture, 2010). In terms of importing, 90 percent of the country's import was in the form of refined palm oil and the number has increase by 30 percent annually in average since 1992 (Figure 6.3).

Regarding the source of import, 67.5 percent of its import came from Malaysia and 31.5 percent came from Indonesia in 2008 (Figure 4). Malaysia dominates the China's market since Malaysia mainly exported in the form of refined palm oil. Although the share has decrease over the years, in 1990 Malaysia's market share was 71 percent meanwhile Indonesia was only 9 percent (Figure 6.4).

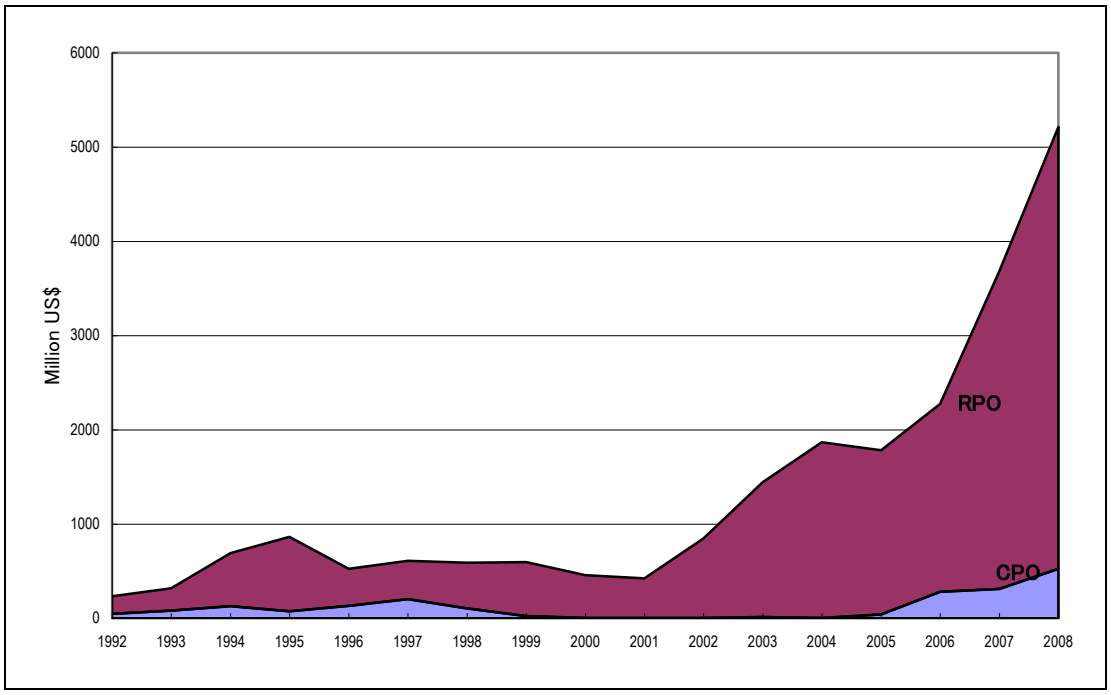

Figure 6.3. China's CPO and Refined Palm Oil Import, 1992-2008
Source: UN Comtrade (2010)

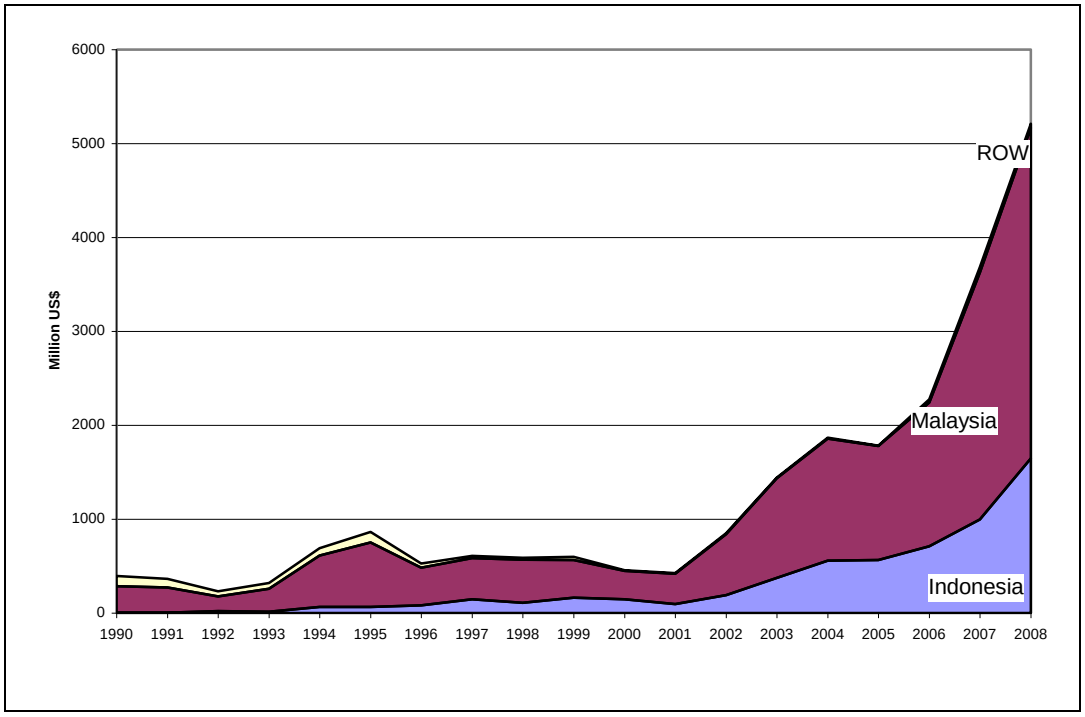

Figure 6.4. China's Source of Palm Oil Import, 1990-2008
Source: UN Comtrade (2010)

Palm oil is the second largest vegetable oil consumed in China after soybean oil. Different from palm oil, the country produced soybean oil and only 27.6 percent of the domestic consumption is imported (United States Department of Agriculture, 2010). Palm oil is mainly utilized in the processing industry and recently the utilization in the oleochemical industry has increased significantly.

The increase in the palm oil consumption in the country is mainly caused by three reasons (MPOC, 2009): high economic growth, improved technology especially in the fractionation capacity and huge population. Beginning in 2002, the government of China introduced the tariff rate quota (TRQ) for edible oil including soybean, rapeseed and palm oil. This system was introduced as a part of a commitment to WTO (Wahid et.al, 2007). Prior to WTO accession, access to China's agricultural market was controlled by the government through several commodity-specific state trading enterprises (STEs) (Coleman et.al, 2002).

In the TRQ system, a specified quantity of imports (i.e a quota) may enter at a low tariff rate; meanwhile the additional imports (i.e over the quota) are subjected to a higher rate (Tuan et.al, 2006). For palm oil, the tariff rate under the quota is 9 percent meanwhile over the quota is 66.3 percent. The system was implemented from 2002 until 2005 and each year the quota is determined. The import quota for palm oil was 2.4 million ton, 2.6 million ton, 2.7 million and 3.168 million from 2002 until 2005 respectively. During these years, the quota is exceeded except in 2002. Beginning in 2006, the TRQ system was abolished and the import tariff rate of 9 percent was imposed for palm oil.

In accordance with the ASEAN-China Free Trade Agreement, beginning from 2010 trade between the two areas will enjoy tariff-free. This agreement will benefit the import of palm oil since the main source of palm import is Indonesia and Malaysia which is the member of ASEAN.

6.3.2. India

India is the second largest consumer of palm oil. In 2008/2009 the country consumed 5 million metric ton, but different from China and Netherlands the country also produced palm oil but only 10 percent of its domestic consumption (United States Department of Agriculture, 2010). In addition, 78.5 percent of the country's import in 2008 was in the form of CPO (Figure 6.5). Therefore, Indonesia dominated India's market with 83 percent market share in 2008 (Figure 6.6). There has been a change in India's market structure over the years, before 1999 the country mostly imported in the form of refined palm oil, therefore during that time Malaysia's dominated the country's palm oil market. This shift in importing CPO is caused by the import tax structure of the country

which imposed zero percent import tax on CPO, meanwhile the refined palm oil is taxed 7.5 percent in 2009. In addition, the country also has a refinery industry which can refine the CPO into various refined palm oil products.

Palm oil is the largest vegetable oil consumed in India followed by soybean and rapeseed oil which is mainly used in the processed food industry. Over the years the government has intervened the vegetable oil market. Persaud and Landes (2006) divided several periods on the government intervention in the vegetable oil market:

- Period 1970s-1988. During this period, vegetable oil imports were conducted by the government through the Government's State Trading Corporation. The annual amount of import is determined by an inter-ministerial committee meetings based on the domestic supply demand and balance of payment condition.
- Period 1989-1994. During this period basically imports are limited since the government promoted the Technology Mission on Oilseeds which was the government initiative to boost self-sufficiency in edible oils.
- Period 1995-2000. Beginning on this period, India began opening its vegetable oil market due to conforming to the WTO rules. Quantitative trade restrictions were replaced by tariff imports and the private traders were allowed to import unlimited vegetable oil subject to applied tariffs which is similar for all the vegetable oil.
- Period 2001-now. From 2000, the government imposed different tariff rate between vegetable oils and whether it is crude or refined. In 2009 the import duty on CPO is zero meanwhile for refined 7.5 percent.

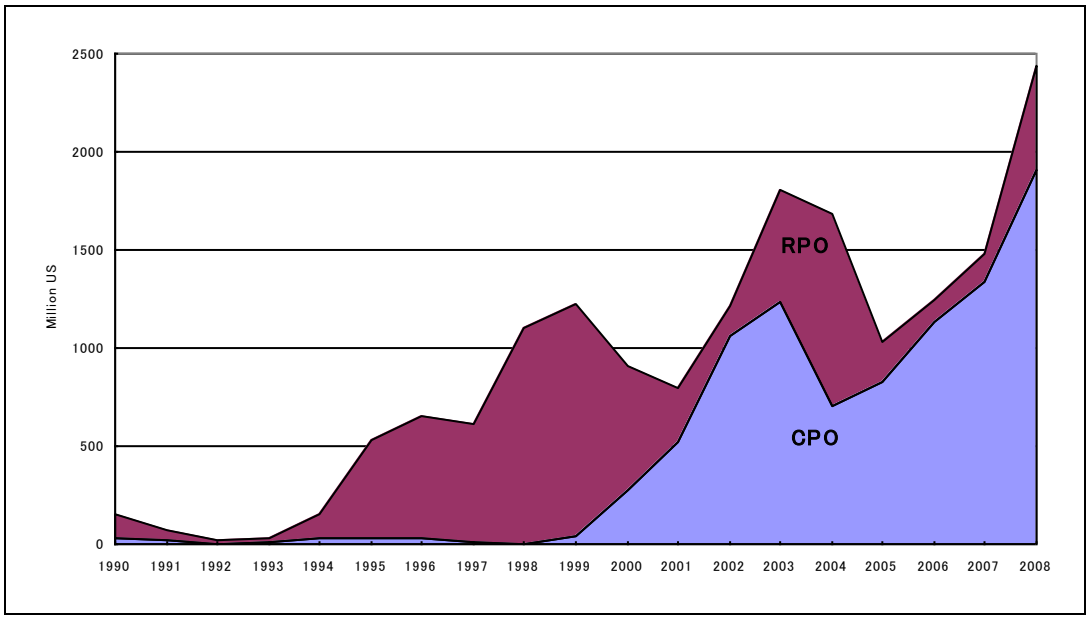

Figure 6.5. India's CPO and Refined Palm Oil Import, 1990-2008
Source: UN Comtrade (2010)

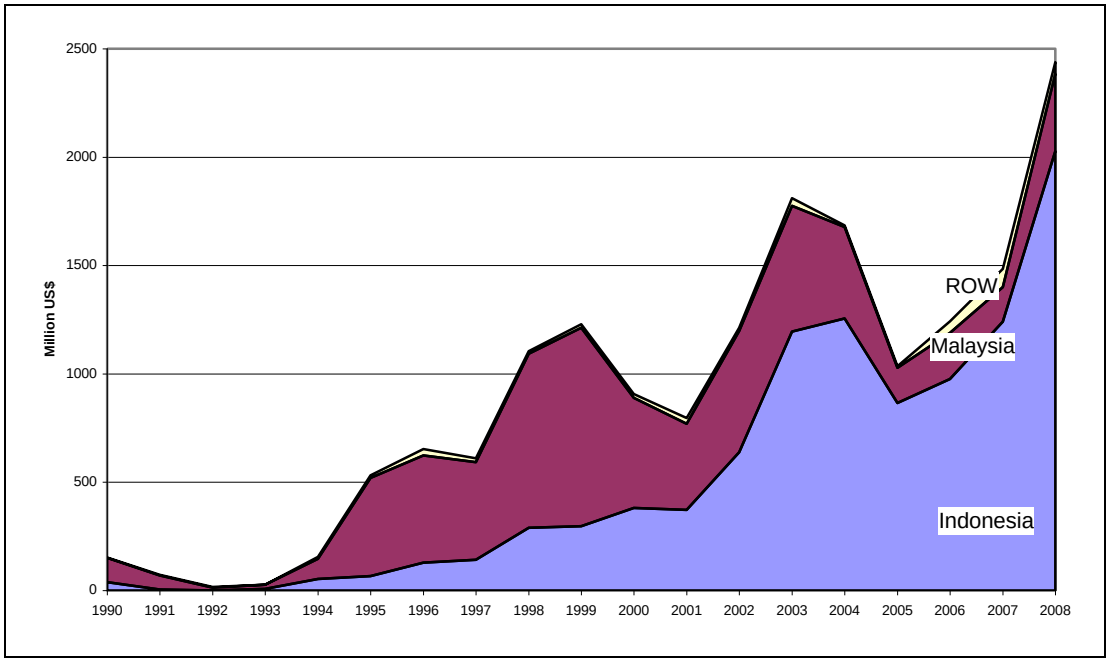

Figure 6.6. India's Source of Palm Oil Import, 1990-2008
Source: UN Comtrade (2010)

6.3.3. Netherlands

Netherlands has been a traditional market for palm oil since the early 1900's especially for Indonesia's palm oil because during that time Indonesia was

occupied by the Dutch (Martin, 2006). In 2008, 83 percent of the country's total import was in the form of CPO (Figure 6.7). But surprisingly, on the same year Malaysia dominated the Netherlands' market grabbing 52.7 percent of the market share although Indonesia mainly exported in the form of CPO (Figure 6.8). Until 1997, Indonesia dominated the Netherlands palm oil market because the country is the traditional market of Indonesia's palm oil since the colonial period.

In 1993, the Europe single market was established based on the Maastricht Treaty signed in 1992 and Netherlands was part of the single market. The single market guarantee four basic freedom related to the movement of goods, services, capital and people around the European Union's internal market.

The main utilization of palm oil in Netherlands is for food processing industry including for making margarine, biscuit, chocolate and snacks and also in the surfactant industry for making soap, detergents and cosmetics (van Gelder, 2004). Additionally, palm oil is also utilized for energy purposes which contribute on the increase of palm oil increase in recent years (Flach, 2005). About 80 percent palm oil is utilized for food and 10-15 percent is used for energy (Wahid et.al, 2007). The increase in palm oil in recent years is also caused by the increase in demand from other European countries since Netherlands is served as a hub for other European countries for obtaining palm oil product.

Different from China and India, Netherlands market is sensitive to environmental issue. Indonesia's CPO suffered a decrease in market share from 55 percent in 1999-2001 to only 33 percent in 2005-2007. The main reason was the boycott of Indonesia's CPO by the Dutch NGO since the Indonesian government was planning to open planning to open a huge plantation along the border with Malaysia in Kalimantan island which is previously a forest area. The plan was

abandoned since the geographic and soil conditions were not suitable for the plantation (The Jakarta Post, 2009).

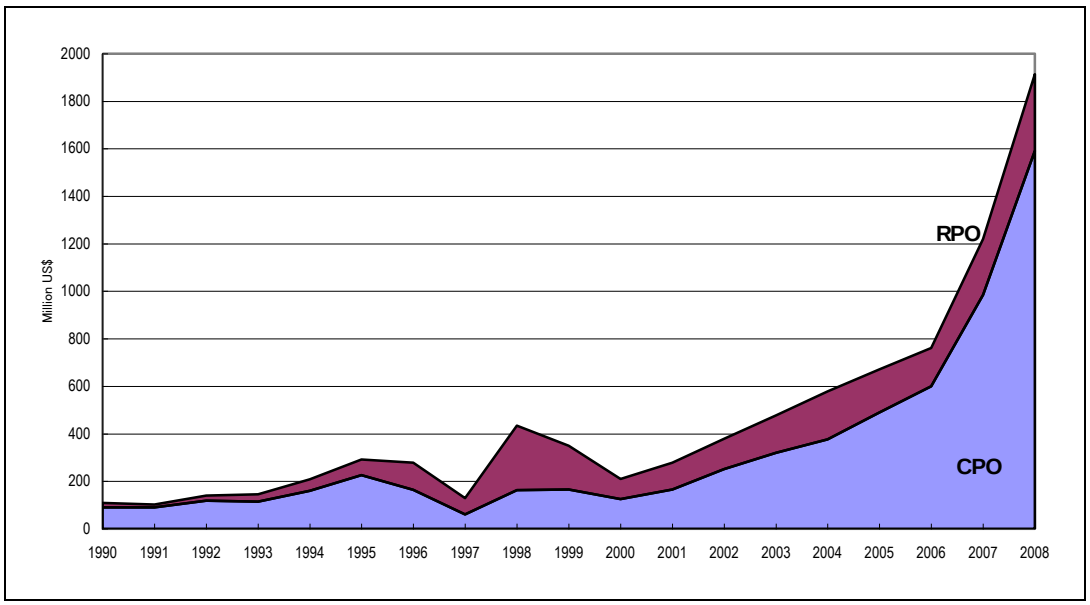

Figure 6.7. Netherlands' CPO and Refined Palm Oil Import, 1990-2008
Source: UN Comtrade (2010)

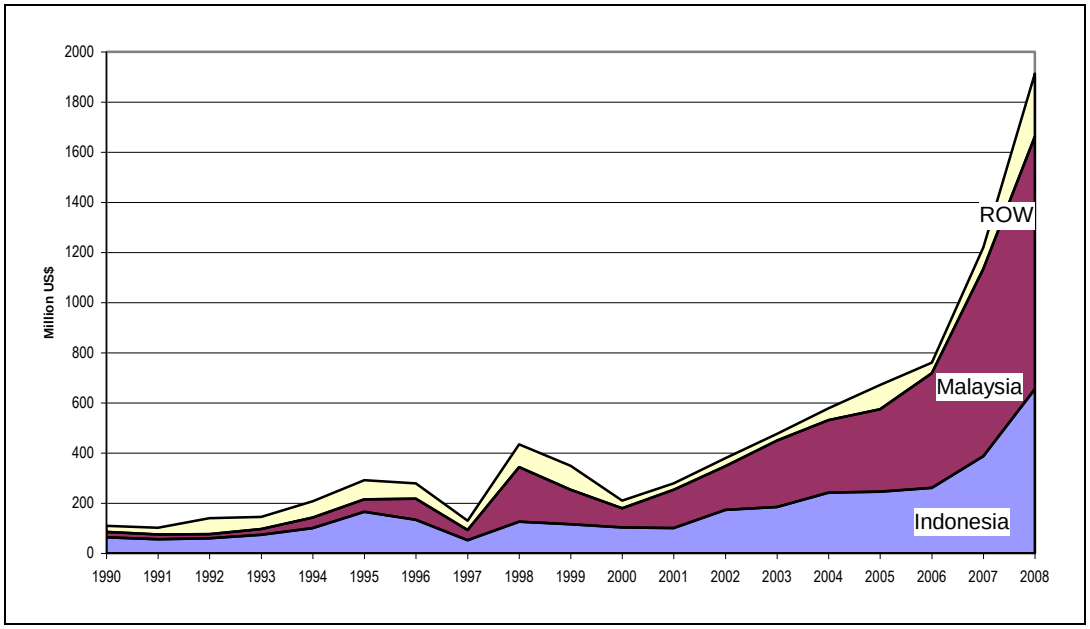

Figure 6.8. Netherlands' Source of Palm Oil Import, 1990-2008
Source: UN Comtrade (2010)

6.4. Methodology

Two stage estimations are conducted. Two stage or multistage analysis has been conducted by several researchers such as Michalek and Keyzer (1992), Honma (1993), Fan et.al (1995) and Dey (2000). The first stage each countries import demand of palm oil is constructed using the autoregressive distributed lag (ARDL) introduced by Pesaran (Pesaran et.al, 2001). Besides has an advantage of testing cointegration with mix I(0) and I(1) variables, the test also can be performed for limited sample size (Narayan and Narayan, 2005).

The test is basically based on an estimate of unrestricted error correction model using Ordinary Least Square (OLS) estimator (Tang, 2003). For the import demand equation, the function can be written as follows:

$$\Delta M_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta M_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta P_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta PS_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta GDPPC_{t-i} + \alpha_5 M_{t-1} + \alpha_6 P_{t-1} + \alpha_7 PS_{t-1} + \alpha_8 GDPPC_{t-1} + \varepsilon_t$$

Where

M = country's palm oil import (ton)

P = country's palm oil nominal price (LCU/ton)

PS = country's palm oil substitute nominal price (LCU/ton)

GDPPC = country's real GDP per capita or GDP (LCU/capita)

Δ indicates the difference form and all are in the log and real form

Several variations of the variables will be implemented. The price variable can be in the form of world price (WP) or domestic price (P), the same also for the substitute price. For China and India, soybean will be the substitute product for palm oil. Meanwhile in Netherlands, soybean, rapeseed and sunflower oil are the substitute products. In addition, dummy variable will also be added to

capture the possibilities of structural change that might affect the demand for palm oil in these countries.

In order to test the existence of cointegration, the ARDL method test a joint significance test (Wald test) for the coefficient of lag level form (α_5, α_6, α_7, and α_8) with the hypothesis for H_0: $\alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = 0$ against H_A: $\alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq 0$. The critical values for the F-statistics are cited in Pesaran et.al (2001). If the computed F-statistics exceeds the upper critical value I(1) then reject the hypothesis or in other words the variables are cointegrated. If the computed F-statistics falls below the lower critical value I(0) then the hypothesis can not be rejected or no cointegration exist. Meanwhile if the F-statistic lies between the lower and upper critical value bounds, a conclusive inference can not be made. Furthermore, minimizing the Schwartz criterion (SC) is utilized to select the appropriate lag length (n) for the ARDL testing.

The second import demand is the world import demand classified by sources. The Almost Ideal Demand System (AIDS) was selected as the specification for the empirical analysis. The AIDS model was introduced by Deaton and Muellbauer (1980) for analyzing demand analysis. Several years later, Winters (1984) utilized the approach for analyzing the import demand which analyze competition between different importing countries in a specific market/country for the same product. The AIDS model has been used extensively in applied demand analysis in recent years because of its theoretical consistency and functional flexibility (Chang and Nguyen, 2002). In this paper, the model has been considered for the stationarity of the data, therefore the AIDS model is as follows (Karagiannis et.al, 2000; Feleke and Kilmer, 2007):

$$\Delta S_i = \vartheta \Delta S_{it-1} + \beta_i \Delta \ln\left(\frac{M}{P^*}\right) + \sum_{i=1}^{n} \gamma_{ij} \Delta \ln P_j + \lambda_i EC_{it-1} + \varepsilon_t$$

where

S = share of import source in the world market

P = price of palm oil (US$/ton)

M = expenditure

P* = corrected Stone Price Index

EC = error correction term

Δ indicates the difference form

In the usual linearized AIDS, the P is the stone index. But according to Moschini (2000), the stone price index can affect the calculation properties of the AIDS model since it is not invariant to changes in units of measurement. Moschini (2000) suggested using the corrected stone price index which is the log-linear version of the Laspeyres index. The index is defined as follows:

$$\ln P^* = \sum_{i=1}^{n} S_i \ln \frac{P_{it}}{P_t^0}$$

where the P_t^0 is the price on the base year.

The theoretical restrictions of adding up, homogeneity and symmetry hold if the parameters satisfy the corresponding expressions:

Adding up: $\sum_{i=1}^{n} \alpha_i = 1, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \beta_i = 0$

Homogeneity: $\sum_{i=1}^{n} \gamma_{ij} = 0$ Symmetry: $\gamma_{ij} = \gamma_{ji}$

Compensated and uncompensated price elasticites will be calculated. The compensated (or Hicksian) price elasticity represents only the price effect of a change in price and it is compensated for the change in income, meanwhile

uncompensated (or Marshallian) price elasticity contains the price and income effect of a change in price. The compensated (η^*_{ij}), uncompensated price elasticities (η_{ij}) and expenditure elasticities (μ_i) are calculated as follows:

$$\eta^*_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{S_i} + S_j \qquad \eta_{ij} = -\delta_{ij} + \frac{\gamma_{ij} - \beta_i S_j}{S_i} \qquad \mu_i = 1 + \frac{\beta_i}{S_i}$$

where δ_{ij} is the Kronecker delta.

Table 6.1. Summary of Import Demand Variables

Variables	Mean	Std. Dev.	Min.	Max.
China				
Import (ton)	1,276,370	1,515,588	9,238	5,178,568
World palm oil price (yuan/ton)	2,377	1,565	695	5,996
World soybean oil price (yuan/ton)	2,908	1,814	762	7,878
GDP per capita (yuan/capita)	5,690	4,263	1,239	16,265
India				
Import (ton)	1,346,098	1,368,436	18,045	5,138,625
Domestic palm oil price (rupee/ton)	11,854	7,600	3,094	28,340
World soybean oil price (rupee/ton)	13,807	10,380	3,306	49,325
GDP per capita (rupee/capita)	16,255	6,251	9,660	31,663
Netherlands				
Import (ton)	428,492	508,754	54,499	2,152,003
World palm oil price ($/ton)	364	157	139	863
World soybean oil price ($/ton)	443	186	150	1,134
World rapeseed oil price ($/ton)	511	208	199	1,287
World sunflower oil price ($/ton)	539	263	150	1,694
Gross Domestic Product (million $)	260,452	97,713	105,401	449,073

The data used in this study are annual data. For the first stage world import demand, China's data are from 1977-2008, India 1975-2008 and Netherlands 1962-2008. The palm oil import and domestic palm oil price are

taken from the UN Comtrade database. The domestic prices variables are obtained from the cif price of the variables by dividing the import value with the quantity. GDP per capita data and GDP is obtained from the World Development Indicator (WDI) of the World Bank. The international prices are from International Financial Statistics (IFS) database of the International Monetary Fund (IMF). The summary of the variables is presented in Table 6.1.

Table 6.2. Summary of AIDS Variables

Variables	Mean	Std. Dev.	Min.	Max.
China				
Import share Indonesia (%)	16.92	12.28	0.001	32.35
Import share Malaysia (%)	67.28	14.63	22.10	79.39
Price Indonesia ($/ton)	479.97	170.00	266.38	977.71
Price Malaysia ($/ton)	477.60	159.20	283.59	989.40
Price Rest of the World ($/ton)	457.46	93.99	324.53	677.90
Total Import (thousand $)	1,080,471	1,258,186	95,955	5,212,516
India				
Import share Indonesia (%)	28.75	25.73	0.00	83.69
Import share Malaysia (%)	65.31	24.91	15.66	100.00
Price Indonesia ($/ton)	433.06	125.42	290.40	709.36
Price Malaysia ($/ton)	450.03	112.42	290.71	684.87
Price Rest of the World ($/ton)	479.16	131.73	289.98	706.60
Total Import (thousand $)	613,479	529,129	16,501	1,810,009
Netherlands				
Import share Indonesia (%)	39.42	12.80	13.69	65.50
Import share Malaysia (%)	35.84	17.64	2.07	68.79
Price Indonesia ($/ton)	446.25	133.36	204.26	879.72
Price Malaysia ($/ton)	477.80	149.81	207.91	961.48
Price Rest of the World ($/ton)	506.91	136.47	216.73	731.10
Total Import (thousand $)	201,577	185,225	34,618	760,733

For the second stage import demand, China's data are from 1987-2008,

India 1975-2008 and Netherlands 1976-2008. Three sources of import are considered; Indonesia, Malaysia and Rest of the World (ROW) from the SITC revision 1 code 4222. The data were all collected from the United Nations Commodity Trade Statistics (UN COMTRADE). The unit import values are calculated by dividing the total import value by total import volume. The summary of the variables is presented in Table 6.2.

6.5. Empirical Result

The product analyzed is palm oil which consist of CPO and refined palm oil. Analyzing specific product is preferable but constrained by the data limitation since the availability of the specific product only from 1990 from all the countries.

On the first stage, import demand equation is constructed for the three countries. The first step in the ARDL procedure is to test for the cointegration. The results indicate that two equations are cointegrated in 10 percent significance level meanwhile one equation, Netherlands, is inconclusive (Table 6.3). The Netherlands equation is treated as cointegrated and will be cross check with the significancy of the error-correction term coefficient in the short-run model. If the coefficient is significant, it can be concluded that the equation is cointegrated.

Table 6.3. ARDL Test for Cointegration Relationship

Country/Variables	Lag	F-statistic	Cointegration
China (M,WP,WPSOY,GDPPC)	2	3.883	Yes
India (M,P,WPSOY,GDPPC)	1	4.302	Yes
Netherlands (M,WP,WPRAP,WPSUN,WPSOY,GDP)	1	2.690	Inconclusive

Note: Critical value for k=3 at 10% significance level I(0)=2.72 and I(1)=3.77
Critical value for k=5 at 10% significance level I(0)=2.26 and I(1)=3.35

After checking the existence of cointegration, the optimal ARDL model is calculated based on the Schwartz criterion using Microfit software. The result shows that the optimal ARDL model for China is (1,0,0,0,0), India (1,0,0,0,0) and Netherlands (1,0,0,0,1,0,0) (Table 6.4).

Table 6.4. ARDL Estimates

Variables	**Coefficients**		
	China	**India**	**Netherlands**
Constant	-4.029 (-1.543)	17.616 (1.787)*	- 8.780 (-2.599)**
M(-1)	0.587 (5.041)***	0.499 (2.208)**	0.261 (1.794)*
WP	-1.317 (-2.927)***		-0.805 (-2.414)**
P		-1.486 (-1.798)*	
WPSOY	2.192 (4.010)***	1.169 (1.239)	-0.520 (-1.091)
WPSOY(-1)			-0.531 (-2.320)**
WPRAP			1.983 (3.395)***
WPSUN			0.044 (0.149)
GDPPC	0.273 (0.688)	-0.912 (-0.642)	
GDP			1.325 (3.374)***
D2002	0.067 (0.251)		
D1995		1.934 (2.078)**	
D1993			0.205 (1.235)
R^2	0.949	0.817	0.945
F stat	88.885	24.042	80.023

For China, import lag, world palm oil price and world soybean price is a significant factor in determining the palm oil import. Meanwhile income and the

implementation of import quota in 2002 do not affect the palm oil import. Soybean oil price is a substitute price of palm oil since China's is one of the largest importers of soybean oil in the world (United States Department of Agriculture, 2010) and soybean oil is considered to be the price leader among other vegetable oils (Amiruddin et.al, 2005). Looking at the elasticities, the impact of world soybean price has the largest effect on palm oil demand compare to import lag and world palm oil price.

The import lag, domestic price of palm oil and trade liberalization are the factors that affecting palm oil import in India. It has been reported that India's buyer is sensitive to price difference especially price difference between source of palm oil import (Subramani, 2005).

In the case of Netherlands, almost all variables are significant except for world soybean oil and sunflower oil price and the creation of one European single market in 1993. The effect of world palm oil price is relatively small with an elasticity of -0.805. In addition, rapeseed oil is a close substitute of palm oil since the product is mainly utilized in several industries including for biofuel. This finding is also supported by Ernawati et.al (2006) which reported that rapeseed oil is a close substitute of palm oil in the European market. Although soybean price in the same period is insignificant but the previous year soybean price is siginificant and the sign is negative which indicates complementary effect rather that competitive effect with palm oil.

Comparing the three countries, import lag has a significant effect on the import demand showing that there is a habit persistence in these countries demand (Welsch, 1989; Goddard and Glance, 1989). This inferred that these three countries are satisfied with the performance of palm oil therefore in the future

they are willing to import palm oil even more. Awad et. al. (2006) also reported the existence of habit persistence for palm oil demand in Middle East countries. Regarding the price elasticities, India is more sensitive to price change compare to the other two countries. Interestingly, the income effect is significant only in Netherlands and the trade liberalization only affects palm oil demand in India.

The ARDL method also can generate long-run and short-run model of the import demand equation. In the long-run, China is more sensitive to price change compare to India and Netherlands although all of the countries have elastic elasticities (Table 6.5). Different results reported by Yulismi and Siregar (2007) for Indonesia's palm oil import demand in China and India, in both countries the long-run elasticities are inelastic meanwhile in EU is elastic. For Malaysia, Shariff et.al (2006) reported that in China and India the long-run price elasticities are elastic. For the European market, Niemi (2004) reported an inelastic own price elasticity of -0.48 in the long-run.

For the palm oil substitute product, soybean oil is the substitute for palm oil in China and rapeseed oil in Netherlands in the long-run. Meanwhile in India, substitute product does not affect palm oil import. Both commodities are important vegetable oil in these two countries. China is the largest consumer of soybean oil in the world with 26 percent of the world consumption in 2009 (United States of Agriculture, 2010) meanwhile European countries are the largest consumer of rapeseed oil with 30 percent of the world consumption in 2009 (United States of Agriculture, 2010). Different result reported by Shariff et.al (2006), in China soybean oil is not significant meanwhile in India is significant and elastic.

The income factor in the long-run only affects the palm oil import in

Netherlands also and the effect is less that the effect of own price. Niemi (2004) also indicates that income is an important factor in determining palm oil import in Europe. For the trade liberalization, in the long-run it has the largest effect on the palm oil import in India. This inferred that the trade liberalization that the Indian government has implemented in 1995 is the main responsible for the large increase in the India's palm oil import.

Table 6.5. Long-run Estimates of the ARDL Model

Variables	**Coefficients**		
	China	**India**	**Netherlands**
Constant	-9.750 (-2.503)**	35.150 (1.594)	-11.877 (-3.109)***
WP	-3.186 (-2.000)*		-1.088 (-2.280)**
P		-2.966 (-2.006)*	
WPSOY	5.303 (2.519)**	2.333 (1.222)	-1.422 (-2.044)**
WPRAP			2.682 (3.404)***
WPSUN			0.060 (0.149)
GDPPC	0.661 (0.558)	-1.820 (-0.623)	
GDP			1.792 (4.766)***
D2002	0.162 (0.176)		
D1995		3.859 (3.079)***	
D1993			0.277 (1.259)

In the short-run, India's import demand is more sensitive to price change compare to China and Netherlands (Table 6.6). The short run elasticites are higher than those of Yulismi and Siregar (2007) which calculated inelastic short run price

elasticities for China, India and EU. For Malaysia, Shariff et.al (2006) reported that price elasticity in India is elastic and significant meanwhile in China is not significant. Niemi (2004) also reported an inelastic own price elasticity of -0.27 in the short-run for the demand in Europe.

The effect of substitute price has greater effect on the import demand compare to palm oil price itself. Shariff et.al (2006) also reported an elastic cross elasticity of Malaysia's palm oil demand in China and India. Interestingly, the soybean price has negative sign which indicate that palm oil and soybean oil are complementing product rather than substitute. This is because both products are competing in the European market with rapeseed oil which is the dominant vegetable oil in the region.

All the error correction terms are negative and significant supporting the previous result of the cointegration test. For Netherlands, it proved that the equation is cointegrated. The coefficient of the error correction term indicates how fast the country fine-tunes back to its long-run equilibrium. From the coefficient, it inferred that Netherlands has the fastest fine-tune back to its long-run equilibrium meanwhile China is the slowest.

Table 6.6 Short-run Estimates of the ARDL Model.

Variables	Coefficients		
	China	**India**	**Netherlands**
Constant	-4.029 (-1.798)*	17.616 (1.802)*	-8.780 (-2.599)***
dWP	-1.317 (-2.443)**		-0.805 (-2.414)**
dP		-1.486 (-2.086)**	
dWPSOY	2.192 (3.225)***	1.169 (1.315)	-0.520 (-1.091)
dWPRAP			1.983 (3.395)***
dWPSUN			0.044 (0.149)
dGDPPC	0.273 (0. 514)	-0.912 (-0.663)	
dGDP			1.325 (3.374)***
dD2002	0.067 (0.179)		
dD1995		1.934 (3.168)***	
dD1993			0.205 (1.235)
EC(-1)	-0.413 (-3.209)***	-0.501 (-4.095)***	-0.739 (-5.084)***

In general, palm oil performance has satisfied the consumer in these three countries indicated by the existence of habit persistence. In addition, palm oil price is an important factor in determining palm oil import in these three countries although different type of own price is applied. In China and Netherlands, palm oil import is affected by the world palm oil price meanwhile in India by the palm oil import price. The other important factor is the palm oil substitute which is soybean oil in China and rapeseed oil in Netherlands. The effect of the substitute price is greater than its own price. This variable explains the increase in palm oil import in these two countries since compare to palm oil price, the increase in

soybean oil and rapeseed price is higher (Figure 6.9). Meanwhile income factor only affects palm oil import in Netherlands and trade policy in India.

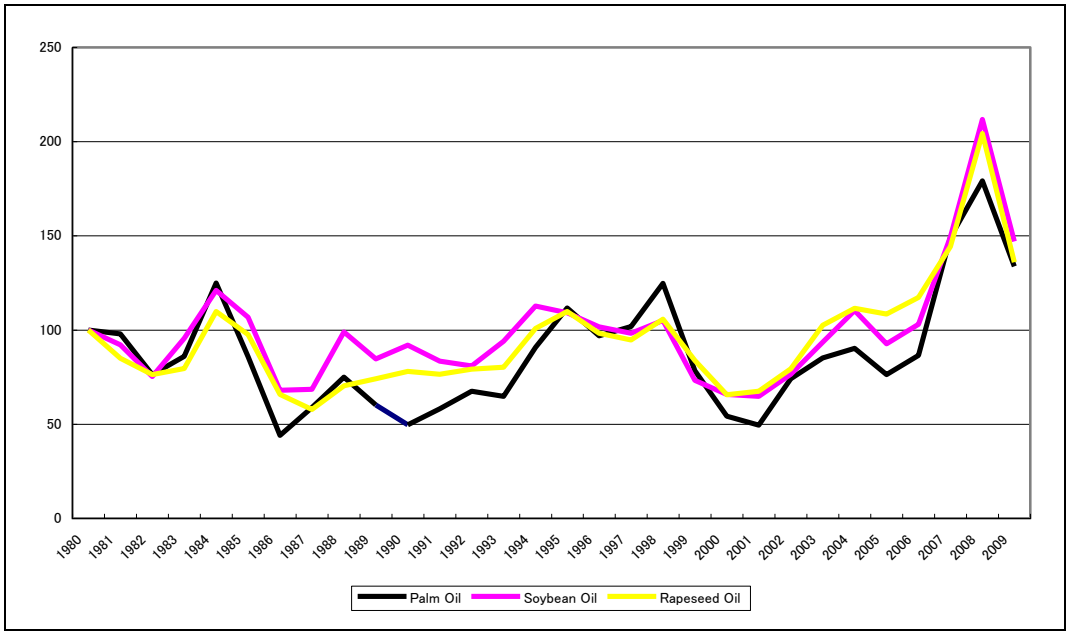

Figure 6.9. Price Index of CPO, Soybean Oil and Rapeseed Oil (1980=100)
Source: IMF (2010)

Next, is the second step of the analysis. Before constructing the model, unit root using Augmented Dickey Fuller (ADF) test and cointegration test using Engle Granger approach is conducted for all countries (Table 6.7, 6.8, 6.9 and 6.10). The results of the unit root indicate that the majority of the variables are stationer in the first difference form.

Table 6.7. Augmented Dickey Fuller (ADF) test for China's AIDS variables

Variables	Level		First Difference	
	ADF	p-value	ADF	p-value
Share Indonesia (Wi)	-2.772	0.221	-4.461	0.012
Share Malaysia (Wm)	-3.508	0.066	-3.385	0.083
Price Indonesia (Pi)	-3.254	0.112	-4.362	0.013
Price Malaysia (Pm)	-4.406	0.017	-4.016	0.027
Price ROW (Pr)	-2.587	0.290	-3.088	0.136
Expenditure (Mp_cor)	0.736	0.955	-3.598	0.056

Table 6.8. Augmented Dickey Fuller (ADF) test for India's AIDS variables

Variables	Level		First Difference	
	ADF	p-value	ADF	p-value
Share Indonesia (Wi)	-2.344	0.400	-6.612	0.000
Share Malaysia (Wm)	-1.798	0.675	-2.044	0.550
Price Indonesia (Pi)	-3.195	0.103	-5.646	0.000
Price Malaysia (Pm)	-2.858	0.190	-5.997	0.000
Price ROW (Pr)	-3.933	0.022	-3.601	0.052
Expenditure (Mp_cor)	-2.621	0.274	-5.799	0.000

Table 6.9. Augmented Dickey Fuller (ADF) test for Netherlands' AIDS variables

Variables	Level		First Difference	
	ADF	p-value	ADF	p-value
Share Indonesia (Wi)	-3.395	0.070	-8.103	0.000
Share Malaysia (Wm)	-1.374	0.848	-6.364	0.000
Price Indonesia (Pi)	-3.352	0.076	-6.948	0.000
Price Malaysia (Pm)	-3.848	0.027	-7.087	0.000
Price ROW (Pr)	-1.915	0.620	-5.793	0.000
Expenditure (Mp_cor)	-3.974	0.020	-5.376	0.001

For the cointegration on AIDS model, Karagiannis (2000) and Nzuma and Sarjer (2010) stated that cointegration of the system equation exists when at least one share equation is cointegrated. The test indicates that at least one share

equation is cointegrated in the three countries AIDS model (Table 6.8) therefore it can be concluded that the model is cointegrated and can be continued in calculating the AIDS model using the error correction terms. In addition, the existence of cointegration between variables can also be detected from the error correction coefficient significance.

Table 6.10. Engel-Granger Cointegration Test on AIDS Variables

Countries and Equations	Constant		Constant and Trend		None	
	ADF	p-value	ADF	p-value	ADF	p-value
China						
Indonesia	-4.186	0.009	0.430	0.998	-2.919	0.007
Malaysia	-2.350	0.167	-1.762	0.678	-2.410	0.019
India						
Indonesia	-0.558	0.866	-2.557	0.301	-0.711	0.401
Malaysia	0.065	0.957	-5.838	0.000	-2.906	0.005
Netherlands						
Indonesia	-4.067	0.003	-4.063	0.014	-4.115	0.000
Malaysia	-2.854	0.061	-3.397	0.068	-2.892	0.005

From the AIDS equations, only Indonesia's equation is cointegrated which is indicated by the significant at 5% level of the error correction coefficient (Table 6.11). Compensated, uncompensated and expenditure elasticities for China is estimated using the coefficient in the AIDS equation (Table 6.11). The results indicate that Indonesia's palm oil is close to a unitary elastic on both compensated and uncompensated elasticities. Meanwhile, Malaysia's palm oil is non-sensitive to price change compare to Indonesia's product. In addition, in China's market Indonesia and Malaysia's palm oil complement each other rather competing. This can be explained by the fact that China's market is still expanding in the future. The increase in palm oil import will benefit more Indonesia compare than Malaysia since Indonesia's expenditure elasticity is higher. Comparing the price

between the countries, it proves that Indonesia increased it market shares in recent years due to lower import price and Indonesia's palm oil elasticity is more elastic compare to Malaysia although Malaysia's market share is still higher (Figure 6.10).

Table 6.11. China's AIDS Result

Variables	**Indonesia**	**Malaysia**	**ROW**
ΔS_{t-1}			
P_{ind}	0.0004 (0.008)	-0.152 (-2.482)**	0.151 (1.441)
P_{mal}	-0.152 (-2.482)**	0.271 (2.493)**	-0.119 (-0.759)
P_{row}	0.151 (3.652)***	-0.119 (-1.492)	-0.032 (-0.310)
Exp	0.044 (1.487)	0.040 (0.903)	-0.084 (-1.256)
EC_{t-1}	-0.303 (-2.498)**	-0.136 (-1.015)	
R^2	0.0448	0.2428	
χ^2	37.49	13.24	

Note: ***, **, * significance at 1%, 5% and 10% respectively

Table 6.12. China's Elasticities Result

Elasticities	**P_{ind}**	**P_{mal}**	**P_{row}**
Price			
Compensated			
P_{ind}	-0.997 (-3.285)***	-0.225 (-0.626)	1.053 (4.297)***
P_{mal}	-0.057 (-0.622)	-0.326 (-2.013)**	-0.019 (-0.163)
P_{row}	1.127 (1.695)	-0.083 (-0.083)	-1.235 (-1.887)*
Uncompensated			
P_{ind}	-1.042 (-3.477)***	-1.074 (-2.666)***	0.854 (3.475)***
P_{mal}	-0.236 (-2.585)***	-0.637 (-3.925)***	-0.187 (-1.572)
P_{row}	1.048	-0.396	-1.118
Expenditure	1.261 (7.176)***	1.060 (16.009)***	0.466 (1.096)

Note: ***, **, * significance at 1%, 5% and 10% respectively

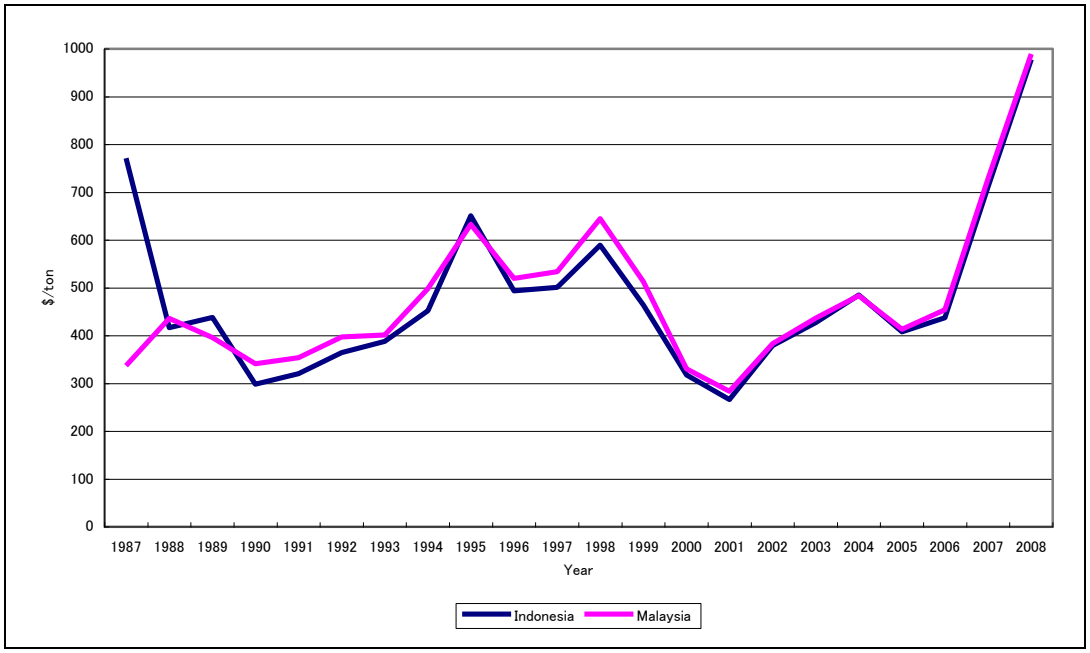

Figure 6.10. Indonesia and Malaysia's Palm Oil Price in China, 1987-2008
Source: UN Comtrade (2010)

The error correction coefficient on both share equations are significant at 1% level which indicates that the variables are cointegrated (Table 6.13). Similar to China, own price elasticity of Indonesia's palm oil in India is close to one. Meanwhile Malaysia's product is less elastic than Indonesia. These higher elasticity and lower import price (Figure 6.11) causing Indonesia's market in India to expand over the years compare to Malaysia. For the expenditure elasticity, Indonesia and Malaysia's elasticity is relatively the same. The relation between these two countries product in India can not be determined since the cross price elasticity are both insignificant.

Table 6.13. India's AIDS Result

Variables	Indonesia	Malaysia	ROW
ΔS_{t-1}			
P_{ind}	-0.005 (-0.037)	-0.047 (-0.373)	0.051 (0.203)
P_{mal}	-0.047 (-0.373)	0.147 (1.118)	-0.100 (-0.397)
P_{row}	0.051 (1.113)	-0.100 (-2.213)**	0.049 (0.567)
Exp	-0.006 (-0.231)	0.041 (1.508)	-0.035 (-0.656)
EC_{t-1}	-0.306 (-3.962)***	-0.299 (-4.188)***	
R^2	0.099	0.245	
χ^2	17.71	27.12	

Note: ***, **, * significance at 1%, 5% and 10% respectively

Table 6.14. India's Elasticities Result

Elasticities	P_{ind}	P_{mal}	P_{row}
Price			
Compensated			
P_{ind}	-1.022 (-2.210)**	0.491 (1.130)	0.238 (1.482)
P_{mal}	0.216 (1.130)	-0.628 (-3.125)***	-0.094 (-1.356)
P_{row}	1.154 (0.270)	-1.035 (-0.243)	-0.130 (-0.090)
Uncompensated			
P_{ind}	-1.011 (-2.154)**	-0.148 (-0.344)	0.180 (1.120)
P_{mal}	-0.089 (-0.464)	-0.816 (-3.914)***	-0.157 (-2.265)**
P_{row}	1.035	-1.307	-0.144
Expenditure	0.978 (10.454)***	1.063 (25.626)***	0.417 (0.468)

Note: ***, **, * significance at 1%, 5% and 10% respectively

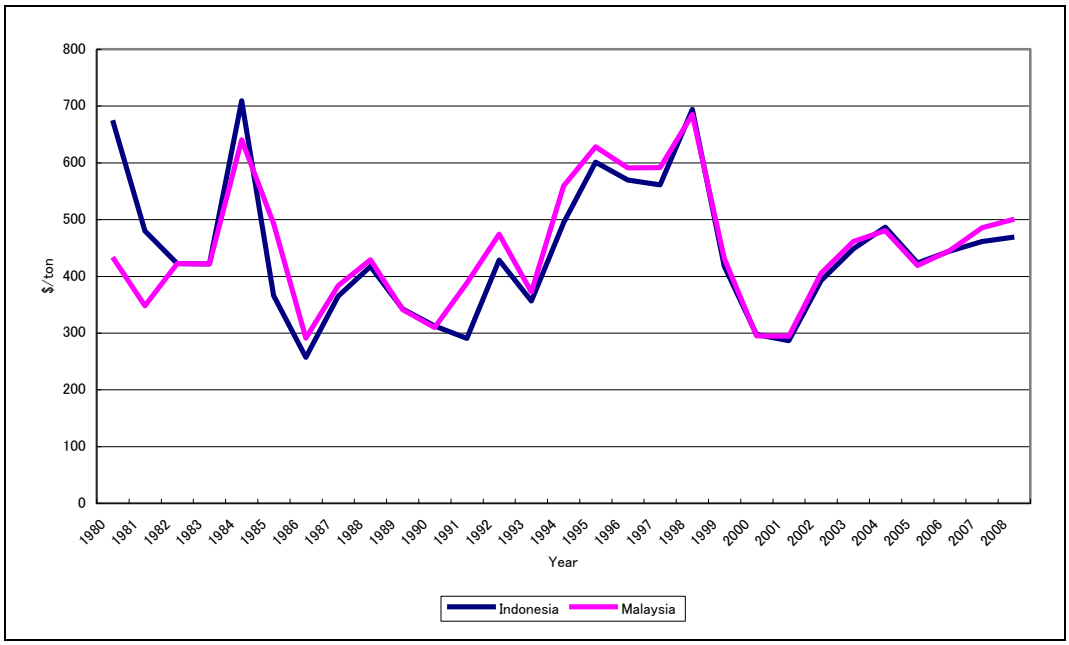

Figure 6.11. Indonesia and Malaysia's Palm Oil Price in India, 1980-2008
Source: UN Comtrade (2010)

For the Netherlands equation, the error correction coefficient on both share equations are significant at 1% level which indicates that the variables are cointegrated (Table 6.15). Regarding the elasticity, Malaysia's palm oil is very sensitive to price change compare to the other two countries meanwhile Indonesia's own price elasticity is insignificant. This can be explained that there are other factors affecting palm oil import demand from Indonesia such as the environmental issue. Meanwhile in this country, Indonesia and Malaysia's palm oil is competing with each other shown by the positive sign of cross price elasticity. Since 1998, Malaysia has the highest market share in this country although Netherlands mainly imported in the form of CPO which is Indonesia's main export product. When Indonesia's CPO was boycotted, Malaysia' replaced Indonesia's product. In addition, Malaysia' palm oil offered lower price (Figure 6.13) and combined with an elastic price elasticity cause Malaysia's palm oil

export increase to this country in recent years.

Table 6.15. Netherlands' AIDS Result

Variables	Indonesia	Malaysia	ROW
ΔS_{t-1}	0.055 (0.393)	-0.152 (-1.178)	0.097 (0.079)
P_{ind}	-0.017 (-0.062)	0.276 (1.124)	-0.259 (-0.500)
P_{mal}	0.276 (1.124)	-0.435 (-1.867)*	0.159 (0.337)
P_{row}	-0.259 (-3.127)***	(0.159) (2.231)**	0.099 (0.693)
Exp	0.046 (0.796)	0.014 (0.271)	-0.060 (-0.586)
EC_{t-1}	-0.658 (-4.274)***	-0.442 (-3.826)***	
R^2	0.321	0.340	
χ^2	41.57	35.96	

Note: ***, **, * significance at 1%, 5% and 10% respectively

Table 6.16. Netherlands' Elasticities Result

Elasticities	P_{ind}	P_{mal}	P_{row}
Price			
Compensated			
P_{ind}	-1.060 (-1.511)	1.097 (1.762)*	-0.847 (-0.342)
P_{mal}	1.087 (1.762)*	-2.529 (-4.317)***	0.609 (3.392)***
P_{row}	-0.847 (-0.342)	1.162 (0.512)	-0.425 (-0.618)
Uncompensated			
P_{ind}	-1.089 (-1.568)	0.653 (1.043)	-0.681 (-3.169)***
P_{mal}	0.679 (1.099)	-2.108 (-3.612)***	0.393 (2.136)**
P_{row}	-1.127	0.880	-0.463
Expenditure	1.117 (7.631)***	1.036 (7.757)***	0.711 (1.438)

Note: ***, **, * significance at 1%, 5% and 10% respectively

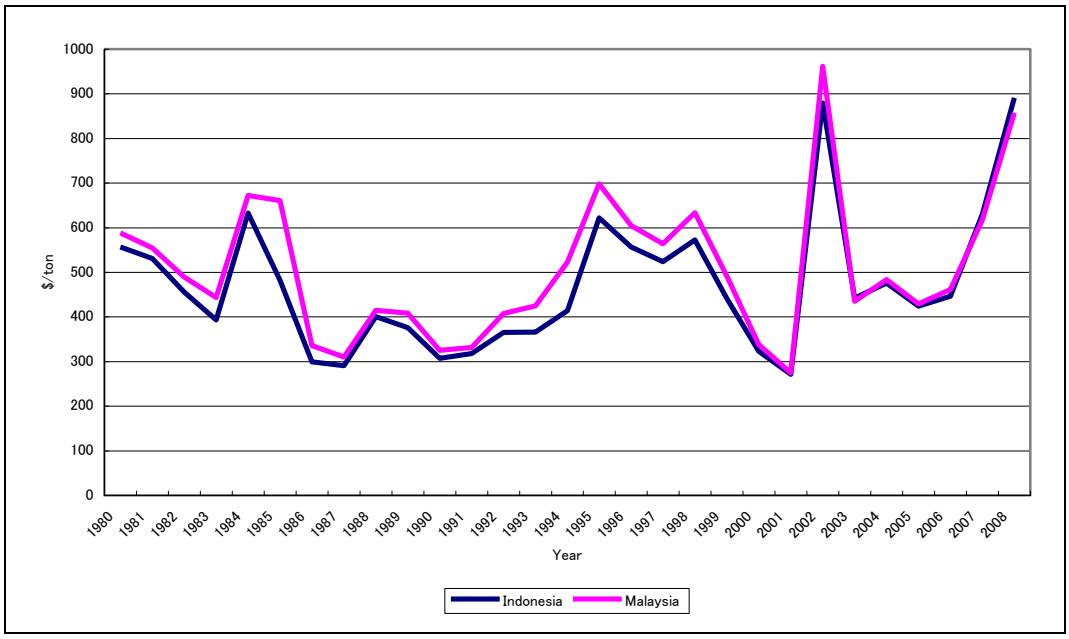

Figure 6.12. Indonesia and Malaysia's Palm Oil Price in Netherlands, 1980-2008
Source: UN Comtrade (2010)

From these analyzes, the characteristics of each palm oil market can be determined. China is the largest consumer and importer of palm oil. The country is sensitive to price change in palm oil and soybean oil. The change in world soybean oil price will have greater effect to palm oil import in the short and long-run. On the other hand, income does not have any affect on the palm oil import.

From these three countries, palm oil price has played an important factor in increasing Indonesia or Malaysia's export. In recent years, Indonesia's palm oil price is lower compare to Malaysia in China and India making palm oil import from Indonesia increase in these countries. Meanwhile in Netherlands, Malaysia's palm oil has offered lower price compare to Indonesia causing Malaysia's export to increase in this country.

In China, Indonesia and Malaysia's palm oil import is complementing

each other therefore with the prediction of increasing palm oil import in coming years both countries will benefit. In this country, with the existence of habit persistence, Indonesia can implement the expansion strategy through increasing the awareness of Chinese people in order to consume palm oil. Cooperation with Malaysia will be an advantage since both products are complementary.

India's market for palm oil is the most sensitive to price change. In addition, the relation between Indonesia and Malaysia's palm oil can not be determined since the value of cross price elasticity is insignificant and increase in palm oil import will equally benefited for Indonesia and Malaysia. For the strategy, pricing strategy will be the most effective strategy to be adapted in this country since is sensitive to price change.

Netherlands is a traditional market for palm oil and also serves as a hub for other European countries. The country is also sensitive to price change in palm oil and its substitute which is rapeseed oil. Furthermore, with the existence of habit persistence, expansion strategy is also suited for this country. The expansion is not only on this country but also to other western European countries. The other important issue is to counter negative campaign on Indonesia's palm oil.

6.6. Conclusion

Habit persistence, world palm oil and substitute price are the major determinants of palm oil import in China and Netherlands. Substitute price has the largest effect on the palm oil import in these two countries. Meanwhile in India domestic price and trade liberalization are the main determinants.

Indonesia's palm oil obtained the largest market share in India, meanwhile Malaysia in China and Netherlands. Different countries has different

market characteristic, India and China are more price sensitive meanwhile Netherlands is less sensitive to price change. In China, Indonesia and Malaysia's palm oil complement each other; on the other hand in Netherlands both products are competitor.

Different characteristics will generate different strategies for every country. For China and Netherlands, market expansion by introducing palm oil usage to new consumer will be effective meanwhile in India pricing strategy should be implemented. In Netherlands where non-market issue is important, especially for Indonesia's palm oil, countering these issues will be important in maintaining market share in this country.

VII. CONCLUSION AND POLICY RECOMMENDATION

7.1. Conclusion

Palm oil industry in Indonesia has three important role; supplying raw material for the cooking oil industry which is one of Indonesia's staple food, employing huge number of worker and as an important export product. In terms of economic contribution, palm oil processing industry has more impact on the economy in output and value added meanwhile the on farm sector has more contribution on the employment. In addition, the refined palm oil industry has more links on other sectors of the economy forward and backward.

Furthermore, the palm oil processing industry mostly affects the rural population involved in agriculture and non-agriculture as well. On the other hand, the on-farm and CPO industry only affect the agriculture population especially who were involved in the on-farm sector. Palm oil industry, on farm and processing sector, mostly benefit landowner especially in the rural area.

Over the years palm oil product export has increased significantly. Market share of Indonesia's palm oil product has increased in all areas except for CPO in the Netherlands which slightly decrease. This is caused by the increase in competitiveness of these products and increase of demand.

Comparing Indonesia and Malaysia's palm oil industry, both industries have its similarity and differences. The similarity is in the proportion of oil palm plantation, in both countries 61 percent is owned by private and government-owned companies and 39 percent belong to the smallholder farmers. Meanwhile the difference is mainly in the policy objective. Malaysia's government policy on palm oil industry is developing the industry into an export

oriented commodity meanwhile Indonesia's policy is mainly making the palm oil industry as an import substitute commodity.

Regarding the determinants of Indonesia's CPO export competitiveness, lag price, exchange rate, export tax and refined palm oil export affected Indonesia's CPO export competitiveness. In terms of magnitude, exchange rate has the most affect on Indonesia's CPO export competitiveness.

Over the years, Indonesia has gained competitiveness in China and India mainly through lower price compare to its competitor, Malaysia. In India, Indonesia has the largest market share meanwhile Malaysia dominates in China and Netherlands. These three largest consumers of palm oil has different characteristics, India is more price sensitive compare to the other two countries. Meanwhile in Netherlands, environmental issue is one of the important issue which affects demand of palm oil from Indonesia.

From this research it can be concluded that the development of palm oil industry, which include the on-farm, CPO and refined palm oil industry, will have a huge effect on the Indonesian economy. Since almost 70 percent of the palm oil product is exported, increasing palm oil export competitiveness will be an important factor in the development of Indonesia's palm oil industry.

7.2. Policy Recommendation

In developing the palm oil industry, there are two approaches that can be taken; domestic and foreign. The domestic approach includes domestic policy which will have affects the domestic palm oil industry. Meanwhile the foreign approach includes policy to increase Indonesia's export competitiveness.

On the domestic policy, there are four main objectives to focus on. First,

to implement policy that can attract business people to invest in the refined palm oil industry which has more value added rather than only investing in on-farm or until crushing FFB into CPO. The policy must give incentive to investor who would be interested in investing refined palm oil industry, the incentive can be in the form of tax incentives or other supports. The current policy does not support the refined palm oil industry. For example in the trade policy, the refined palm oil products are taxed when exported. According to the calculation made by INDEF (2007), the value added to produce CPO after considering the investment is US$ 458 per ton meanwhile for refined palm oil only generates value added of US$ 30-50 per ton. Therefore is more realistic to invest only in producing CPO rather than investing in the downstream industry. Although recently there are several companies investing in the downstream industry of palm oil, but most of them are companies that already invest in the upstream industry such as plantation or CPO crushing factories (INDEF, 2007). These companies intend to integrate their business from plantation until producing refined palm oil.

Secondly, the policies imposed must be toward more participation of farmers in the on-farm activities of oil palm plantation as landowner not as labor. Based on this research, the largest beneficiary of the palm oil industry is the landowner in rural areas. The government has issued the Ministry of Agriculture regulation No 26/Permentan/OT.140/2/2007 regarding the requirements to have partnership with local farmers when a certain company open an oil palm plantation. If the regulation is followed strictly, hopefully many more farmers will benefit from the palm oil industry. In addition, in organizing the partnership between companies and farmer, farmers' participation must be guaranteed in all the activities. Several partnerships between farmers and companies have proved to

be sustained because the farmers are involved in all the decisions made and all the activities in the oil palm plantation (Jelsma et.al, 2009).

Thirdly, the government must have a clear road map on the palm oil industry. The road map must involve all the stakeholders of the palm oil industry. Currently each ministry has their own strategy and target but no coordination between them. For example, the Ministry of Agriculture has their own strategy and target on the on-farm part of the palm oil industry. But without the coordination with other sectors, these targets will not be achieved. In the future forming an institution that handle all the palm oil industry matters should be considered such as the Malaysian Palm Oil Board (MPOB) in Malaysia.

Lastly, the government should promote specialization and further cooperation among the oil palm producers. Smallholders can specialized in the on farm activities of producing FFB cooperating with the government-owned and private companies through partnership scheme. The smallholders must be supplied by a quality service extension and management capacity in order to produce high quality FFB. Meanwhile, government-owned and private companies will specialized in producing CPO and especially refined palm oil which has higher value added. By concentrating in the upstream industries, these two producers can concentrate on producing high value added product and developing new refined palm oil product for domestic and international market.

Concerning the policy for increasing export competitiveness, there are four activities that can be implemented. First, Indonesia's palm oil must increase its promotion activities in the international market. The promotion can be carried out on the countries which has already been consumer such as India, China and others or countries where Indonesia's market share are still low such as Japan and

South Korea or even in countries that are potential consumer in the future such as United States. The promotion is not just only in the form of participation in expo or single events but a continuous promotion to promote Indonesia's palm oil. Currently, the tremendous expansion in Indonesia's palm oil is mainly responsible of the private sector to sell their product internationally. These promotion activities must correspond with each countries market characteristics. For example India, this country is sensitive to price therefore giving price discount will be one of the strategy to attract new customers in this country.

Second, Indonesian government and private sectors must coordinate its action in order to increase Indonesia's palm oil export. The government has resources in foreign countries in the form diplomats and the private sectors have their own agent in foreign countries. With the cooperation between these two stakeholders, hopefully foreign buyers can obtain information easily through Indonesian embassy or trade agent. The cooperation is not just in the form of promoting palm oil but also regarding information for foreign investors if they intend to invest in the palm oil industry in Indonesia.

Third, Indonesia and Malaysia are the major producer and exporter of palm oil. These two countries produce 84 percent of the world's production and 92 percent of the total world palm oil export. But ironically these two countries have less power in the market, therefore, Indonesia and Malaysia must cooperate with each other. The cooperation can be in three forms:

- Promotion, Indonesia and Malaysia's palm oil are complementing each other in some countries such as China and in the world (Rifin, 2010). Consequently, by cooperating in promoting palm oil, both countries will benefit from the increase in world palm oil demand.

- Price stabilization scheme, palm oil price is relatively volatile. During the period of 2000-2005, palm oil price is relatively low. This low price will hurt the producer in both countries especially smallholder farmers. On the other hand, high price will also hurt consumer including domestic consumer. Therefore, by cooperating with each other in price stabilization it will avoid extreme low and high price.
- Investment, Malaysia has a developed refined palm oil industry meanwhile Indonesia has an abundant resources to produce CPO which Malaysia needed to produce refined palm oil. Investment cooperation can be achieved with harmonization of the two countries policy on palm oil industry. Both countries can produce different kind of refined palm oil product or concentrate on certain products in order not to compete in the international market.

Lastly, Indonesia's palm oil industry stake holder must identify each countries demand for palm oil product especially on what kind of palm oil the countries demanded. This information will be important for the existing palm oil producer to market their products and also for future palm oil producers to analyze which palm oil products are prospective to produce.

The domestic and foreign approach policies must be implemented simultaneously since both sectors are linked. In order to develop domestic palm oil industry, demand from international market is essential. Increasing export competitiveness will not be achieved without the well established domestic palm oil industry. Hopefully in the future, the Indonesian people especially the rural population will benefit more with the developed palm oil industry

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Appendix 3.1 Output Contribution of Agriculture Sectors (Million Rupiah)

Agriculture Sectors	2000		2005	
	Value	Share (%)	Value	Share (%)
Paddy	56,850,086	20.71	84,644,361	17.54
Corn	10,700,060	3.90	25,556,700	5.29
Cassava	4,880,493	1.78	9,960,470	2.06
Sweet Potatoes	936,991	0.34	1,807,323	0.37
Other root crops	8,865,025	3.23	9,723,642	2.01
Groundnut	3,553,623	1.29	5,512,335	1.14
Soybean	2,397,887	0.87	3,267,110	0.68
Other beans	1,083,988	0.39	1,423,239	0.29
Vegetables	13,943,195	5.08	27,938,954	5.79
Fruits	22,787,767	8.30	55,246,861	11.45
Cereals and Other Food Crops	114,429	0.04	1,328,208	0.28
Rubber	11,972,081	4.36	23,594,183	4.89
Sugarcane	5,190,566	1.89	6,635,839	1.37
Coconut	6,911,272	2.52	9,611,136	1.99
Oil Palm	5,298,764	1.93	19,669,950	4.07
Fiber Crops	315,238	0.11	329,192	0.07
Tobacco	970,166	0.35	2,097,276	0.43
Coffee	1,943,888	0.71	9,517,466	1.97
Tea	600,524	0.22	771,999	0.16
Clove	1,553,382	0.57	2,339,046	0.48
Cacao	2,040,206	0.74	5,327,648	1.10
Cashew Fruit	2,171,333	0.79	2,826,032	0.59
Other Estate Crops	2,955,833	1.08	3,990,536	0.83
Other Agriculture Crops	1,031,629	0.38	1,415,324	0.29
Livestock & Its Product Exc Milk	9,722,313	3.54	19,749,311	4.09
Fresh Milk	891,160	0.32	1,197,545	0.25
Poultry and Its Product	35,732,657	13.02	46,913,794	9.72
Other Livestock Raising	200,224	0.07	447,395	0.09
Wood	17,340,028	6.32	21,805,402	4.52
Other Forest Product	2,698,944	0.98	5,294,529	1.10
Sea Fish and Other Sea Product	22,138,438	8.06	40,277,086	8.34
Inland Water Fish and Its Product	5,648,732	2.06	11,917,373	2.47
Shrimp	11,093,820	4.04	20,566,701	4.26
TOTAL	274,534,741	100.00	482,703,965	100.00

Source: Statistics Indonesia 2002 and 2007

Appendix 3.2 Value Added Contribution of Agriculture Sectors (Million Rupiah)

Agriculture Sectors	2000		2005	
	Value	Share (%)	Value	Share (%)
Paddy	47,507,932	22.42	62,234,364	16.86
Corn	9,117,832	4.30	19,481,366	5.28
Cassava	4,589,458	2.17	8,486,855	2.30
Sweet Potatoes	880,524	0.42	1,690,220	0.46
Other root crops	8,327,938	3.93	8,449,590	2.29
Groundnut	3,019,549	1.42	4,565,675	1.24
Soybean	2,015,788	0.95	2,512,914	0.68
Other beans	876,865	0.41	1,144,471	0.31
Vegetables	12,535,859	5.92	23,348,531	6.33
Fruits	21,127,222	9.97	49,144,708	13.31
Cereals and Other Food Crops	93,251	0.04	1,111,384	0.30
Rubber	8,517,383	4.02	16,418,734	4.45
Sugarcane	3,917,901	1.85	4,751,124	1.29
Coconut	5,685,907	2.68	7,686,953	2.08
Oil Palm	3,554,780	1.68	12,436,259	3.37
Fiber Crops	288,560	0.14	292,011	0.08
Tobacco	517,497	0.24	1,043,243	0.28
Coffee	1,313,998	0.62	6,047,505	1.64
Tea	516,090	0.24	626,594	0.17
Clove	1,321,616	0.62	1,920,291	0.52
Cacao	1,693,268	0.80	4,243,910	1.15
Cashew Fruit	1,951,441	0.92	2,460,010	0.67
Other Estate Crops	1,827,087	0.86	2,349,537	0.64
Other Agriculture Crops	614,898	0.29	940,531	0.25
Livestock & Its Product Exc Milk	6,945,905	3.28	15,250,802	4.13
Fresh Milk	517,240	0.24	741,530	0.20
Poultry and Its Product	16,773,785	7.92	27,324,572	7.40
Other Livestock Raising	158,591	0.07	361,317	0.10
Wood	13,700,655	6.47	18,080,356	4.90
Other Forest Product	2,282,652	1.08	4,464,841	1.21
Sea Fish and Other Sea Product	17,533,006	8.27	34,793,333	9.43
Inland Water Fish & Its Product	4,724,685	2.23	9,652,019	2.62
Shrimp	7,455,067	3.52	15,039,192	4.07
TOTAL	211,904,229	100.00	369,094,743	100.00

Source: Statistics Indonesia 2002 and 2007

Appendix 3.3. Direct and Total Backward Linkage

Sectors	Direct Backward Linkage		Total Backward Linkage	
	Value	Index	Value	Index
Food crops	0.1751	0.4241	1.2519	0.7605
Oil Palm	**0.3270**	**0.7919**	**1.5115**	**0.9181**
Other Estate Crops	0.2791	0.6758	1.4325	0.8702
Livestock, Forestry and Fishery	0.2317	0.5612	1.4095	0.8562
Agricultural Service	0.2017	0.4885	1.3055	0.7930
Oil, Gas and Mining	0.1450	0.3512	1.2041	0.7314
Food Processing	0.5978	1.4479	1.9021	1.1554
Animal and Vegetable Oil Processing	**0.6388**	**1.5470**	**2.1644**	**1.3147**
Animal Feed	0.6453	1.5627	1.9784	1.2017
Textile,Textile Industry, Footware	0.5091	1.2329	1.9095	1.1599
Wood, Rattan and Bamboo Product	0.5148	1.2468	1.8409	1.1182
Pulp and paper	0.4903	1.1873	1.8385	1.1168
Basic Chemical, Fertilizer and Pesticides	0.4496	1.0889	1.5650	0.9506
Other Chemicals	0.3919	0.9491	1.5564	0.9454
Medicine	0.4552	1.1024	1.7248	1.0477
Soap and Cosmetics	0.3951	0.9569	1.6522	1.0036
Petrochemical Product	0.2123	0.5142	1.2604	0.7656
Rubber and Plastic Product	0.5120	1.2399	1.7882	1.0862
Ceramic and Glass Product	0.3800	0.9204	1.5670	0.9518
Cement and Non Metal Product	0.4882	1.1824	1.7026	1.0342
Basic Metal and Metal Product	0.5075	1.2290	1.7586	1.0682
Electric Equipments and Machinery	0.3864	0.9358	1.6352	0.9933
Vehicles	0.3594	0.8704	1.5803	0.9599
Other Industries	0.4695	1.1370	1.7854	1.0845
Electric, Gas and Clean Water	0.6155	1.4907	1.9098	1.1601
Buildings	0.5346	1.2947	1.8731	1.1378
Agriculture Infrastructure	0.5470	1.3247	1.8323	1.1130
Infrastructure	0.4911	1.1893	1.7498	1.0629
Trade, Restaurant and Hotel	0.3761	0.9109	1.6164	0.9818
Transportation	0.4704	1.1391	1.7118	1.0398
Communication	0.1799	0.4358	1.2743	0.7741
Financial Sector	0.3051	0.7388	1.4646	0.8897
Other Services	0.3437	0.8324	1.5698	0.9536

Appendix 3.4. Direct and Total Forward Linkage

Sectors	Direct Forward Linkage		Total Forward Linkage	
	Value	Index	Value	Index
Food crops	0.6324	1.5314	1.9725	1.1981
Oil Palm	**0.3000**	**0.7264**	**1.4180**	**0.8613**
Other Estate Crops	0.3897	0.9437	1.5525	0.9431
Livestock, Forestry and Fishery	0.3871	0.9376	1.5973	0.9703
Agricultural Service	0.0553	0.1339	1.0963	0.6660
Oil, Gas and Mining	1.6467	3.9880	3.7403	2.2720
Food Processing	0.3858	0.9344	1.7088	1.0380
Animal and Vegetable Oil Processing	**0.3689**	**0.8935**	**1.5473**	**0.9399**
Animal Feed	0.1705	0.4130	1.2577	0.7640
Textile,Textile Industry, Footware	0.3346	0.8104	1.5119	0.9184
Wood, Rattan and Bamboo Product	0.2511	0.6080	1.3207	0.8022
Pulp and paper	0.3736	0.9048	1.6376	0.9947
Basic Chemical, Fertilizer and Pesticides	0.3650	0.8841	1.5767	0.9577
Other Chemicals	0.2897	0.7015	1.4070	0.8546
Medicine	0.0860	0.2083	1.1139	0.6766
Soap and Cosmetics	0.0313	0.0758	1.0409	0.6323
Petrochemical Product	0.9316	2.2561	2.4549	1.4912
Rubber and Plastic Product	0.2381	0.5766	1.3659	0.8297
Ceramic and Glass Product	0.0776	0.1880	1.0906	0.6625
Cement and Non Metal Product	0.2283	0.5529	1.2598	0.7652
Basic Metal and Metal Product	0.5530	1.3392	1.7227	1.0465
Electric Equipments and Machinery	0.3935	0.9529	1.6340	0.9925
Vehicles	0.2261	0.5477	1.3466	0.8180
Other Industries	0.0261	0.0631	1.0372	0.6300
Electric, Gas and Clean Water	0.4777	1.1568	1.7625	1.0706
Buildings	0.0994	0.2408	1.1978	0.7276
Agriculture Infrastructure	0.0515	0.1247	1.0800	0.6560
Infrastructure	0.0706	0.1709	1.1392	0.6920
Trade, Restaurant and Hotel	1.5272	3.6985	3.2564	1.9781
Transportation	0.7221	1.7489	2.1419	1.3011
Communication	0.2401	0.5814	1.3833	0.8403
Financial Sector	0.7268	1.7600	2.2888	1.3903
Other Services	0.9690	2.3467	2.6655	1.6191

Appendix 3.5. Output, Income and Employment Multiplier

Sectors	Multiplier		
	Output	Income	Employment
Food crops	1.3330	0.1890	0.0789
Oil Palm	1.6903	0.3149	0.1095
Other Estate Crops	1.5348	0.3205	0.1310
Livestock, Forestry and Fishery	1.4980	0.2609	0.1068
Agricultural Service	1.3633	0.3054	0.1306
Oil, Gas and Mining	1.3119	0.1591	0.0061
Food Processing	2.0859	0.2465	0.0481
Animal and Vegetable Oil Processing	2.2682	0.3225	0.0502
Animal Feed	2.1424	0.2337	0.0431
Textile,Textile Industry, Footware	2.3599	0.3073	0.0261
Wood, Rattan and Bamboo Product	2.0972	0.2881	0.0344
Pulp and paper	2.3135	0.2995	0.0260
Basic Chemical, Fertilizer and Pesticides	2.1475	0.2860	0.0218
Other Chemicals	2.1927	0.2635	0.0243
Medicine	2.3103	0.3112	0.0369
Soap and Cosmetics	2.3591	0.3309	0.0395
Petrochemical Product	1.6836	0.2478	0.0180
Rubber and Plastic Product	2.3760	0.3087	0.0428
Ceramic and Glass Product	1.9467	0.3028	0.0225
Cement and Non Metal Product	1.9500	0.2761	0.0181
Basic Metal and Metal Product	2.2401	0.2804	0.0221
Electric Equipments and Machinery	2.3623	0.2994	0.0286
Vehicles	2.2092	0.3186	0.0271
Other Industries	2.3566	0.3282	0.0302
Electric, Gas and Clean Water	2.2624	0.2762	0.0162
Buildings	2.2985	0.3042	0.0278
Agriculture Infrastructure	2.1218	0.3612	0.0283
Infrastructure	2.1289	0.3263	0.0259
Trade, Restaurant and Hotel	1.7691	0.3023	0.0422
Transportation	2.1274	0.3565	0.0322
Communication	1.3958	0.2228	0.0193
Financial Sector	1.6079	0.2997	0.0108
Other Services	1.8358	0.4335	0.0300