

Determinants of Indonesia's Crude Coconut Oil Export Demand

Djoni, Dedi Darusman, Unang Atmaja, and Aziz Fauzi
 Faculty of Agriculture Siliwangi University Tasikmalaya West Java Indonesia

Abstract

This research was intended to know the export development of Indonesia's Crude Coconut Oil (CCO) and to analyze the determinants of its demand. Descriptive and quantitative method by panel data regression model were explored to process secondary data of range year 2000 to 2011 as time series data and China, Netherland, Malaysia, Singapore as cross section data. The result demonstrated that Indonesia's CCO export volume fluctuated as well as its export price, while its market share varied in four analyzed countries. The determinants of Indonesia's CCO export demand were Indonesia's CCO export price, importing country's population and GDP real per capita, real exchange rate of IDR to currency of importing country and Philippine's CCO export price.

Introduction

Crude Coconut Oil (CCO) is processed coconut product which is the most dominant product in international trade of coconut. This can be seen in Table 1 which shows that during the 2000-2011 year period, CCO export volume reached 5,183,943 tons, followed by copra meal (3,909,511 tons) and desiccated coconut / coconut flour (619,733 tons). CCO's export volume during the year period fluctuates. The highest export volume during 2000-2005 reached in 2000 i.e. 666,171 tons. In 2006, Indonesia's exported CCO dropped to 383,808 tons, then sharply increased in 2007 to 606,627 tons. The increase cannot be sustained in subsequent years until the lowest export volume achieved in 2011 i.e. 324,244 tons. Other coconut processed product, namely coir fiber from year to year tend to decrease. Agency for Agricultural Research and Development (2007) states that the decreased was caused by the coir fiber quality which was not fulfill the export quality standard.

Table 1: Export Volumes Some Indonesia's Coconut Products Year 2000-2011 (tons)

Year	Copra	CCO	Desiccated coconut	Oilcake	Coir fiber
2000	34,579	666,171	31,373	408,431	88.95
2001	23,884	337,679	34,820	258,959	97.30
2002	40,045	352,888	48,550	301,759	208.17
2003	25,107	244,680	36,883	771,149	55.00
2004	36,139	376,166	31,186	124,279	282.10
2005	56,880	640,043	51,456	323,774	634.66
2006	38,362	383,808	62,410	171,340	213.00
2007	46,919	606,827	60,648	323,288	361.00
2008	26,109	479,805	55,431	247,021	496.00
2009	39,517	409,043	46,705	209,046	285.00
2010	38,042	362,188	47,096	231,396	42.00
2011	34,565	324,244	51,664	182,832	20.00
Total	488,449	5,183,943	619,733	3,909,511	1,417.34

Source: Central Bureau of Statistics 2012

CCO world demand is expected to increase in the future. This is because of the discovery of variety of new technologies that require CCO as part of their raw materials. One of the technologies is the use of crude coconut oil as an alternative energy source. MAPI Secretariat Team (2006) states that the use of crude coconut oil is able to substitute the use of diesel fuel to 100 per cent for the use of diesel engines in the mill scale and potentially generate up to 1 MW of electrical power. The amount of electrical power that can be distributed to approximately 100 houses with a capacity use of three lights, television and one or two other electronic equipment. Its high content of lauric acid in the coconut for the benefit of industry as well as detergents and cosmetics, according to the Directorate General of Agro and Chemical Industries (2009) will also drive the increased demand of CCO. Global trend for environmentally friendly products that can be produced by CCO derivative products are also expected to enhance the level demand of CCO.

The dynamics influences and country preferences cause the different pattern and level of export demand. In 1999 Indonesia's CCO product only imported by the Dutch and USA, in 2003, however it was imported also by the Netherlands, China and Malaysia (Agency for Agricultural Research and Development, 2007). In 2011 the main export destination of Indonesia's CCO is growing, China, Spain, India, Malaysia, Netherlands, Singapore and USA (United Nations Commodity Trade Statistics Data Base/UN Comtrade, 2013), however, international trade of Indonesia's CCO in the future will face with a variety of threats. The number of producing countries of

processed coconut products recently is increasing. The competing, exporting countries of Indonesia's CCO have started to reduce their coconut exports in the form of copra and replace it with the CCO. International market demand of good quality processed coconut products is also another threat to the domestic CCO industry. CCO products importers not only basing their purchases on the basis of price and product quality, but also on other factors that facilitate international transactions.

Research on the development of Indonesia's CCO exports and the factors that will determine the demand for Indonesia's CCO exports is very important. It is intended as an attempt to improve the performance of the Indonesia's CCO exports in the future by looking at trends in the global market.

Research Methodology

The method used in this study is the case study method. Arikunto (2010) states that a case study is an intensive, detail, depth study conducted to an institution or a specific symptom. The data used in this study is secondary data obtained from official publications institutions nationally and internationally. Such institutions are the Central Bureau of Statistics (BPS), the International Monetary Fund (IMF), United Nations Commodity Trade (UN Comtrade) and the Food and Agricultural Organization (FAO).

Analysis of the data used in this study is a descriptive analysis to determine the Indonesia's CCO export growth, and quantitative analysis to analyze the determinants of its demand. Indonesia's CCO export demand equation is estimated with panel data regression. Panel data is a form of data that is a combination of the data time series and cross section. Estimation technique used is Fixed Effect Model (FEM) due to the amount of time series data is more than the amount of cross section data as the opinion of Baltagi (1995) in Daryanto and Yundy Hafizrianda (2010). Free variables in the equation will be tested partially and simultaneously at three significant levels, namely 1 percent, 5 percent and 10 percent. Data processing is done with the help of software eViews 5.1. Estimated CCO export demand equation is as follows:

$$\ln Q_{it} = \beta_0 + \beta_1 \ln PX_{it} + \beta_2 \ln NTR_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln Pop_{it} + \beta_5 \ln PY_{it} + \beta_6 \ln PZ_{it} + e_i$$

Explanation :

- Q_{it} = Indonesia's CCO export demand volume (kg)
- PX_{it} = Indonesia's CCO export price (US\$/kg)
- NTR_{it} = Real exchange rate of IDR to currency of importing country (IDR/ currency of importing country)
- GDP_{jt} = Importing country GDP real per capita of (US\$)
- Pop_{it} = Importing country population (million people)
- PY_{it} = Indonesia's CPO export price (US\$/kg)
- PZ_{it} = The Phillipines' CCO export price (US\$/kg)

Results and Discussion

Indonesia's Crude Coconut Oil Production and Export

Indonesia's CCO production has fluctuated from year 2000-2011. Indonesia produces 778,000 tons CCO in 2000 and increased 0.25 percent in 2001 to 780,000 tons. This production rate can not be increased in the following year, but continued to decline up to 707,095 tons in 2003. In 2004, the production rate increased by 22.41 percent, but in 2005 decreased by 11.32 percent. The highest production rate is achieved in 2007 amounted to 958,400 tons. Indonesia's CCO production mostly is to meet the domestic demand. It was evidenced from the export market share of the total production of CCO which never more than 60 percent except in 2000, 2005 and 2007. The average exports proportion of total CCO production is 53 percent. The Indonesia's CCO production and exports is presented in Figure 1.

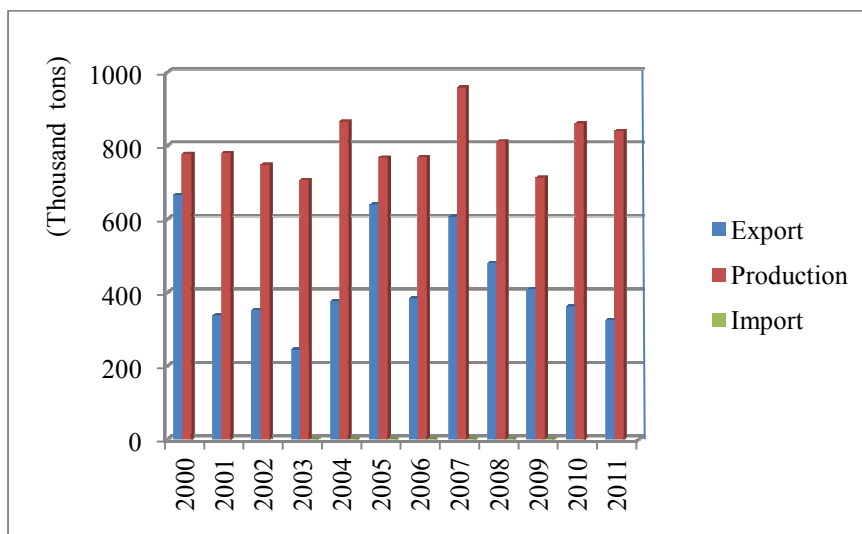


Figure 1: Indonesia's CCO Production, Export, and Import

Indonesia's CCO export volume during the period year 2000-2011 is likely to fluctuate in the range of 244.68 to 666.17 thousand tons. The lowest export volume during the period of analysis occurred in 2003 in the amount of 244.68 thousand tons, but increased during the next two years. The increase in world vegetable oil prices lead to the decreased volume of Indonesia's CCO exports of 383.80 thousand tons in 2006. The decrease in the export volume of Indonesia's CCO continues to occur from 2008 until the end of the analysis, 2011. The 32.59 per cent decrease is the impact of the U.S. financial crisis which became a global financial crisis.

The average growth in Indonesia's CCO products export volume during 2000-2011 showed a positive number of 0.81 percent, while in the four countries was 5.39 percent lower than the average growth in the volume of world exports amounting to 10.39 percent. The demand growth is contributed from various countries which import Indonesia's CCO products. The Indonesia's CCO export volume in the four countries is the highest in the Netherlands, which is 24.85 percent followed by Singapore, China and Malaysia respectively by 23.71 percent, 15.34 percent and 11.16 percent (Figure 2). CCO export volume growth rate is positive due to the increasing CCO derivative products manufactured in these countries.

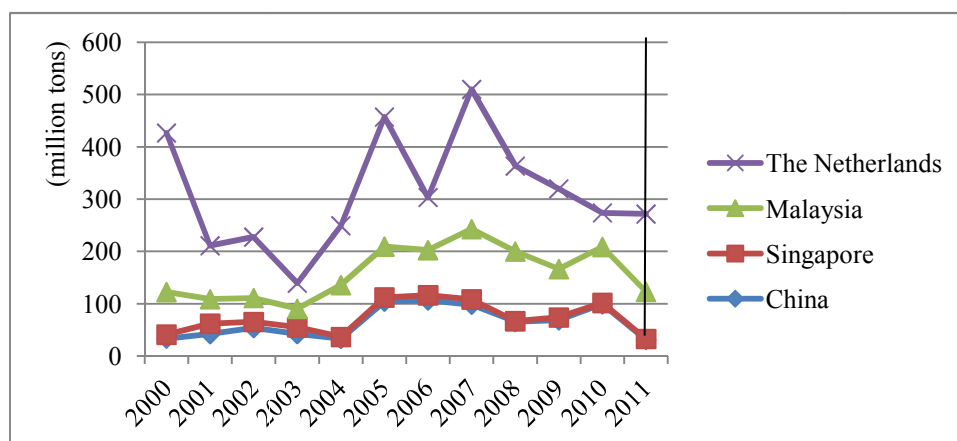
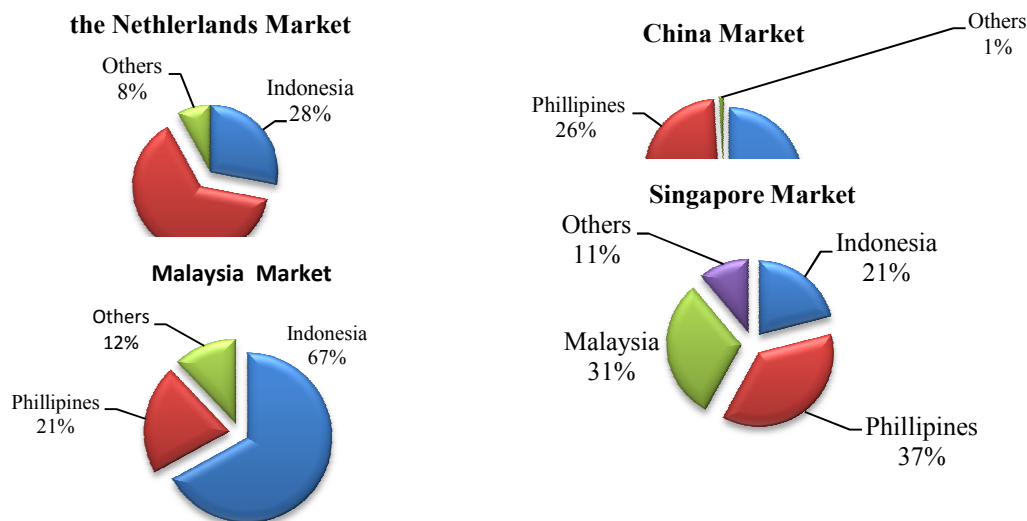


Figure 2: Growth of Indonesia's CCO Export Volume in the Neherlands, Malaysia, Singapore, and China 2000-2011

The CCO products share in the market Indonesia Export Destination Countries

The Indonesia's CCO exports is absorbed most by the Netherlands (35%), Malaysia (16%), China (12%), USA (9%), Spain (3%), and Singapore (2%), but the export market which will be discussed in this section is addressed to the four countries that used as the unit of analysis, namely the Netherlands, Malaysia, Singapore, and China. The Indonesia's CCO products share in each of these countries is as shown in Figure 3.



Figurer 3: Indonesia's CCO Market Share in the Four Countries 2000-2011

Products Export Development of Indonesia's CCO

The average export price of Indonesian CCO varies in each country importers though minor variations. Highest average is in the Singapore market, which is 0.71 U.S. \$ / kg, whereas CCO exporters in this country much more than other countries, namely Malaysia, the Philippines and Indonesia. This suggests that the country's demand for the product is high CCO. Lowest price in the market namely China 0.68 U.S. \$ / kg. This value is even lower than the average world price is 0.72 U.S. \$ / kg. Indonesia's export prices in the Dutch market and Malaysia respectively is 0.70 U.S. \$ / kg and 0.69 U.S. \$ / kg. The average export price of Indonesia which was formed in four countries thus is 0.69 U.S. \$ / kg. Developments in the export price of each importing country can be seen in the following graph (Figure 4). Fluctuations in the price of each country are generally influenced by the CCO world export prices also fluctuate.

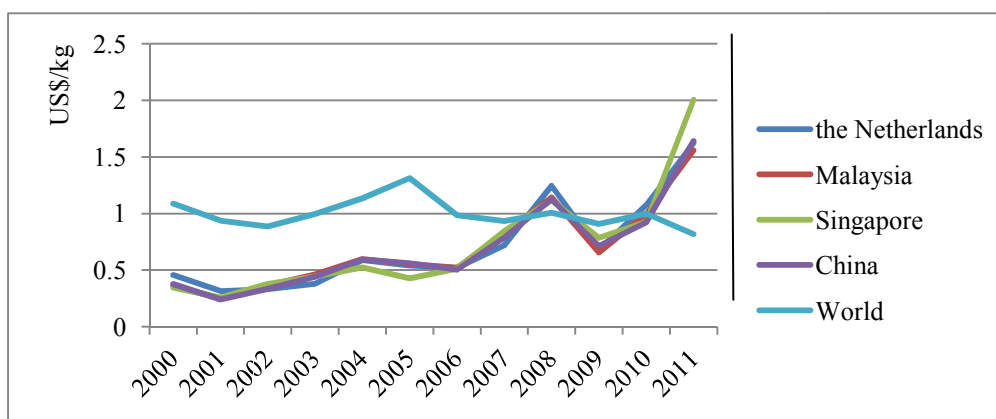


Figure 4: Indonesia's CCO Export in the Netherlands, Malaysia, Singapore, and China Year 2000-2011

Determinants of Export Demand of Indonesia's CCO

The results of the panel data regression analysis with eViews 5.1 software on the factors that influence the demand for Indonesian CCO exports can be seen in Table 2. The table shows that the coefficient of determination (R^2 -adjusted) is 0,997. It means that there is a 99.7% variation in the volume of Indonesia's CCO exports can be explained by the independent variables, while the rest is explained by other variables that are not included in the model. The analysis also showed that the value of the F-test has a probability of 0.000. This value is much smaller than the value of the confidence level of 1 percent. This suggests that the independent variables in the form of export prices of Indonesia CCO, the real exchange rate against the currencies of the importing country, the importing country's real GDP per capita, population of the importing country, Indonesia's CPO export price and export price of Philippines CCO simultaneously affect the volume of Indonesia's CCO exports at

the confidence level 99 percent.

Table 2: Analysis results of panel data regression FEM method with eViews 5.1

Variable	Coefficient	Std. Error	t-statistik	Prob.
C	26.48577	9.481590	2.793390	0.0081
Px	-0.572374	0.326337	-1.753938	0.0875*
NTR	-1.168132	0.473873	-2.466584	0.0183**
GDP	1.128909	0.464577	2.429970	0.0199**
Pop	-2.934190	0.931772	-3.149044	0.0032***
Py	-0.605661	0.040902	-1.593302	0.1194 ^{ns}
Pz	0.516256	0.380130	12.62163	0.0000***
Fixed Effect (Cross)				
China	10.71667			
Singapore	-8.970973			
Malaysia	-0.642138			
Netherlands	-1.103564			

Note:

*** = Significant at 99% confidence level

** = Significant at 95% confidence level

* = Significant at 90% confidence level

ns = Non Significant

The data analysis produced the following equation:

$$\ln Q_{it} = (\text{Cross}_i + 26.48577) - 0.572374 \ln PX_{it} - 1.168132 \ln NTR_{it} + 1.128909 \ln GDP_{it} - 2.934190 \ln Pop_{it} - 0.605661 \ln PY_{it} + 0.516256 \ln PZ_{it} + e_i$$

The estimation results in Table 2 also shows the effect of regional differences on export demand of Indonesia CCO is the value of the fixed effect cross section (countries). China is a country that has the highest value differentiator. This suggests that the exports volume of Indonesia's CCO to the country has the highest average change of 37.20. Countries that have the smallest effect is Singapore with an average change of 17.51. This gives the conclusion that China is the most potential export destination market of Indonesia's CCO among the four other countries.

The Indonesia's CCO export prices (Px) has significant effect at the significant level of 10 percent with a regression coefficient value of -0.572. This means that a 1 percent increase in price would reduce demand for Indonesian exports amounted to 0.572 percent CCO assuming of *ceteris paribus*. The changes in demand that is lower than that of the price change show that the elasticity of CCO exports price is inelastic. CCO is classified as intermediate products or half-finished goods with other ingredients become the input to its processing company. The decrease in the export price of Indonesian CCO will not increase the production capacity of the company so that the response to the demand of the CCO will be small.

Indonesia's CCO export prices in four Indonesia's CCO importing countries is always worth less than the Philippines CCO exports price (Table 3), but the exports price competitiveness of Indonesia coming from comparative advantage of cheaper labor and abundant of natural resources resulting in low of procurement cost. Competitiveness derived from comparative advantage is feared to decrease in the future. It is because of wages increasing from year to year, an increase in electricity tariff (TDL), a reduction in fuel subsidies and higher demand of domestic oil due to the diversity of derivative oil products. These will increase the production cost of CCO processing so that the exports prices will be higher in the international market.

Table 3: Comparison between the average CCO export price of Indonesia and the Phillipines

Country	Export price of Indonesia CCO (US\$/kg)	Export price of the Phillipines CCO (US\$/kg)
China	0.6869	0.7145
Netherlands	0.7134	0.7155
Singapore	0.6909	1.2195
Malaysia	0.7058	0.7290

Future export competitiveness according to Tambunan (2001) will be no longer determined by comparative advantage, but by the competitive advantage that is the advantage based on technological know-how and expertise. Bank of Indonesia (2013) states that the technology level of processing copra into crude palm oil at the small and medium scale categorized medium and tended traditionally managed so that their business efficiency and productivity is still low, in addition, the CCO product of Indonesia according to Lay and Patrik M Pasang (2012) comes mostly from copra which is smoked. Smoked copra at high temperatures and uncontrolled will produce brown copra, smelling of smoke and much part of it is burned. The resulting oil is rancid oil, dark brown in color and high of free fatty acid, 1-5 percent. Coconut oil with these characteristics are less favored by some

importing countries.

Exchange rate variable (NTR) significantly affect the demand for Indonesia's CCO exports at 5 percent confidence level. The regression coefficient this variable is -1.168. This figure shows that the strengthening of the IDR against the importing country's currency by 1 percent, the demand for Indonesia's CCO exports will decrease by 1.168 percent by assuming other variables remain the same. It happens due to the appreciation of the exchange rate that makes Indonesia's CCO products become relatively more expensive in the international market.

Appreciation (depreciation) of the exchange rate is influenced by various factors, one of which is the inflation rate of a country. Country which inflation is relatively higher compared to other countries then it would tend to weaken its currency. This is related to aspects of purchasing power parity. As inflation increases, the purchasing power parity will decrease. The increase in the price of domestic products will encourage people to seek alternative bids from other cheaper countries. The outcome was rate of domestic currency will weaken with the decrease in demand for domestic currency, while demand for foreign currency will increase (Halwani, 2005).

Real GDP per capita describes purchasing power of a country's population. The Real GDP of the importing country gives significant effect at the significance level of 5 percent. The value of the coefficient is 1.128. This value gives the sense that if the importing country's real GDP per capita increased by 1 percent, the demand for Indonesia's CCO exports will increase by 1.128 percent assuming the other factors are not changed (*ceteris paribus*). The importer's real GDP per capita are variables that influence most in increasing export demand for Indonesia's CCO.

Changes in demand higher than changes in real GDP per capita as an indicator of the average income shows that the elasticity average income of the importing country is elastic. This is understandable because both CCO and its derivatives are normal goods whose demand would increase with income because their purchasing power is increasing. CCO products in importing countries is used as raw material for food and non-food industries. Food industry that uses CCO one of them is coconut cooking oil, while the non-food industrial use CCO as a raw material is cosmetics, soaps, shampoos, creams and others. Increased demand for these products will result in the industry increase its output so that the import of CCO is greater.

The growth in real GDP per capita of Indonesia's CCO importer in 2001-2007 tended to increase, but in 2008 decreased even negative in 2009. The decrease was caused by a chained of financial crisis in America and Europe in 2008 and 2009. The crisis led to slowing economic growth and reduction of employment opportunities (National Development Planning Agency, 2011). China is the only one of four Indonesian CCO importing country's with positive real GDP per capita growth for the year. The crisis resulted in the decrease in export demand for Indonesia's CCO. The U.S. financial crisis in 2008 lowered demand for export all the importing countries that are analyzed. The highest decrease is experienced by the Singapore (84.96 percent). Europe's financial crisis in 2009 only impact on reducing demand for exports from the two countries, Malaysia and the Netherlands with a decrease respectively 30.56 percent and 6.00 percent.

Population variable of the importing country (Pop) significantly affect the demand for Indonesia's CCO exports at 1 percent confidence level. The regression coefficient was -2.934. This means that if the population of the importing country increase by 1 percent, the demand for the Indonesia's CCO exports will decrease by 2.934 percent by assuming other factors constant. This result is in contrary with the proposed hypothesis that is positive effect. This could occur because the population in the importing countries are not consumptive residents or in other words, the importing country population is productive so that when there is an increase in population, there will be an increase in production which will ultimately help the country to meet the needs of the country with its own merits and reduce imports.

The research result of Trung Kien and Hashimoto Yoshizo (2005) gives a similar result that the population of the importing country give doubles impact, positively and negatively. Negative impacts occur in countries that have a large population with an increase in income higher the absorption of domestic product. China is a case in point. The magnitude of China's urban population with rapidly per capita income growth makes the CCO domestic market growing. It is encouraging local manufacturers to produce more CCO. This can be evidenced by the data from FAO (2012) which show that in 2000 China's CCO production is only 3.43 tons then increased very rapidly by 10,174 per cent to 352.42 tons in 2011.

The variable of Philippine CCO export price is used to observe the effect of competitor price on the export demand for Indonesias CCO. The analysis showed that the effect of the export price CCO Philippines is significant at 99 percent confidence level. The Direction and coefficient value of the Philippines CCO export price variable is 0.516 in accordance with the proposed hypotheses. The values is interpreted that when the Philippines' CCO export prices increase by 1 percent, the demand for Indonesian CCO exports will also increase by 0.516 percent assuming *ceteris paribus*.

The results of the study reinforce the previous studies results by Malian *et al* (2005) that the decrease in the competitiveness of Indonesian CCO will increase the volume of exports of its competitors, namely the

Philippines and India. Philippines increased their exports of U.S. \$ 133.1 million, while India of U.S. \$ 17.1 million. The decrease or increase of export competitiveness of competitor countries are the main factors that decrease or increase the volume of exports of Indonesian CCO.

Indonesia's CPO export price variable does not affect the demand for Indonesian CCO exports at various confidence level that is used. This means that the decrease in CPO prices do not make the CCO oil producers switch to using CPO. This happens because of the decrease in CPO prices do not lower CCO products in the market, in addition, the higher lauric acid content of the CCO that is needed by the cosmetics industry do not make producers reduce the number of demand for CCO when the CPO prices decrease. Furthermore, Bank of Indonesia (2013) states that consumer preferences on cooking oil that is free of preservatives, such as cooking palm oil encourages CCO manufacturers to continue to increase their production.

Conclusion

This research comes to the following conclusions:

- 1) The Indonesia's CCO exports of years 2000 to 2011 in terms of volume as well as prices fluctuate and vary in different countries. It is due to the exports demand from each importing country that also fluctuate. Indonesia's export share in the world during the years 2000-2011 is at an average of 38 percent. Indonesia's CCO export share of the four countries analyzed respectively from the largest to the lowest are China, Malaysia, the Netherlands and Singapore.
- 2) Significant Factors determining the demand for Indonesia's CCO exports is Indonesia's CCO export prices, the real exchange rate against the currencies of the importing country, the importing country's real GDP per capita, population of the importing country and the export price of the Philippines CCO.

Recommendations

- 1) It needs the improvement in copra processing techniques, one of which is through the creation of white copra using oven dryers developed by Industry Baristand Manado. The technology is able to produce copra and crude coconut oil with better quality.
- 2) The variable of real exchange rate against the currencies of the importing country give effect on the CCO export demand, that Bank Indonesia needs to control the rate of inflation under the rate of inflation of the importing country.
- 3) The economic crisis that hit the U.S. and Europe led to a decreasing in the real GDP per capita in some importing countries of Indonesian CCO products, thereby reducing the amount of their demand, therefore the it is necessary to make diversification of export destinations of Indonesia CCO to countries with high and relatively stable real GDP per capita.
- 4) Farmers are advised to utilize the credit facilities provided by the government such as Food Security Credit and Energy (KKP-E) in order to overcome the problem of capital so that the productivity of coconut farming increased.
- 5) Further research is needed regarding the financial feasibility of coconut farming as a matter of consideration in distributing farming credit.

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