ANALYSIS OF PALM OIL PRICE IN SOUTHEAST ASIA

Dwi Lestari[1)], Shanty Oktavilia[2)]**

[1, 2] Fakultas Ekonomi, Universitas Negeri Semarang, Semarang, Indonesia

Abstract

This study aimed to analyze some factors influencing fluctuations of palm oil (CPO) prices in 3 (three) countries in Southeast Asia. This study analyzes the factors that influence domestic CPO prices from the supply and demand side. International CPO prices, coconut oil prices, and CPO consumption are factors that influence domestic CPO price fluctuations from the demand side, while CPO production is a factor affecting domestic CPO price fluctuations from the supply side. This study uses a quantitative method, where the type of data used in this study is panel data taken from 3 countries, namely Indonesia, Malaysia, and Thailand from 1998-2019. The data were analyzed using multiple linear regression, where the variables used included domestic CPO prices, international CPO prices, coconut oil prices, CPO production, and CPO consumption as independent variables. This study shows that all the independent variables significantly affect the domestic CPO price variable, except for the CPO consumption variable, and all the independent variables have a positive effect on the domestic CPO price variable, except for the CPO production variable. The international CPO price variable is the most dominant in influencing domestic CPO price fluctuations.

***Keywords**: Domestic CPO prices, analysis, Southeast Asia*

1. INTRODUCTION

Palm Oil is one of the plantation crops that has a very rapid productivity compared to other plantation crops. Based on data from the Indonesian Central Statistics Board, Indonesia's palm oil production was 26,015 million tons in 2012 and became 40,567 million tons in 2018 (a rise of 55.93 percent), while rubber platations only experienced a 20.51 percent increase in productivity and coffee by 4.53 percent. The productivity of other plantation crops, such as coconut, cocoa, sugar cane, tea and tobacco, decreased during 2012-2018.

Palm oil produced in several countries especially Indonesia, was a small part of which is consumed domestically as a raw material in the manufacture of coking oil, soap, etc., and most of it was exported in the form of crude palm oil (CPO), palm oil and palm kernel (Palm Kernel Oil/PKO) (Novianti, 2019).

CPO is a leading export commodity in several countries in the world. Based on data from the Mundi Index (2019), there were 10 countries as the world's largest CPO exporting countries. For the Asian region, especially the Southeast Asia region, Indonesia, Malaysia, and Thailand were included in the 10 countries. In fact,

* Corresponding author. Email address: oktavilia@mail.unnes.ac.id

Indonesia and Malaysia were the two largest CPO exporting countries in 2019 respectively with total exports reaching 29.11 million Metric Tons (MT) and 18 million Metric Tons (MT). Thailand was in 8th position with total exports of 0.375 million MT.

The number of Indonesian CPO exports increased by 0.831 million MT (an increase of 2.94 percent) compared to the previous year which was only 28,279 million MT. Thailand's total CPO exports also increased by 0.1 million MT (an increase of 36.36 percent), while Malaysia's total exports actually decreased by 0.364 million MT (down 1.98 percent) compared to 2018.

The increase in CPO exports on the one hand is a positive international trade performance for the macro economy, because this can increase the country's foreign exchange earnings originating from exports. On the other hand, an increase in exports can lead to a shortage of domestic supply, which will result in an increase in the price of CPO itself.

Based on data from the United States Department of Agriculture (USDA) in 2019, Indonesia, Malaysia, and Thailand were the countries that produced the largest CPO in the world. Indonesia and Malaysia in total produced around 85-90% of the world's total CPO production, with CPO production in 2019 of 42,5 million Metric Tons (MT) and 19,8 million MT respectively, while Thailand ranks third as country's largest producer of CPO in the world, with production of 4 million MT in 2019.

According to Soetrisno in Hariyanto (2008), palm oil played a very important role in the economy of a country. Palm oil is the main raw material in the manufacture of cooking oil, so the amount of its supply also affects the stability of the cooking oil price. Cooking oil is included in one of the 9 (nine) basic commodities needed by the community; therefore, the price of CPO must be stable so that the price of cooking oil can be reached by all levels of society. CPO is one of the mainstay agricultural commodities for non oil exports in several coutries, so that fluctuations in the price of this commodity affect the amount of foreign exchange earnings and also the country's income. In addition, in the process of production and processing, CPO is able to create jobs that can later improve the welfare of the community. Based on this, considering the important role of CPO in the economy, the stability of commodity prices is also important.

Table 1
Domestic CPO Prices in Indonesia, Malaysia and Thailand 1998-2019

Year	Domestic CPO Prices (USD/MT)		
	Indonesia	Malaysia	Thailand
1998	513.95	671.08	688.48
1999	374.06	436.00	454.10
2000	241.20	310.25	302.28

Year	Domestic CPO Prices (USD/MT)		
	Indonesia	Malaysia	Thailand
2001	243.34	285.67	247.55
2002	394.42	390.25	378.55
2003	445.22	443.25	459.58
2004	447.79	471.33	528.34
2005	375.25	422.08	444.83
2006	453.40	478.35	483.32
2007	726.41	780.25	836.67
2008	696.26	948.54	888.48
2009	718.06	682.83	741.89
2010	869.48	900.83	1,001.35
2011	979.70	1,125.42	1,248.94
2012	892.82	999.33	1,053.21
2013	693.88	856.90	786.71
2014	713.68	821.44	918.65
2015	539.24	663.39	787.93
2016	636.44	735.70	980.72
2017	656.80	750.90	913.46
2018	530.46	638.70	738.70
2019	505.51	601.61	618.02

Source: Bappebti, USDA, and Department of Internal Trade Thailand (2020)

CPO prices in Indonesia, Malaysia, and Thailand based on the Table 1 fluctuated form year to year and tended to increase. The price of Indonesian CPO

was the lowest among the three countries with a price level of 505.51 USD/MT, while the Malaysian CPO price was 601,61 USD/MT and Thailand's was 618,02 USD/MT.

The increase in domestic CPO prices in the three countries, on the one hand had a positive impact on the country's economy, where the three countries were the largest CPO producers and exporting countries in the world. The increase in CPO prices also affects the country's foreign exchange earnings, because this will have impact on increasing the value of exports in the three countries, which will later have an impact on the trade balances of each country. CPO was one of the mainstay export commodities in the three countries and had a strategic role in the economy in each of these countries. The increase in domestic CPO prices on the other hand is actually detrimental to consumers (the community), because with the increase in CPO prices, the commodity cannot be reached by all levels of society so that people cannot fulfil one of their basic needs, considering that CPO is the main ingredient in making cooking oil.

The important role of CPO in the economy of the three countries and the price fluctuations that have occurred form year to year, made this commodity interesting to study. This can not be separated from the influence of various influencing factor, such as the price of CPO in the international market, the price of substitute goods (coconut oil), CPO production and domestic consumption of CPO.

Research on the factors that affect domestic CPO prices has been carried out by previous studies, both domestically and abroad, such as research conducted by Rahman *et al.* (2013), Zainal (2013), Athikulrat *et al.* (2015), Kittichai (2015), Arshad and Mohamed (2000), and Chansuchai (2017). Rahman *et al*. (2013) said that the price of CPO was strongly influenced by supply and demand factors. On the supply side, CPO Production and palm oil stock had a significant role in influencing CPO prices, while on the demand side, CPO exports were a key factor influencing CPO price behavior. CPO production and palm oil stock variabels had a negative relationship to CPO prices, while CPO export variables, soybean oil prices, and crude oil prices had a positive relationship to CPO prices.

The result of research by Arshad dan Mohamed (2000) found that the finalstock variable of CPO had a negative relationship with CPO prices, while the consumption variable as a positive relationship with the dependent variable (CPO Price). Chansuchai (2017) found that soybean oil prices had a significant effect on CPO prices, while the amount of bio-diesel consumption exchange rates, and imports had no significant effect on CPO prices. The price of soybean oil had a significant effect on the price of CPO, because soybean oil was a substitute for CPO and was often used to replace CPO. If the price of soybean oil rises, consumers will prefer to consume CPO instead because the price is relatively cheaper.

The first difference between this study and previous studies lied in the factors that influence the price of palm oil (CPO) in Southeast Asia, with the scope of the research object covering 3 (three) countries which were the largest producers and exporters of CPO in Southesast Asea, namely Indonesia, malaysia, and Thailand. While in the previous study, conducted by Rahman et al. (2013) and Zainal (2013)

only analyzed the factors that affected CPO prices in Malaysia, in the research of Athikulrat et al. (2015) only analyzed the factor that affected CPO prices in Thailand, and Buana (2006) analyzed the factors that affected domestic cooking oil prices in Indonesia. In other words, previous studies only covered one state object, while this study covered 3 (three) countries at once. The second difference from this study with previous research is that this study used the substitution price variable of CPO, namely coconut oil, because coconut oil was the most consumed vegetable oil in the three countries after CPO. While in previous studies, such as that conducted by Rahman (2013) and Kittichai (2015), they used the soybean oil price variable as one of the variables that affected the domestic CPO price. The third difference that distinguished this research form previous research is that this study used the latest data for the last 22 years, namely from 1998-2019.

The results of this study are expected to provide theoretical benefit to enrich the study of knowledge about the factors that influence CPO Price fluctuations in Southeast Asia (especially Indonesia, Malaysia, and Thailand). The practical benefit of this research is as useful information for the government and can provide solutions for the government in determining the right steps or policies in maintainaning the stability of CPO commodity prices, so that this indirectly helps keep the economic stability in Indonesia, Malaysia and Thailand.

2. LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Price is a unit of value given to an item or commodity as counter-achievement information from the producer as the owner of the commodity. An important factor in price formation is the existence of forces between demand and supply, where demand and supply will be at market price equilibrium if the quantity demanded is equal to the quantity supplied.

Alfred Marshall (1842-1924) in his book entitled Principle of Economics published in 1980 explained that demand and supply simultaneously determined prices. According to Marshall, supply and demand together determined the price (*Price/*P) and the equilibrium quantity of an item (*Quantity/*Q).

This study also paid attention to the theory of purchasing power parity (PPP) which explained the relationship between commodity prices in domestic currency and exchange rates. This theory stated that the exchange rate will adjust over time to reflect the difference in inflation between the two countries, due to the purchasing power of consumers to buy domestic products which is considered the same as the purchasing power to buy foreign products (Madura, 2000:208).

If a commodity is traded by several countries in the international market, then when there is a change in the price of the commodity in the international market, the domestic price of the commodity will change following the changes in commodity prices in that market. If the exchange rate of the country is low, then it will definitely be affected.

The Effect of International CPOPrices on Domestic CPO Prices

The formation of domestic CPO Prices can not be separated from fluctuations in world CPO Prices. Changes (fluctuations) in international CPO prices have resulted in changes in domestic commodity prices. Rising international CPO pricess will ecourage domestic CPO producers to export their products abroad, because it is more profitable. The large number of CPO producers who export their products to foreign countries will result in a decrease in the amount of domestic CPO supply so that this will increase domestic CPO prices. Based on this, the influence between international CPO prices and domestic CPO prices is positively related, which means that the higher the international CPO price, the higher the domestic price.

H1: International CPO prices have a positive effect on domestic CPO prices.

The Effect of Coconut Oil Prices on Domestic CPO Prices

The price of coconut oil is very influential on the price of CPO, because the two products are substitutes that replace each other. The increase in the price of coconut oil will reduce the demand for coconut oil which has an impact on the increase in demand for CPO as a substitute product. This condition certainly has an impact on the increase in world and domestic CPO prices. Based on this, the effect of coconut oil prices on domestic CPO prices is positively related, which means that the higher the price of coconut oil, the higher the domestic CPO price.

H2: Coconut oil prices have a positive effect on domestic CPO prices.

The Effect of Domestic CPO Production on Domestic CPO Prices

CPO, like other commodities, the price is relatively dependent on the amount of supply of CPO, in this case is domestic production. The increasing production of CPO causes an abundant supply of goods in the market, causing prices to decline. Based on this, in general, the effect of CPO production with domestic prices is negatively related, which means that the greater the production of CPO, the lower the domestic price.

H3: Domestic CPO production has a negative effect on domestic CPO prices.

The Effect of Domestic CPO Consumption on Domestic CPO Prices

The effect of consumption of a commodity on the price of the commodity itself is 2 (two) things that influence each other. The greater the consumption of a commodity the higher the price of that commodity. The relationship between consumption variables and domestic prices is directly proportional (positive), which means that when there is an increase in consumption, then there will be an increase in the domestic price of CPO.

H4: Domestic CPO consumption has a positive effect on domestic CPO prices.

3. RESEARCH METHOD

This study used a quantitative research type, where the data obtained in the form of numbers and analyzed using econometrics. The data used in this study is

secondary data obtained from various sources. The type of secondary data used in this study is a combination of time series and cross section data which are combined into panel data.

In this study, there were 3 countries observed (cross section) for a period of 22 years (time series) from 1998 to 2019. The countries observed included Indonesia, Malaysia, and Thailand. These three countries were the largest producers and exporters of palm oil (CPO) in the world, especially in Southeast Asia.

Definition of Operational Variabel

The variable used in this study include domestic CPO prices as the dependent variable, and international CPO prices, CPO Production and CPO consumption as independent variables. The domestic CPO price was the CPO price from each country observed in this study, namely domestic CPO price in Indonesia, Malaysia and Thailand in 1998-2019 in USD/MT units. The second variable was the international CPO price, which was the average selling price of CPO in the international market, measured in USD/MT units. The third variable was the price of coconut oil, which was the average selling price of coconut oil on the international market, measured in USD/MT units. Coconut oil in this study is a substitute for palm oil (CPO). The fourth variable was CPO production which was the total amount of CPO production produced by each country within a period of 1 (one) year in tons. The last variable was domestic CPO consumption, which was the total amount of CPO production consumed by a number of downstream industries. Domestic CPO Industries that consume CPO include the food and non-food industries. These variabel are measured in tons.

Analysis Techniques

The analysis technique used in this research was descriptive analysis and panel data regression analysis. Descriptive analysis is a simple analysis of a distribution of data with presentation in the form of tabulation and graphs/pictures. Decsriptive analysis in this study is used to describe the development of data related to the variables used in this study. While panel data regression analysis is an analysis of the data that has been obtained to be processed using a regression tool to determine the effect of the relationship between the independent variables on the dependent variables used in the study. Panel data or panel pooled data is a combination of cross section data (cross objects) and time series (cross time), or in other word panel data is data that is composed of several objects and observed within a certain period of time. The analytical tools used is TSLS (Two Stage Least Square) or multiple linear regression processing using Eviews 9.0 Software.

The panel data equation model used in this study is as follows:

$$\mathbf{DOMPRICE_{it} = \alpha + \beta_1 INTPRICE_{it} + \beta_2 COPRICE_{it} + \beta_3 CPOPROD_{it} + \beta_4 CPOCONS_{it} + e_{it}} \quad \text{.....1}$$

where DOMPRICE is the price of domestic CPO, INTPRICE is the price of international CPO, COPRICE is is the price of coconut oil, CPOPROD is the

production of CPO, CPOCONS is the consumption of CPO, $\beta_1 - \beta_4$ is the estimated parameter, i is the order of countries (i=1,2,3 countries), t is the 1998-2019 series, α is the intercept, and e is the *error term*.

4. ANALYSIS AND DISCUSSION

General Description

CPO is the mainstay of export commodities in several countries in the world. Indonesia, Malaysia and Thailand were the 3 (three) largest CPO producing and exporting countries in the Southeast Asia region as well as in the world. Indonesia and Malaysia were the two main CPO producing countries that cotrol around 85 percent of the world market share (Pahan, 2008).

CPO produced by Indonesia, a small part (about 20-25%) is used for domestic consumption and the rest is exported to other countries. Indonesia's CPO exports in 2019 were 29.11 million tons and increased by 2.94% compared to previous year which was only 28,279 million tons. According to 2018 Indonesia Palm Oil Statistic, around 76.02% of Indonesia's CPO exports are destined for Asian countries, 19.96% to Europe, and the rest to other parts of the world.

Malaysia is Indonesia's main competitor in trading CPO commodities. Countries that became Malaysia's market share as Indonesia's competitors include China, India, EU, Pakistan, and Japan. However, as a CPO exporting country, Malaysia had also imported CPO from several countries for further processing. Based on data obtained from Oil World, in 2007 Malaysia imported CPO from Indonesia, Thailand (39,3 thousand tons), and papua New Guinea (6,1 thousands tons) (Hafizah, 2011).

Thailand is the largest CPO producer in the world besides Indonesia and Malaysia. Thailand is the third largest CPO producer in the world, with annual production reaching around 2 million tons or about 1.2% of global production. Based on data from the Thailand Foreign Agricultural Trade Statistics 2017, in 2016, Thailand's total CPO export value of 4,613,444 THB and in 2017 experienced a significant increase to reach 429,959 MT with an export value of 11,751,679 THB. The main destinations for Thailand's CPO exports were India and Malaysia with an export quantity of 265,688 MT (India) and 114,531 MT (Malaysia).

Domestic CPO Price Outlook

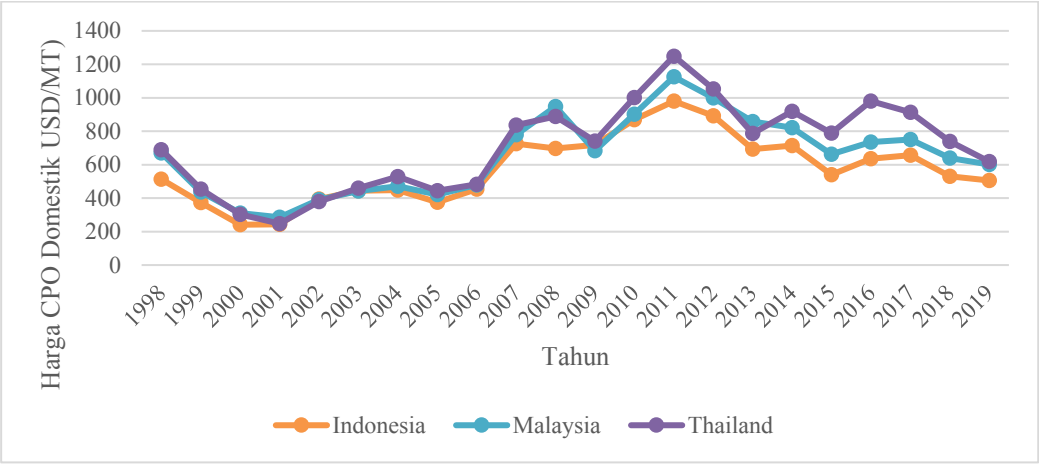

Figure 1 CPO Domestic Price in Indonesia, Malaysia, and Thailand Year 1998-2019 (in USD/MT)

Source: Bappebti, USDA, and Department of Internal Trade Thailand

Figure 1 shows that in the period 1998-2019 Indonesia's CPO price was at its lowest point, namely in 2000 at the level of 241.2 USD/MT. Meanwhile, the lowest CPO prices for Malaysia and Thailand occurred in 2001, respectively, with prices of 285.67 USD/MT for Malaysia) and 247.55 USD/MT for Thailand.

The low price of Indonesia CPO in 2000 was caused by a decrease in the quality of fresh fruit bunches (FFB) produced by smallholder plantations, which was the impact of the increase in fertilizer prices in 1999. The low price was the impact of the policy of imposing a tax on CPO exports in order to overcome crisis which occurred in 1998. At that time, the Indonesia government issued a policy in the form of stipulating an export tax of 60% to limit CPO exports due to the scarcity of CPO availability in the country, which resulted in a fairly hugh price increase and the scarcity of cooking oil in Indonesia. After the emergence of the policy of imposing an export tax, the availability of domestic CPO began to stabilize again, so that the price of domestic CPO began to fall (Agustian dan Hadi, 2008).

The economic crisis that occurred in 1998 also had an impact on the economies of Malaysia and Thailand, especially on the plantation sector which led to the price increase of CPO commodities. The CPO prices booming that occurred as a result of the crisis in 1998 prompted the two countries to issue policies to stabilize domestic CPO prices.

Domestic CPO prices always fluctuate and tend to increase from year to year. Changes in CPO prices in recent years were not only influenced by fluctuations in world CPO prices, but were also influenced by changes in world oil prices. At this time, besides being used for the food industry, CPO has begun to be used as a substitute for diesel fuel (*diesel*).

International CPO Price Outlook

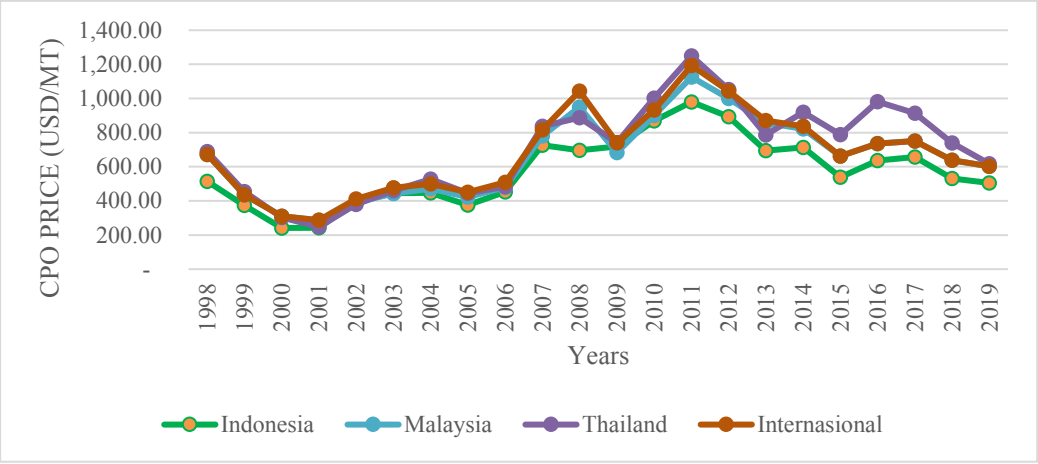

Figure 2 The World CPO Price and Domestic CPO Price Movements in Indonesia, Malaysia, and Thailand Year 1998-2019 (in USD/MT)
Source: *Worldbank*, USDA, Bappebti, and DoIT Thailand, 2020

Figure 2 shows that the International CPO Price Movements in 1998-2019 were fluctuated from year to year, and these price fluctuations were always followed by fluctuations in domestic CPO prices in Indonesia, Malaysia, dan Thailand.

International CPO prices were at their lowest point in 2001, at 287.46 USD/MT. The lower the international CPO price, the lower the domestic CPO prices in Indonesia, Malaysia, and Thailand, where in that year, CPO price in each country also reached its lowest point during 1998-2019 period.

International CPO prices were at their highest point in 2011, where the prices for that year reached 1,193.37 USD/MT. The increase in CPO prices in the world vegetable oil market resulted in an increase in soybean oil consumption, but the transition was only temporary due to the limited world soybean oil stock. International CPO prices continued to fluctuate until in 2019, which reached 601.61 USD/MT.

The fluctuations in international CPO prices have received serious attention from the government because they will affect the domestic CPO prices and domestic cooking oil prices. The high and low international CPO prices were the basic reference for the government in setting policies related to the determination of the price of palm oil (FFB) and the price of domestic cooking oil. The domestic CPO prices will continue to move following the international CPO prices. When the international CPO price increases, the domestic CPO price will usually move up in line with the increase in the international CPO price, vise versa.

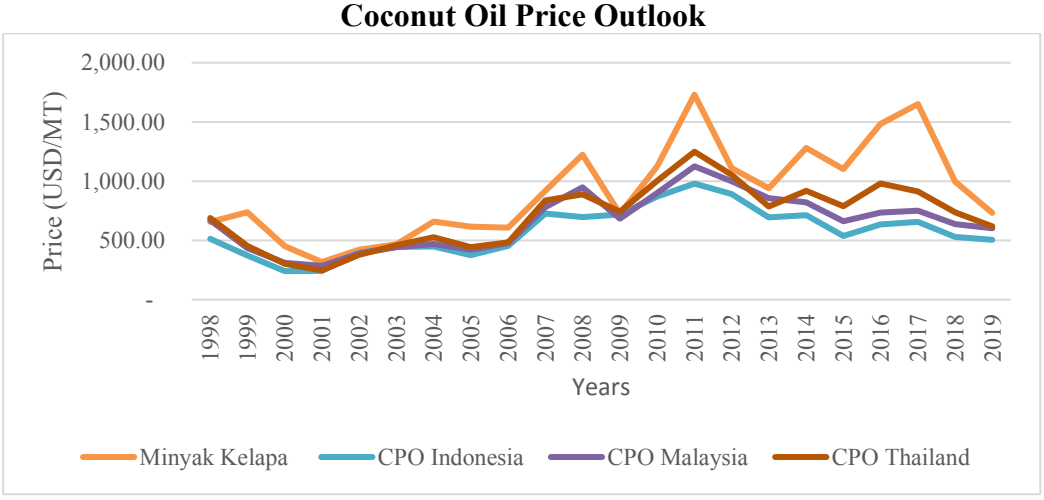

Figure 3 Coconut Oil Prices and Domestic CPO Prices Movements in Indonesia, Malaysia, and Thailand Year 1998-2019 (in USD/MT)
Source: *Worldbank*, Bappebti, USDA, and DoIT Thailand, 2019

Figure 3 shows that the price of coconut oil in the period 1998-2019 fluctuated from year to year and these fluctuations were followed by changes in domestic CPO prices in Indonesia, Malaysia, and Thailand. In 1998, the price of coconut oil was 657.92 USD/MT. In the following year, the price of coconut oil continued to decline and was at its lowest point in 2001 at 318.08 USD/MT. This condition affected the price of CPO, especially the price of domestic CPO in Indonesia, Malaysia, and Thailand, because CPO and coconut oil were substitutes for each other. During the period 1998-2001, domestic CPO prices in these three countries also decreased from year to year.

The rise and fall of coconut oil prices were in line with domestic CPO prices. When the price of coconut oil increased, the price of domestic CPO tended to move up following the price of coconut oil, and vise versa.

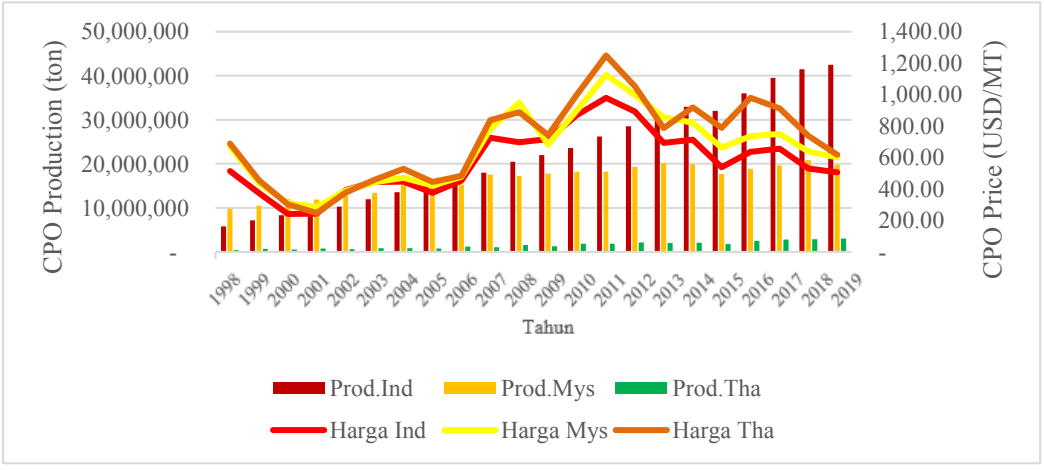

Figure 4 Total CPO Production (in tons) and CPO Prices (in USD/MT) in Indonesia, Malaysia, and Thailand Year 1998-2019
Source: Bappebti, USDA, and DoIT Thailand, 2019

Figure 4 shows that the amount of CPO production in Indonesia, Malaysia, and Thailand continued to fluctuate and tended to increase from year to year. The high and low CPO production in Indonesia, Malaysia, and Thailand had affected the fluctuations in domestic CPO prices in each of these countries.

In 1998, Indonesia's CPO production was 5.8 million tons, while Malaysia's CPO production was 9,758 million tons and Thailand was 0.4 million tons. Based on figure 4, it can be seen that in 1998, Indonesia's CPO production was the highest compared to Malaysia and Thailand. However, when viewed from the side of domestic CPO prices, domestic CPO prices in Indonesia were the lowest among the three countries. In this case, Thailand had the lowest CPO production, but it had the highest domestic CPO prices compared to Indonesia and Malaysia. Based on this, it can be concluded that the higher the CPO production of a country, the lower the domestic CPO price in that country, and vise versa.

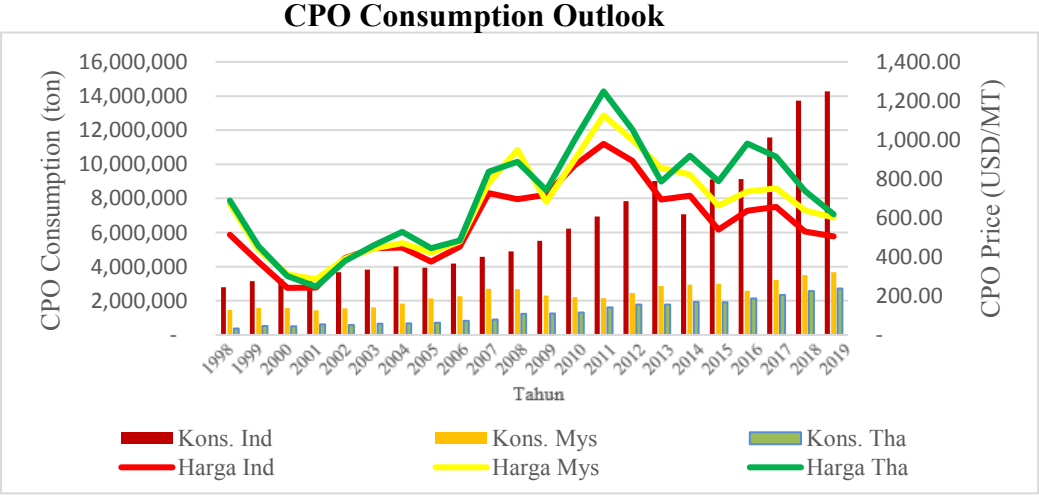

Figure 5 CPO Consumption and Domestic CPO Price in Indonesia, Malaysia, and Thailand year 1998-2019 (in tons)
Source: Index Mundi, Bappebti, USDA, and DoIT Thailand, 2019

Based on Figure 5, CPO consumption in Indonesia, Malaysia, and Thailand tends to increase from year to year in line with the increase in population. The increase in domestic CPO consumption has an impact on the high and low prices of domestic CPO in the country. Domestic CPO Prices in Indonesia, Malaysia, and Thailand as seen in Figure 5 tended to increase during 1998-2019, so it can be concluded that an increase in CPO consumption will increase domestic CPO prices

in these three countries, and vise versa.

Regression Analysis Resuts

The selected model used to estimate the relationship between international CPO prices, coconut oil prices, CPO production, and CPO consumption on domestic CPO prices is the fixed effect model (FEM). In this studi, the classical assumption test used includes autocorrelation and heteroscedasticity tests, in accordance with Gujarati dan Porter (2012), which in their book stated that if the selected model is a fixed effect or random effect model, then a classical assumption test must be carried out, including the autocorrelation and heteroscedasticity, because the occurrence of multicollinearity in panel data is very small. Based on the classical assumption test, the model used is free from auto correlation and heteroscedasticity problems. The regression estimation results from the research model used in this study can be seen in table 2:

Table 2 Fixed Effect Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.44254	21.89583	1.253323	0.2150
INTPRICE	0.797077	0.049364	16.1468	0.0000
COPRICE	0.123666	0.032034	3.860511	0.0000
CPOPROD	-0.00000774	0.00000313	-2.474718	0.0162
CPOCONS	0.0000204	0.0000103	1.984753	0.0518

where : * significant α = 5%
Source : processed data, 2020

Based on the results of the regression analysis listed in Appendix 1, we can see that the R-squared value is 94.83%, which means that the independent variables (International CPO Prices, Coconut Oil Prices, CPO production, and CPO consumption) could explain the dependent variable (Price of Domestic CPO) of 94.83% and the remaining 5.17% was explained by other variables outside the model. Based on the results of the regression estimation in table 2, it can be seen that the coefficients of all variabels showed a positive relationship, except for the CPO production variable and all variables had a significant influence on the domestic CPO price variable, except for the CPO consumption variable.

The international CPO price variable has a regression coefficient value of 0.797077which means that an increase in international CPO prices by 1% will cause an increase in domestic CPO prices by 0.797%. An increase in international CPO

prices will lead to an increase in domestic CPO prices, because a rise in CPO prices in the international market will encourage producers to sell or export CPO abroad, causing a domestic shortage. The lack of supply of CPO in the country has resulted in an increase in the price of domestic CPO. The results of this study are in line with the research conducted by Applanaidu et al. (2011) in his research on econometric analysis of the relationship between biodiesel demand and the Malaysian palm oil market, where in the study it was concluded that the international CPO prices had a positive and significant effect on domestic CPO prices.

The coconut oil price variable had a regression coefficient value of 0.123666. This means in that period, if the price of coconut oil increases by 1%, it will cause an increase in domestic CPO prices by 0.12%. In this study, coconut oil was a substitute for CPO. The increase in the price of coconut oil will cause a rise in the price of domestic CPO, because the increase in the price of coconut oil will make consumers tend to prefer to consume CPO compared to coconut oil. The increase in demand for CPO which is driven by increased consumption will automatically increase the price of CPO in the country. The results of this study were in line with the research conducted by Rahman et al. (2013), Athikulturat et al. (2015), and Zainal (2013). Rahman et al. (2013) and Athikulturat et al. (2015), in his research used coconut oil as a substitute for CPO. Both of them came to the same conclusion, that the price of substitte goods, in this case the price of coconut oil was used, had a positive and significant relationship with the domestic CPO price.

Based on the regression results, the CPO production variabel had a regression coefficient value of -0.00000774 which indicated that CPO production had a negative effect on domestic CPO prices. This shows that an increase in CPO production by 1% tended to result in a decrease in domestic CPO prices by 0.00000774%. The increase in CPO production tended to cause the domestic CPO price to decrease, because the increase in production tended to increase the number of goods on the market so that it will cause excess supply which has an impact on decreasing domestic CPO prices. The results of this study were in line with the research conducted by Rahman et al. (2013) that studied the impact of supply and demand on the behavior of palm oil prices, in that study, he concluded that the production variable had a significant role and had a negative relationship to CPO prices.

The CPO consumption variable has a regression coefficient value of 0.0000204. This showed that CPO consumption had a positive effect on Domestic CPO prices. The interpretation was that if CPO consumption increases by 1%, it tended to increase domestic CPO prices by 0.0000204%. An increase in the amount of CPO consumption tended to lead an increase in domestic prices. This was in accordance with the theory of the demand, that the excess of demand will shift the demand curve to the right so that prices will increase. The results of this study were in line with research conducted by Mohamed & Mohd. Arshad (2000) and Mohammadi et al. (2015), which concluded that CPO consumption had a positive effect on domestic CPO prices.

CONCLUSION, LIMITATION AND SUGGESTION

Based on the research hypothesis testing, it can be concluded that the international CPO price variable and the coconut oil price had a positive and significant effect on the domestic CPO price in Southeast Asia, while the CPO production variable had a negative and significant effect on the domestic CPO price in Southeast Asia. Meanwhile, the CPO consumption variable had a positive and insignificant effect on domestic CPO prices in Souteast Asia. In addition, of the four variables used, the international CPO price variable was the variable that had the most dominant effect in influencing domestic CPO price fluctuations in Southeast Asia, especially in Indonesia, Malaysia and Thailand.

This study still had limitations, since it only covered 3 (three) countries and did not include all countries in the Southeast Asian regions as research objects. In Southeast Asia there were only 4 (four) countries that were CPO producers in the Southeast Asia region, namely Indonesia, Malaysia, Thailand and Philippines. The Philippines was not included in the research object, because the available data were very limited. The data used in this study were data from 1998-2019, while the data for the Philippines was available only from 2010-2019 so it is not compatible to be included in this study.

Suggestions that can be given based on the results of this study include: (1) International price variables were the most dominant variables in influencing domestic CPO Prices, so that international CPO price fluctuations must always be considered and the government should be able to overcome by maintaining the availability of domestic CPO Stocks; (2) the government is advised to maintain that CPO products and substitute commodities (in this case coconut oil) had to go hand in hand, considering that Indonesia, Malaysia and Thailand were producers of these two commodities. In addition, the prices of the two commodities were substitutes for each other; (3) the government was advised to take policies that benefit all parties, both producers and consumers of CPO so that the balance between production and consumption was maintained; (4) the government was advised to continue to monitor fluctuations in domestic CPO prices so that prices remain stable and accessible to all levels of society; (5) Indonesia is the largest producer and exporter of CPO in the world. Therefore, Indonesia needs to strive to become a price maker or world CPO price maker. In addition, Indonesia was expected to be able to improve the quality of CPO in accordance with the standards set by CPO importing countries in the international market; (6) the government was advised to shorten the marketing or distribution chain system for palm oil from farmers to CPO producers, because the price of fresh fruit bunches (FFB) of palm oil among palm oil farmers was still quite low. In addition, the government must also establish a policy in the form of determining price for palm oil fresh fruit bunches (FFB) among farmers so that the price is not too low, and later on can improve the welfare of palm oil farmers. (7) further research should involve more varied variables, such as the use of a various models of equations to replace the variable price of substitute goods for CPO substitutes.

REFERENCES

Agustian, A., & Hadi, P. U. (2008). Analisis Dinamika Ekspor dan Keunggulan Komparatif Minyak Kelapa Sawit (CPO) di Indonesia. *Pusat Penelitian Sosial Ekonomi Pertanian Badan Penelitian dan Pengembangan Pertanian, Bogor*, *1*, 1–24.

Athikulrat, K., Rungreunganun, V., & Talabgaew, S. (2015). *Factors Affecting the Reliability of the Price of Palm Oil in Thailand*. *3*(3).

Badan Pusat Statistik Indonesia. (2020). *Statistik Kelapa Sawit Indonesia 2018*. Jakarta: Badan Pusat Statistik.

Bappebti. (2020). Harga Bursa (Forward-Futures-Spot). Retrieved February 15, 2020 from http://bappebti.go.id.

Chansuchai, P. (2017). *Factors Affecting the Palm Oil Price in Thailand*. *4*(5).

Gilarso, T. (2003). *Pengantar Ilmu Ekonomi Mikro* Edisi Revisi. Kanisius: Yogyakarta.

Gujarati, Damodar N. dan Dawn C. Porter. (2012). *Dasar–dasar Ekonometrika*. Jakarta: Salemba Empat.

Hafizah, D. (2011). Kajian Kebijakan Pemerintah Indonesia dalam Perdagangan CPO Indonesia Menggunakan Pendekatan Analisis Integrasi Pasar (Study on Indonesian Government Policy on CPO Trade Using Market Integration Approach). *Agrisep*, *10*(2), 154–170.

Mankiw, N. Gregory, dkk. (2003). *Teori Makroekonomi.* Jakarta: Erlangga.

Marshall Alfred. (1890). *Principles of Economics.*

Mohamed, Z., & Mohd. Arshad, F. (2000). Price Discovery through Crude Palm Oil. *International Management Development Association (IMDA) and Universiti Sains Malaysia*, *1994*, 1–19.

Novianti, F. (2019). Motivasi Indonesia Ekspor CPO (Crude Palm Oil) ke Tunisia Tahun 2010-2014. *JOM FISIP*, *6*.

Nur, Ermon Muh. (2012). "Konsumsi dan Inflasi Indonesia". Dalam *Jurnal Kajian Ekonomi*, Volume 1 No. 1. Hal. 55-77.

Pahan, Iyung. (2008). *Panduan Lengkap Kelapa Sawit: Manajemen Agribisnis dari Hulu Hingga Hili*r. Penebar Swadaya, Jakarta.

Rahman, A. K. A., Balu, N., Faizah, & Shariff, M. (2013). Impact of Palm Oil Supply and Demand on Palm Oil Price Behaviour. *Oil Palm Industry Economic Journal*, *13*(1), 1–13.