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Trading of Indonesian Crude Palm Oil Supply Chain and its Impact on Economic Growth: Implementation of Theory of Comparative Advantage and the Competitive Advantage of Nation

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ABSTRACT

The purpose of this study was to determine the effect of the volume and value of palm oil exports consisting of Crude Oil of Palm Kernel, Other Crude Oil of Palm Kernel, Solid fractions of refined palm kernel oil, Palm kernel olein, refined, bleached and deodorized (RBD) and Palm kernel oil bleached and deodorized against Economic Growth. This type of research is quantitative. The sample used is the development of Indonesian palm oil exports in the period 1970-2017. The analytical tool used is a structural approach which is completed with the WarpPLS Version 7.0 application. The results show that the export variables of Crude Oil of Palm Kernel, Other Crude Oil of Palm Kernel, Solid fractions of refined palm kernel oil, Palm kernel olein, refined, bleached and deodorized (RBD) and palm kernel oil, RBD have an effect on Economic Growth. Novelti produced by this research shows that oil palm production makes a significant contribution to economic growth in a country and this supports and strengthens the theory of theory of comparative advantage and theory of competitive advantage.

Keywords: Economic Growth, Crude Oil of Palm Kernel, Other Crude Oil of Palm Kernel, Solid Fractions of Refined Palm Kernel Oil
JEL Classifications: Q11, Q21, Q41

1. INTRODUCTION

Palm oil exports which consist of crude oil of palm kernel, other crude oil of palm kernel, solid fractions of refined palm kernel oil, palm kernel olein, refined, bleached and deodorized (RBD), palm kernel oil RBD (Talib et al., 2007, Rifin, 2010, Muda et al., 2016, Sihombing et al., 2017 and Putra, 2020). GAPKI (2018) released that in August 2018 it reached 3.3 million tons, the highest figure so far this year. Previously, in July 2018, palm oil exports were recorded at 3.22 million tonnes. Gapki (2018) also noted that the export performance of palm oil and its derivative products on an annual basis in January-August 2018 fell 2% compared to last year. Cumulative total, palm oil exports of 20.43 million in January - August 2017 fell to 19.96 million tonnes in the same period in 2018. In August, the highest export to India was 823 thousand tonnes, up 26% compared to July. This volume

is the highest volume in the history of Indonesia's monthly palm oil trade with India (Director General of Plantation, 2019). The trade dispute between India and the United States (US) provides an opportunity for palm oil to supply substitute vegetable oil from soybean oil. India has increased import duties on crude and refined products for soybeans, sunflowers, peanuts and rapeseed by 35% for refined products and 45% for crude grades, respectively. the increase in exports of palm oil and its derivative products to China also rose 26%, the US rose 64%, Africa increased 19%, and Pakistan was only slightly pushed 7% (Purba, 2020). Conversely, the decline in exports occurred to the European Union by 10%. Likewise, exports to Bangladesh fell 62% due to the high stocks of rapeseed and sunflower oil. production throughout August 2018 reached 4.06 million tons, down about 5% compared to the previous month which reached 4.28 million tons. The reason is that climatic factors and monthly production patterns are also

possibly caused by farmers not harvesting maximally due to low prices. Annually, the production performance of January - August 2018 reached 30.67 million tons, an increase of 19% compared to the same period last year which reached 25.85 million tons (Director General of Plantation, 2019). National stocks are still high enough that in some places they have affected the trade in palm oil or fresh fruit bunches.

Palm oil can be produced in various types of products, most of which are products that have a potential market share, both for domestic market share and export market share (Kustiari, 2018 and Ng, 2019). Several downstream products derived from CPO and PKO that have been produced and exported include the food category: cooking oil, salad oil, shortening, margarine, Cocoa Butter Substitute (CBS), vanaspati, vegetable ghee, food emulsifier, fat powder, and ice cream (Muhammad et al., 2019 and Vo et al., 2019). As for the non-food category, they are: surfactants, biodiesel, and other oleochemical derivatives. The potential of CPO as a raw material for the downstream industry is very much needed, to produce products with advantages that are safe and environmentally friendly when consumed (Rulli et al., 2019 and Mishra and Prasad, 2019). The government through the Ministry of Industry issued a downstream oil palm development policy as follows: (Robbani et al., 2015).

1. Oil palm downstream industry plays an important role in the national economy, especially as a foreign exchange earner, absorbing labor and providing basic needs for the community
2. Since 2006, Indonesia has become the largest producer of crude palm oil (MSM), which is a combination of CPO and PKO, in the world with a total CPO production of 16 million tonnes while Malaysia is only around 14.9 million tonnes. In 2008, the national CPO production reached 18.8 million tons while Malaysia was 17.7 million tons. In 2009, Indonesia's CPO production reached 20.2 million tons, and it is predicted that in 2020 it will reach 40 million tons
3. Based on Presidential Regulation No. 28 of 2008, concerning National Industrial Policy, the palm oil processing industry (MSM derivatives) is one of the priorities to be developed and has higher added value, such as the oleofood, oleochemical, energy and pharmaceutical industries
4. In Permenperin No.111/M-IND/PER/10/2009 concerning the Road Map for the Development of the Palm Oil Processing Industry Cluster, it is stated that the mid-term development of the Palm Oil Downstream Industry cluster (2010-2014) will be focused on Sumatra North and Riau and in the long term will be integrated in East Kalimantan, West Kalimantan, South Kalimantan and Papua (Republic of Indonesia, 2010)
5. The basic strategy for developing is to encourage the processing of crude palm oil (MSM) to third-product derivatives (including metallic salt, fatty amine, fatty alcohol, fatty amide) in the country, at least 50% of total national MSM production. before being exported in 2015.

So far, in Indonesia, several products of the downstream palm oil industry have been produced through refinery, oleochemical and biodiesel production activities (Lam et al., 2019). Every year the cooking oil industry processed through refineries often requires around 4-5 million tons of CPO as raw material. Currently, it is recorded that Indonesia has 94 refineries spread across 19 provinces. Apart from having the largest oil palm plantation in the world, Indonesia also continues to develop palm oil derivative industries, one of which is the oleochemical industry (Muda et al., 2018, Astari and Lovett, 2019). To date, in Indonesia there are nine basic oleochemical producers that produce fatty acids, fatty alcohol and glycerine. The installed capacity of fatty acids reaches 986,000 tons/year, fatty alcohol reaches 490,000 tons/year and glycerine reaches 141,700 tons/year (Robbani et al., 2015). Fossil-based energy sources, currently experiencing environmental constraints and faced with the depletion of reserves, the world is looking for alternative energy to replace fossil oil, one of which is biodiesel from palm oil (fatty acid methyl ester). The fact is that palm biodiesel has much lower emissions than fossil oil. Robbani et al. (2015) stated that in Indonesia there are around 20 palm biodiesel producers with a total installed capacity of 3.07 million tons/year. The purpose of this study is to determine the impact of palm oil exports on national economic growth.

2. LITERATURE REVIEW

2.1. The Economic Growth (Increase)
Measuring the ongoing economic growth in a country certainly has its own benchmarks. But generally, the benchmarks are gross national product or GNP and gross domestic product or GDP (Director General of Plantation, 2019). GNP has the function of measuring the amount of production expenditure of the national economy by all citizens of that country. So the amount of profit is calculated from the income generated by citizens of that country, both those who work domestically and abroad. GDP has a function as a measure of the rate of economic growth based on the amount of profit or income obtained from within the country. So the important thing is that the production area is still in the country so that it does not separate between the original citizens of the country or foreigners who work there, the most important thing is that they are still in the country. The calculation method is simple because many formulas have been used to determine the rate of economic growth. The GDP value for the desired year is then reduced by the GDP value for the following year minus one. After finding the results, the next step is divided by GDP before any changes. After finding the results, they are converted into a percentage and the results of the measurement of the country's economic growth are found. In a measurement of economic growth, of course, there are several indicators before including GDP and GNP which are the benchmarks for growth.

2.2. Theory of Comparative Advantage
The first theory about exports put forward by the expert is the comparative advantage yeori. This theory was put forward by David Ricardo. In this theory, he states that international trade or exports can occur if there are differences in comparative advantages of each country (Abiad and Teipelke, 2017; Alami, 2017, Bansal et al., 2017, Jaud et al., 2018, Murdock, 2019 and Davis and Dingel, 2020). Comparative advantage can be achieved if a country is able to produce a number of goods with a large volume but at a lower cost compared to other countries. Asirvatham et al. (2017) states that a country can generate a lot of profits by selling its comparative advantage to other countries, also consider

the inhibiting factors of economic growth. In addition, the income earned can also come from specialized production of goods or services that have high productivity and efficiency (Barnes, 2017, and Atmadji et al., 2018). In this case, of course, the main determining factor is the number of natural resources and human resources that are able to process them at low cost but produce a larger volume than other countries.

2.3. Demand Conditions

The condition of fever is a condition in which there is the nature of domestic demand for goods and services in certain industries (Brindha, 2017). This means that a product or service does not always have a high level of demand in the market. In this case, before being able to export, of course we have to consider the domestic market conditions (Darma and Hastiadi, 2017). Where if the fulfillment of the product is said to be sufficient for the domestic market then of course the product or service can be exported out (Desai, 2017 and Echeverri-Gent, 2017). In this case, sometimes the goods or services produced are not sufficiently attractive to the domestic market. However, it is different when these products and services are sold to the global market, the products are in great demand. This is the ability to read market demand conditions that must be relevant and in accordance with reality.

2.4. Related and Supporting Industries

In this regard, the presence and absence of an internationally competitive supplier industry and related industries in the country is also one of the things that influences exports. The existence of supplier and related industries will be very supportive, especially if the two industries are able to compete in the global market. In this case, the existence and absence of an internationally competitive supplier industry and related industries in the country is also one of the things that influence exports (Khan, 2017; Khorana and Narayanan, 2017). The existence of supplier and related industries will be very supportive, especially if the two industries are able to compete in the global market. Of course, this opportunity can

be used to establish cooperation in gaining a wider and bigger market in the international market.

3. METHODS

This type of research is the causality effect which explains the influence of a phenomenon. This research data is secondary data, namely secondary data time series from the period 1970-2017. The observations made were Indonesian palm oil exports to 82 countries around the world. The data analysis technique in this study was to test the effect with a structural approach. The operational definition and measurement of variables can be seen in Table 1.

Data processing techniques include the calculation of data analysis research models. Before making conclusions in a study, an analysis of the data must be carried out so that the research results are accurate. So this research was conducted using statistical methods assisted by the WarpPLS 7.0 program. The analysis in this study uses time series data in a period of time from 1970 to 2019.

4. RESULTS AND DSICUSSION

4.1. Results

4.1.1. Descriptive statistics
Based on the tabulation results as follows in Table 2:

Based on Table 2, this research will conduct descriptive statistical analysis first and then carry out all the testing stages required in PLS-SEM.

4.1.2. Hypothesis test
The models and hypotheses in this study will be tested using the partial least square-structural equation modeling (PLS-SEM) path analysis using WrapPLS software. PLS-SEM is used in this study because it does not require research data to be normally

Table 1: Operational definition and variable measurement

Variable	Operational Definition	Measure	Scale
Economic of Growth (Y)	Economic growth of goods and services in a country in the form of gross domestic product	The value of goods and services produced within a certain period of time	Ratio
Crude oil of palm kernel (X_1)	The export value of palm oil derivative products in the form of crude oil of palm kernel in one period (Jamaluddin et al 2019 and Lim and Biswas, 2019)	The amount in dollars is the export value for a specific country destination of palm oil derivatives in the form of palm oil derivative products in the form of Crude Oil of Palm Kernel in one period.	Ratio
Other crude oil of palm kernel (X_2)	The export value of palm oil derivative products in the form of other crude oil of palm kernel in one period	The amount in dollars is the export value for a particular country destination of palm oil derivatives in the form of palm oil derivative products in the form of other crude oil of palm kernel in one period in a certain country	Ratio
Solid fractions of refined palm kernel oil (X_3)	The export value of palm oil derivative products in the form of solid fractions of refined palm kernel oil in one period (Achoja et al., 2019)	Amount in dollars, the value of exports to a certain country destination of palm oil derivatives in the form of palm oil derivative products in the form of solid fractions of refined palm kernel oil in one period in one particular country	Ratio
Palm kernel olein, refined, bleached and deodorized (RBD) (X_4)	The export value of palm oil derivative products in the form of palm kernel olein, refined, bleached and deodorized (RBD) in one period	The amount in dollars is the export value for a specific country destination of palm oil derivatives in the form of palm oil derivative products in the form of palm kernel olein, refined, bleached and deodorized (RBD) in one period in one particular country	Ratio
Palm kernel oil, RBD (X_5)	Export value of palm oil derivative products in the form of Palm kernel oil, RBD in one period	Amount in dollars, the export value for a specific country destination of palm oil derivatives in the form of palm oil derivative products in the form of palm kernel oil, RBD in one period in a certain country	Ratio

Table 2: Descriptive statistics

Years	Crude palm oil (X_1)	Palm kernel oil (X_2)	Other crude oil of palm kernel (X_3)	Solid fractions of refined palm kernel oil (X_4)	Palm kernel olein, refined, bleached and deodorized (RBD) (X_5)	Gross domestic product (Y)
1970	216827	20480,46	5851,56	8777,34	7802,08	8057325
1971	249957	23732,94	6780,84	10171,26	9041,12	8623271
1972	269464	24830,82	7094,52	10641,78	9459,36	9230147
1973	289677	26894,7	7684,2	11526,3	10245,6	9978155
1974	347676	30695,7	8770,2	13155,3	11693,6	10739955
1975	397253	34068,72	9733,92	14600,88	12978,56	11274515
1976	431006	34784,82	9938,52	14907,78	13251,36	12050942
1977	457607	39053,28	11158,08	16737,12	14877,44	13106764
1978	501284	39734,1	11352,6	17028,9	15136,8	13993708
1979	641240	50619,24	14462,64	21693,96	19283,52	14018650
1980	721172	53738,58	15353,88	23030,82	20471,84	14502505
1981	800060	59085,18	16881,48	25322,22	22508,64	14810684
1982	886820	65951,76	18843,36	28265,04	25124,48	14910791
1983	982987	69054,72	19729,92	29594,88	26306,56	14974364
1984	1147190	103891,62	29683,32	44524,98	39577,76	15297926
1985	1243430	108551,94	31014,84	46522,26	41353,12	15797690
1986	1350729	119081,76	34023,36	51035,04	45364,48	15819564
1987	1506055	134000,58	38285,88	57428,82	51047,84	15904232
1988	1713335	143920,14	41120,04	61680,06	54826,72	16439771
1989	1964954	165013,38	47146,68	70720,02	62862,24	1671846
1990	2412612	211597,26	60456,36	90684,54	80608,48	1955972
1991	2657600	286699,4	44107,6	93728,65	66161,4	2274502
1992	3266250	290822,48	44741,92	95076,58	67112,88	2598845
1993	3421449	313159,08	48178,32	102378,93	72267,48	3297758
1994	4008062	414199,24	63722,96	135411,29	95584,44	3822197
1995	4479670	489872,76	75365,04	160150,71	113047,56	4545141
1996	4898658	455563,92	130161,12	195241,68	173548,16	5532568
1997	5448508	460014,66	131432,76	197149,14	175243,68	6276958
1998	5930415	498154,86	142329,96	213494,94	189773,28	9557535
1999	6455590	542269,56	154934,16	232401,24	206578,88	10997316
2000	7000508	588042,84	168012,24	252018,36	224016,32	1389,77
2001	8396472	703783,92	201081,12	301621,68	268108,16	1440,406
2002	9622345	769048,98	219728,28	329592,42	292971,04	1505,216
2003	10440834	883983,24	252566,64	378849,96	336755,52	1577,171
2004	10830389	952253,82	272072,52	408108,78	362763,36	1656,517
2005	11861615	1039303,44	296943,84	445415,76	395925,12	1750,815
2006	17350848	1457471,4	416420,4	624630,6	555227,2	1847,127
2007	17664725	1483836,9	423953,4	635930,1	565271,2	1964,327
2008	17539788	1473342,36	420954,96	631432,44	561273,28	2082,456
2009	19324293	1623240,78	463783,08	695674,62	618377,44	2178,851
2010	21958120	1844482,08	526994,88	790492,32	702659,84	6864,133
2011	23096541	1940109,36	554316,96	831475,44	739089,28	7287,635
2012	26015518	2185303,68	624372,48	936558,72	832496,64	7727,083
2013	27782004	2333688,42	666768,12	1000152,18	889024,16	8156,498
2014	29278189	2459367,96	702676,56	1054014,84	936902,08	8564,867
2015	31070015	2609881,26	745680,36	1118520,54	994240,48	8982,511
2016	31730961	2665400,64	761543,04	1142314,56	1015390,72	9434,632
2017	37965224	3189078,9	911165,4	1366748,1	1214887,2	9912,749
Averarage	8708873,458	8708873,458	8708873,458	8708873,458	8708873,458	8708873
Max	37965224	37965224	37965224	37965224	37965224	37965224
Min	216827	216827	216827	216827	216827	216827

Sources: Director General of Plantation. (2019). Statistics of Indonesian Plantation for Palm Oil Commodities 2017 - 2019. Directorate General of Estate Crops. Republic of Indonesia. Jakarta

Table 3: Path coefecient and P value

| Path coefficients						
	CPO_X1	PKO_(X2)	OCOP(X3)	SFR_(X4)	PKOR(X5)	GDP_I(Y)
GDP_I(Y)	−0.448	2.265	−8.405	−2.493	−12.634	
P values						
	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Sources: WarpPLS 7.0 Result (2020)

distributed, it can process research data with various types of measurement scales (Kock, 2019). PLS-SEM can also be used in research with a small number of samples (soft modeling). The problem of improper solution and factor indeterminacy can be avoided by using PLS-SEM (Kock, 2020b). Research models that do not have strong theoretical support can also be built with the help of PLS-SEM (Kock, 2020b). The use of PLSSEM also has a clear basic concept and design that has been tested and continues to be developed for more than 30 years so that it can overcome various substantive problems that arise in research such as model interaction analysis, hierarchical model analysis, heterogeneity analysis and multigroup analysis. The results of the WarpPLS Version 7 application are presented as follows:
a. The path coefecient and P value

Based on the test results, it shows that the path value is as follows show in the Table 3:

Based on the Table 3 show the test results, it shows that the pa value of each variable is the export value of palm oil which consists of crude oil of palm kernel (X1), other crude oil of palm kernel (X2), solid fractions of refined palm kernel oil (X3), palm kernel olein, refined, bleached and deodorized (RBD) (X4) and palm kernel oil, RBD (X5) have a significant effect on economic growth (Y). This is because the significance value of the p value is all <0.05. This shows that Ho is rejected and Ha is accepted. Visually this is presented in Figure 1.

Figure 1: The model of equation
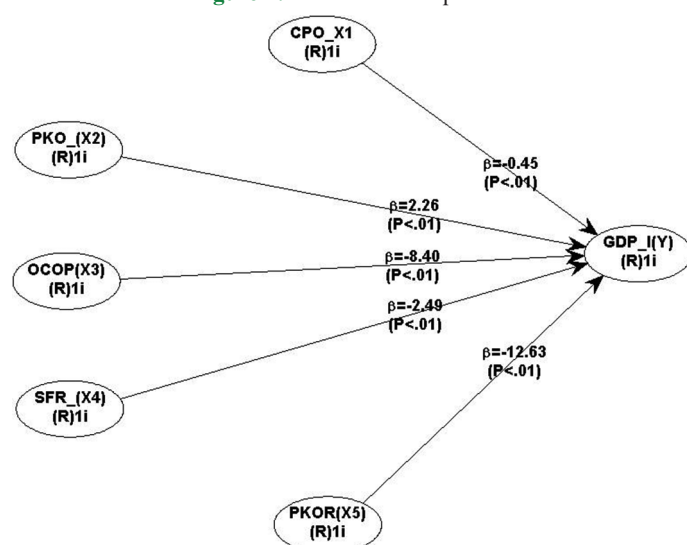
Sources: WarpPLS 7.0 Result (2020)

Based on Figure 1, it also shows that there is an influence on the overall variables used.

Table 4 shows the adjusted R Square value of 19.38%, which means that the variation in the influence of the relationship between variables is 19.38%, while the remaining 80.62% is influenced outside the variables used (Kock, 2020). In addition, the Rohatgi-Szkely and Klaassen-Mokveld-van Es indicators are a unimodality test tool which states that each variable has one mode (Kock, 2019).

4.2. Discussion
Based on the test results, the oil palm commodity is a natural resource that can be relied on. This supports the theory of competitive advantage, also known as competitive advantage, where the ability a country gets through its characteristics and resources can have a higher performance than other countries in the same industry and market. The era of globalization has an impact on the increasingly widespread competition in the global market. This, of course, creates intense competition for market players in the economic sector. In this case, of course, more selling value is needed so that of course it can grab attention from the international market. This theory was promoted by Michael Porter in his book entitled competitive advantage (1985). The theory states that one way to win the competition is to have a competitive advantage. Sustainable competitive advantage is a form of strategy for economic actors to maintain their survival. Competitive advantage is the term used by large-scale companies, so of course this is the main thing that must be owned to be able to compete in the international market. With this theory, we will be able to better understand how to optimize competitive advantage in order to penetrate the global market and be able to provide maximum benefits. In addition, this study supports the Comparative Theory. The theory of comparative advantage was promoted by David Ricardo in his book Principles of Political Economy and Taxation (1817). although a country is less efficient than another in producing the two types of commodities it produces, there is still a basis for trading that benefits both parties. The theory of absolute advantage cannot be used as a basis for international trade if one country has absolute advantage over both types of commodities. If one country has an absolute advantage over both types of commodities, then trade will not occur. However, with the comparative advantage theory, international trade between two countries can still take place even though one country has an absolute advantage over the two types of commodities.

Table 4: Standard errors and effect size value

Standard errors						
	CPO_X1	PKO_(X2)	OCOP(X3)	SFR_(X4)	PKOR(X5)	GDP_I(Y)
GDP_I(Y)	0.118	0.059	0.006	0.054	0.001	
Effect sizes for path coefficients						
GDP_I(Y)	0.418	2.096	7.493	2.247	1.326	
Adjusted R-squared coefficients						
						19.38%
Tests of unimodality						
Rohatgi-Szkely	No	Yes	Yes	Yes	Yes	Yes
Klaassen-Mokveld-van Es	Yes	Yes	Yes	Yes	Yes	Yes

Sources: WarpPLS 7.0 Result (2020)

5. CONCLUSSION

The results show that the export variables of crude oil of palm kernel, other crude oil of palm kernel, solid fractions of refined palm kernel oil, Palm kernel olein, refined, bleached and deodorized (RBD) and palm kernel oil, RBD (X5) have an effect on economic growth (Y). Novelti produced by this research shows that oil palm production provides a significant contribution to economic growth in a country and this supports and strengthens the theory of Theory of comparative advantage and theory of competitive advantage. In addition, the strength of this research compared to other research is that the palm oil commodity is only owned by a few countries in the world such as Indonesia and Malaysia. So that the results of this research have high novelty.

6. ACKNOWLEDGMENT

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